
a Weekiy journal of practical infornation, art, Science, mechanics, Chemistry. and manufactures.

Molecular Motion the Fundamental Problem of
It is thought by the advocates of the physical school that, although at present we are unable to explain how organic nature can be built up by the play of the ordinary chemical forces, yet at some future day when we shall have come to know far more of molecular physics than we do at present, then we may be able to explain the my of the physical theory of life. But it is, asys Mr. Croll, in a late number of the Philosophical Magazine, a mental delusion, a dream which will never be realized.
sion, a dream which will never
It is from the effects produced It is from the effects produced
that we know that that mode of that we know that that mode o molecular motion called hea differs from that mode called electricity. The effects do not as yet enable us to determine wherein this difference consists but it enables us to conclude with certainty that there is a difference.
Effects which are electrical we refer to that unknown mode o motion called electricity. We do not refer them to that mode called heat, because the effects are different from those which we ascribe to heat. Each mode of motion, each energy, is distinguishsd by the effects which it produces. Determination of the molecules of matter accord ing to the objective idea of a plant or an animal is an effect which is constantly taking place in organic nature. To attribute this effect to electricity, for example, would be far more absurd than to attribute electrical effects to gravitation or to heat; for the difference between this effect and any electrical effect is immeasurably greater than be immeasurably greater than beeffects produced by heat, or by effects produced by heat, or by gravitation, or by any other of the forces of inorganic nature It would be far more rational to attribute all the phenomena of the inorganic world, say, to heat, than to attribute the de termination of molecular motion in the organic world to chemical and physical energies.
Nothing which can be determined by the comparative an atomist, no biological research es, no microscopic investiga tions, no considerations regard ing natural selection or the survival of the fittest, can solve the great problem of nature; for it lies in the background of all such investigations. The all such investigations. The problem is mocular. From the hugest plant and animal on the globe down to the smal est organic speck visible under the microscope, all have been |scope, and the high magnifying power of which it will admit built up, molecule by molecule. and the problem is to explain this molecular process. If one plant or animal differs from another, or the parent from the child, it is because in the building-u pprocess the determinations of molecular motion were different in the two cases; and the true and fundamental ground of the difference must be sought for in the cause of the determination of molecular motion. Here in this region, the doctrine of natural selection and the struggle for existence can afford no more light on the matter than the fortuitous concourse of atoms and the atomical philosophy of the ancients.

Locating the Great Refracting Telescope. The United States Coast Survey Bureau is about to locate an elevated astronomical station, somewhere among the Sietra Nevada mountains. The San Francisco Bulletin says that Professor Davidson, of the Coast Survey, is experiment ing near Summit Station, at an elevation of 7,200 feet above the sea, to determine the relative importance of great and small altitudes in the use of the telescope for investigations of physical astronomy. It is understood that he has been completely successful, and will recommend a location about

10,000 feet above the sea, near the line of the Central Pacific Railroad, from which it can be readily reached by a short and easily constructed wagon road. Professor Young, of Dart mouth College, has been experimenting with larger instruments at Sberman, on the Rocky Mountains, at an elevation of 8,242 feet above the sea.
The results of these observers will be presented in reports that will probably lead to the locating of the twenty seven inch refracting telescope at one of these elevations. The lenses for this telescope are being ground by the Messrs. Clark, of Cambridgeport, Mass., for the United States Government, at an expense of nearly $\$ 50,000$. With such a tele-


## WILDER'S PATENT PUNCHING AND SHEARING MACHINE.

 one year.the use, there is not over one or two nights per year on the low Atlantic coast where it could be used with its highest magnifying powers. On the Sierra, with the long freedom from clouds, many more favorable opportunities must exist for observations, and we may look forward for marvelous revelations in physical astronomy.

Progress of Attantic steam Navigation.
The California is the name of a new steamship, lately arrived at New York, belonging to the Anchor line, plying between New York and Glasgow, Scotland. The California was built and finished at Glasgow, Scotland, during the present year, by Alexander Stephens \& Sons, and is an iron screw steamer of $3,287 \cdot 08$ gross tuns, is 361.5 feet in length 40.5 feet in beam, and 24.5 feet depth from tunnage deck to ceiling, and 315 feet from upper deck to ceiling. Her beam being so great makes her a very safe and easy vessel at sea. She has two compound vertical direct-acting engines, with one cylinder 103 inches in diameter and one 57 inches in diameter, with 4 feet stroke of piston, working up to 1,047 H. P., and built at the Finnieston Steamship Works. Her steam power is generated in six boilers, tested to a pressure
of 70 lbs ., and a donkey boiler for supplying steam to the windlass, winch, and other labor-saving engines.
The second of the new fleet, the Victoria, a sister ship to the California, has just been launched, and the Bolivia and Ethiopia, of 4,500 tuns each, are well forward. Three other steamers are in frames, viz., the Eutopia, Castilia, and Italia, making in all seven steamers, of over 23,000 tons in the aggregate, and valued at $\$ 500,000$ each, all to be built within

PAT ENT PUNCHING AND SHEARING MACHINE.
Perhaps in no branch of metal working has there been greater progress than is shown in the manufacture of all de scriptions of punched and tamped ware. There are, in fact, but few of the myriad of metal articles found upon the shelves of our hardware and house-furnishing stores which re not, in some stage of their manufacture, subjected to the action of a machine of this lass. That high degree of kill which was necessaiy to produce each article is now made available through these machines, in producing a thousand articles precisely alike, and at a price very low in comparison with forme times, when such work wa done by hand.
Our illustrations represen three forms of mactines mad under patents granted to Moses G. Wilder, bearing date June 27,1871 , and May 28, 1867 (re ssuued June 27,.1871.)
Fig. 1 is known as Wilder's patent combined punching and hearing machine. This appa ratus is made to punch hole hree fourths of an inch in did meter in iron one half inch hick to the center of a inch nch sheet, and will of a fort nch sheet, and will shear hal nch iron to the center of hirty-six inch sheet. It is constructed in two forms, on with a plain fly wheel of larg size, as shown in the engrav ing, for use where a somewha rapid motion is possible. The other, with a geared driving rain, permits a slower motion of the purch and increases the power of the machine, so that when geared, it will punch three fourths inch holes in hree fourths inch iron, and will shear three fourths inch latesor bars. The ongravin plates or bars. The engravin hows both the punch an shearblades in position, thoug this is never the case when the machine is in use. Th punch and upper shear blade
re so arranged that either may be removed instantly or re placed with perfect certainty. Thedie and lower shear blade
remain fixed at all times, except when it is necessary to remain fixed at all times, except when it is necessary to
change the size of the holes to be punched or to sharpen the shears.
Among the advantages claimed for this machine are that its form is such that it may be set back against a wall or par tition, instead of in the center of the shop •floor, as is now the case with the ordinary combined punch and shears. Ow ing to the peculiar manner of combining the punch and shears in one pair of jaws, instead of making the machine double, it can be sold at a low price, while it has every ca. pacity for work. The machine may be run continuously or arrested after each movement, or may be arranged to stop at any point in the reyolution. The distribution of metal is such that the machine is rigid and stiff, and does not spring perceptibly in doing its heaviest work
In Fig. 2 is shown another form of these machines, such as is used for punching sheet metal into the great variety of shapes required by brass and hardware manufacturers, silversmiths, tinners, etc., in cases where rapidity of movement is of more importance than great power. The die is held in any suitable manner upon the bolster plate, A. This, in its held in the lower part of the slide die bed, B . The punch is as that, when the slide descends, it will enter the die, cutting out a piece from any material previously interposed between it and the die, and of the precise form of the latter. Motion is given to the slide, C , by an eccentric or crank wrist on the front end of the shaft, $D$, through a pitman or connection, E , which is pivoted at its lower end to the slide, C, and which, at its upper end, surrounds the crank, D. The shaft, $D$, receives motion from the flywheel, F, which runs loosely upon it and is connected to it by the sliding bolt of the stop motion, $G$, when the treadle, $H$, is depressed by the foot of the operator. This sliding bolt is so formed that, when the press is at rest, the pressure of the operator's foot forces it into engagement with the wheel positively. As the press starts, this bolt, which is fitted to slide back and forward in an arm or reinforce, $I$ (which is keyed rigidly to the shaft, $D$, and or reinforce, I (which is keyed rigidly to the shaft, D, and
revolves with the shaft), also revolves with the wheel and revolves with the shaft), als
shaft. The stop bolt is moved shaft. The stop bolt is moved
back and forward by means back and forward by means
of a sliding cam plate, which of a sliding cam plate, which
is fitted to the frame of the is fitted to the frame of the
machine at G. This cam machine at G. This cam plate bas a channel way with iaclined faces through which the stop bolt passes in each rovolution. These inclined faces act upon the bolt to move it by the treadle worked by the operator. The cam plate is connected to the treadle by means of an ec treadle by means of an eccentric gear working upon a
fixed stud placed in the side fixed stud placed in the side of the frame, a toothed sec tor which acts upon the gear and a pmall rod to connec this sector to the treadle, H Inside of the frame is a counter weight which acts upon the treadle rod, at $J$, to lift the treadle, $H$, when the operator's foot is removed When the treadle is de pressed, the press starts and will continue running while the treadle remains down When the fcot is removed the weight at J operates to move the cam plate back move the from the arm, I. The it enters the channel bolt, as in thers channe way in the cam plate, is withdrawn, releasing the wheel, F , and the press stops, remaining at rest until the treadle is aguin depressed. The parts of this stop motion are strong and simple in form and work wholly without springs.

The pitman, E, is pivoted to the slide, C, at its lower end by an eccentric wrist pin, K. This wrist pin revolves in bearings in the slide, $C$, and forms the fulcrum for the pit. man through which the latter moves the slide. Where sur rounded by the pitman the wrist pin is eccentric to its journals. When the wrist pin is revolved, it changes the hight of the pirot or fulcrum relative to the punch, and thus not only varies the distance to which the punch is depressed in working, but also compensates for the wear of the latter and of the die. The front end of this wristpin is enlarged, and is made with a toothed periphery as a worm gear, and is so arranged that, by turning the worm which is carried in journals formed upon the slide, $C$, the punch may be raised or lowered to any desired extent.
Fig. 3 shows a geared press of the same size and descrip tion as that shown in Fig. 2, but having a geared train such as would be used where the rapid motion of the plain flywheel would be objectionable.
These presses are now made in a large variety of forms, adapted to all kinds of work, by the New York Steam Engine Company, 121 Cbambers street, New York, to whom application should be made for further information

## The Hartford Steam Boiler inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections for the months of June and July, 1872
During these months, 1,680 visits of inspection were made, and 3,449 boilers examined- 3.371 externally, and 1,336 inter nally-while 357 were tested by hydraulic pressure. The deferts in all discovered were 1,804 , of whic! 347 were re garded as dangerous. These defects were as follows:
Furnaces out of shape, 78-18 dangerous; fractures, 180$90 \mathrm{~d} \ell \mathrm{n}_{\mathrm{j}}$ erous. These defects have been geverally around the heads and fire sheets. Some instances bave been discoverd where mud drums have been badly burned. This comes about frequently from malconstruction. The sheet to which the water leg connecting with the boiler is attached should over lap the sheets on either side, so that any steam generat. ed in the mud drum may find easy escape into the boiler. If, on the contrary, the sheets on either side of the water leg over lap, the point of escape to the boiler is depressed by the thickness of one sheet, and steam generated in the drum will
turn, is fastened by bolts to the die bed, B. The punch is accumulate at the higher points on either side and remai ${ }^{\mathrm{n}}$
accumulate at the higher points on either side and remai ${ }^{n}$ having no means of escape. By thus keeping the water from
contact with the iron, the plate may become badly burned and consequently fractured. Mud drums are so situated that they are frequently subjected to intense heat, especially on the top. Burned plates, 127-54 dangerous; blistered plates $253-27$ dangerous ; sediment and deposit, 293-20 dangerous incrustation and scale, 328-13 dangerous; external corro sion, 129-28 dangerous; internal corrosion, 54-22 danger ous; internal grooving, 43-8 dangerous; water gages defec tive, 68-12 dangerois; blow-out defective, 20-15 danger ous; safety valves overloaded and out of order, 46-14 dan gerous. It takes a long time for some engineers to under stand that when a safety valve leaks steam, it is kept from its seat by some foreign substance, or that it needs grinding. If an engineer does not understand how to properly manage his safety valves, he should seek information at once. During the past month, a case was found where the engineer had
 of the first disk may be estimated. ion of the luminous effects.
ond disk forms a vernier, by which the one sixth of a division
The spark appears in the focus of the lens of a collimator which gives the rays (passing to the vernier) a direction paral el to the axis of rotation of the movable disk. On the oppo site side of the disks, a small telescope is placed for observa

If the spark has an inappreciable duration, the observe may either see a bright line or he may not. In the forme case, the spark appears at the moment of coincidence of a line on the movable disk with one on the fixed disk; in the latter case, the spark appears between two coincidences. There is, however, a certain probability of coincidence o hes and spark, depending on the breadth of the lines on th disks, and also the number of those on the vernier. This ha been determined experimentally for the apparatus now con sidered, and found equal to 0.70 ; that is, if an instan taneous spark be produced at any instant, th3n, out of 100 instances, it will give bright line 70 times, while 30 times it will give none.
Suppose, now, the dura tion of a spark is a little greater than that of the passage of a line on the movabl disk before two lines on the vernier: then, if the com mencement of the spark hap pens at the instant of the first coincidence, the brigh line from this coincidence will (owing to persistenc of imrrasion on the retina ontinue visible at the tim the secon cincidence nd two lines will thus $h$ seen of once.
If, with the same duration the spark commences be tween two coincidences, it will have ceased when th third arrives. And thus ther will only be one bright line that from the second coin cidence. In this way (as th ommittee point out) ther may be either one or two bright lines for the same du ration of spark. But if the duration of the spark b greater than that now apoke of, it will be comprised be tween two numbersed be valy determined the diff easily determined, the differ ence of which is equal to the time elapsing between two successive coincidences. A very close approximation may be arrived at, and the inventors of the method show that, in virtue of the above mentioned probability
cut a brace and driven it between the safety valve lever and the joist over head. When inquired of for a reason for such practice, he said " $i$; was to save steam!" Let every engideer say, "Such shall never be my practice." Pressure gages de fective, 195--28 worthless. These defective ones varied from -7 to +35 . It will be readily seen that a steam gage 20 or 30 pounds out of the way is a very unsafe boiler attachment Gages should be frequently compared with some standard or gage known to be correct. These attachments are very much neglected as a general thing. Boilers without gages, 19-5 were running very high pressure, and hence were regarded as dangerous; deficiency of water, 12--6 dangerous; braces and stays broken, 41-23 left the boilers so poorly supported and securad that they were in a dangerous condition; mud drums condemned, 4 ; steam drum condemned, 1 ; boilers con demned as beyond repair, 12

## Duration of Electric Spark

Two methods have hitherto been employed in the deter mination of this. One is that of Wheatstone, in which a small mirror is made to rotate at a high velocity round an axis in its own plane, and the image of the spark is observed in it. In this way the discharges from batteries have been made to give images elongated in the direction of rotation; showing a censible duration in the spark. By measuring the elongation and the velocity of rotation, the duration may be ascertained
The other method is that of Arago, in which a disk with white sectors on a dark ground is made to rotate about an axis perpendicular to its plane, and the enlargement of the sectors in the light of the spark affords a means of determin ing the duration of the latter.
MM. Lucas and Cazin recently described to the Paris Acad emy a method which gives somewhat more precise results, and on which a committee of the Academy have reported favorably.
They employ a movable disk (made of plates of mica), the rim of which is situated between the observer's eye and the spark. On the rim are traced very fine lines, transparent and equidistant, and which are obtained by photographic reproduction. This disk is placed before a second opaque disk fine lines, comprising six divisions, with a width which is equal to five divisions of the movable disk, so that this sec
of coincidence, by noting the total number of lines observec from a given number of sparks, and the velecity of rotation the duration of the spark may be pretty accurately deter mined.

We cannot see at the aame time more than a limited num er of coincidence lines, so that if they exce
By duration of the visible spark is to be understood the time elapsing between the instant at which the spark com mences and the instant when, owing to a diminution in lu minous intensity, it ceases to illuminate sufficiently the lines of the apparatus, so as to give a sensible image to the ob erver. The entire duration may be much greater.
The committee further remark that the duration of the spark being determined by the number of coincidences seen by the observer, if the degree of illumination of the lines were much diminished, it is to be feared that the number of coincidences would not diminish equally, in consequence of the enfeeblement of the light corresponding to the end of the discharge. And they think it would be of use to ascer tain the effect of variations in luminous intensity, as in discharge between electrodes of various metals, placed at differ ent dietances, in gases at different pressures
The proposers of the method have not been able to make appreciable the duration of a spark from an ordinary ma chine; but they found the duration of the discharges of con densers varies with the surface of these, with their arrange ment, and the resistance of the circuit. It varies, also, with the striking distance, the nature of the balls, and the humidthe striking distance, the nature of the balls, and the humid-
ity of the air. In general, the duration increases with the ity of the air. In general, the duration increases with the
condensing surface, and with the distance between the balls, and diminishes with the length of the circuit.
The limits of duration, given by their observations, are four millionths of a second, and eighty six-millionths of a second, with a possible error of one millionth of a second.
When two or more colors are mixed together, the hue produced does not result from the loss of the particles of either of the colors by absorption or chemical changes of any kind. The microscope reveals the fact that minute particles of each color remain entirely separate.

A NEW green pigment, said to be brilliant, is composed of twenty parts of oxide of zinc and one of sulphate of cobalt, mixed inte a paste with water, and exposed to a red heat.

## a list of velocities.

Dr. E. Hartig, one of the professors of the Royal Polytechnic School at Dresden, has recently published a catalogue of the various velocities at which machinery, etc., should be run, as well as of the speeds at which many natural phenomena take place. The following is a translation of Dr. Hartig's list, made for this journal by Dr. Adolph Oit, who commences by giving the following explanation of the figures: The velocities given in the following list are indicated in meters per second, and are arranged progressively by the figures. One meter being $39 \cdot 37$ inches, very nearly, it is only necessary to multiply the number with the values expressed, in order to convert them into the denominations in use in this, country. For example: $0 \cdot 11$ meters (the usual average cutting velocity in turning wrought iron) is equal to $0.11 \times 39.37=4.33$ inches. The notation officially adopted in the German empire is for meter, $m$; for decimeter, dcm ; for centimeter, cm ; for millimeter, mm . The great completeness and the excellent selection of the list appended, which contains many numbers otherwise difficult to obtain, give it a lasting value.
0.010 Average velocity of the burning of Bickford's fuse
0.015 Velocity in turning the outside of case-hardened cyli ders.
0.015 Most preferable peripherical velocity of iron roll trains and rail bending machines.
0.018 Average velocity of the movable shear blade in parallel shears, and of the punch in a punching machine.
0.025 Working velocity of the opener (willow) and beater for cotton, measured at the licker-in
0.030 Average peripherical velocity of the screw tap and dies in screw cutting engines.
0.040 Average working velocity of shearing machines.
0.040 Working velocity of the twisting frame for short wool. $0 \cdot 050$ Average cutting velocity in turning, boring, and planing steel.
0060 Peripherical velocity of the rotary cylindrical rag boiling apparatus, used in paper manufacture.
0064 Average working veiocity of the doubling machine for silk.
0070 Greatest velocity of water at which deposits of mud and fine sand (to the size of one half mm. for quartz) in ivers are not carried off (Telford, Rittinger)
0.075 Working velocity of paper machines in making strong pastebcard, according to Püschel.
0.080 Average working velocity of the gig mill (cloth manu facture).
0.080 Medium cutting velocity in turning, boring, and planing cast iron.
$0 \cdot 10$ Best working velocity of sheet iron rolling machines. 0.10 Medium working velocity of cloth drying machines with endless stretching chains (Semper)
010 Velocity of an ascending water current, whereby an gular quartz grains of 1 mm . in size are retained in fallng suspension (Rittinger).
0.11 Average cutting velocity in turning, boring, and plan ing wrought iron.
0.13 Average working velocity of cloth brushing machines
0.14 Working velocity of shear machines for short wool
0.14 Velocity of an ascending water current, in which angular quartz grains of 2 mm . size are retained in suspension (Rittinger).
015 Greatest velocity of water whereby deposits of rich clay in rivers are not carried away (Telford)
0.15 Medium cutting velocity in turning, boring, and plan ing hard brass.
019 Velocity of an ascending water current, in which an gular quartz grains of 4 mm . size are retained in falling suspension (Rittinger).
0.20 Working velocity in drawing the strongest iron wire.

021 Peripherical velocity of paper rollers in the smeothing machines of paper mills (Püschel).
0.24 Proper working velocity of the pitch chain of a river dredging engine.
025 Peripherical velocity of wood when turning it off with hand tools.
0.33 Best working velocity of steam drying machines for cotton fabrics.
0.35 Best peripherical velccity of the cutter in cutting cast iron and wrought iron cog wheels
0.35 Working velocity of the paper machine in making thin writing paper (Püschel)
0.40 Medium velocity of the water in the upper and lower channels of hydraulic motors.
044 Best cutting velocity of the chisel in mortising ma chines.
0.47 Best peripherical velocity of rollers for breaking ores (Wertheim)
Proper velocity of the oxen in the whimsey.
0.63 Greatest velocity of the water in rivers whereby deposited sand of 10 mm . size is not set in motion. (Telford, Rittinger).
0.67 Greatest admissible velocity of the shuttle with a silk weft.
067 Most advantageous velocity of the elevators for grain.
$\begin{array}{ll}0.67 & \text { Most advantageous velocity of the elevators for grain. } \\ 0.70 & \text { Medium peripherical velocity of bruising mills for oil }\end{array}$ seeds.
0.75 Most ad̉antageous velocity of the hackle bars in flax heckling machines.
0.75 Average working velocity in calendering fabrics.
0.75 Most advantageous velocity of cranks turned by man ual power.
Most advantageous peripherical velocity of revolving cutters and rotary shears.
0.80 Most advantageous velocity of an ass in a winding $\in \mathbf{n}$ gine
0.82 Greatest admissible peripherical velocity of the sieves in the concentration of ores (Rittinger). sey.
maximum velocity of water whereby round peb et in motion (Telford, Rittinger).
0.95 Average velocity in descending and ascending pit shaft. pressure pipes of singly acting piston pumps. a porking velocity of pase
Alo
Malan fulling milla
machines and fullo mills.
Peripherical velocity of the pressing rollers in wool drying machines.
$1 \cdot 30$ Working velocity in drawing fine iron wire. march ( 108 steps of 0.732 m . length per minute) and with full laggage ( 20 kilogrammes). yarn. horizontal road
Most advantageous peripherical velocity of rail rolls merchant iron bars
3 Greatest velocity of the water in rivulets and river in which conglomerates and slate are not set in mo tion (Telford). pressure pipes of double acting piston pumps.
7 Greatest admissible velocity of the shuttle for short wool (Streichgarn).
180 .
80 Most advantageous velocity of chain steamboats in dead water.
2•20 Most advantageous average velocity of the shear blades of reaping machines (Perels).
30 Most advantageous velocity of fulling rollers for cloth 44 Highest admissible velocity with which oats, bran flour, etc., may be transported on an endless cloth without being scattered by the air.
250 Average cutting velocity of veneer saws.
250 Most advantageous peripherical velocity in rolling re fined iron.
2.50 Highest admissible velocity of the shuttle for combed wool yarn.
2:54 Highest admissible velocity in pits for the descent of miners.
heavy and clean grain on an endless cloth. 00 Highest admissible peripherical velocity of the rollers in wire mills.
00 Peripherical velocity of the cutters of the culling willows in spinning carded wool.
33 Highest admissible velocity of the shuttle for cotton yarn. cylinder in long shear machine cylind
50 Most advantageous velocity of street gas in pipes
3.68 Higheat admissible velocity of the drawing in pits fo the ascent of miners.
4.00 Velocity of the air at a fresh breeze.
4.00 Highest admissible peripherical velocity of drills in wood.
4.00 Average velocity of river steamers in still water.

50 Most advantageous peripherical velocity of the drum in Taylor's catton opener.
Average peripherical velocity of the cutting tool in cutting toothed wheel work.
75 Relative velocity between cloth cylinder and brushing cylinder in brusbing machines for cloth.
Average velocity of marine steamers.
$5 \cdot 00$
for grinding chisels. for grinding chisels.

10 Average peripherical velocity of the cylinder of ing machines for sheeps' wool.
Average peripherical velocity of the cylinder in break ing, and fleece cards in sp:nning, short wool
6.50 Average peripherical velocity of the cylinder in the manufacture of paper. cutting machines.
Most advantageous peripherical der in the cotton carding engine. Most advantageous peripherical velocity of the grindstones of Voelter, which are now being used for the converaion of wood into paper pulp.
10.0 Highest advisable peripherical velocity of millstones 0 Most advantageous peripherical velocity of fine grained grindstones.
10.0 Most advantageous velocity of the blade in endless saws. 100 Medium peripherical velocity of the large grindstones in machine shops.
10.0 Most advantageous velocity of the air in the conduit pipes of blowing engines.
125 Highest admissible velocity of the freight trains on the German railways.
13.5 Most advantageous peripherical velocity of the cylin
der of the breaking card and finishing card for hemp. 5.0 Medium peripherical velocity of the cylinder in the openers in wool spinning mills.
15.0 Most advantageous peripherical velocity of emery wheels for polishing and finishing off.
15.0 Velocity of the air in very high winds.
18.0 Most advantageous peripherical velocity of the catter heads of wood shaping machines.
18.0 Medium flying velocity of the carrier pigeon

0 Highest admissible velocity of passenger trains on the German railways.
25.0 Highest admissible velocity of express trains on the German railways.
25.0 Highest admissible peripherical velocity of large grindstones, consisting of the best material, in ma grindstones,
chine Ehops .
25.0 Most advantageous velocity of the driving rope of cranes, in the system of Ramsbottom.
270 Most advantageous peripherical velocity of the emery wheels in saw sharpening machines.
30.0 Velocity of the transmission of the irritation in the sensatory and motatory nerves (Preyer).
35.0 Highest admissible peripherical velocity of a cotton beater.
35.0 Medium flying velocity of the swallow (Sonnet),

370 Flying velocity of the eagle (Simmler).
400 Most advantageous velocity of circular saws for wood and hot iron.
50.0 Most advantageous peripherical velocity of centrifuga machines for woolen cloth and other fabrics.
600 Highest peripherical velocity of the tappets in the at trition mill of Carr, for pulverizing the hardest mate rials.
75.0 Most advantageous peripherical velocity of the cylinders of rag devils in the manufacture of shoddy.
332. 77 Most probable value of the velocity of sound in open dry air at a temperature of $32^{\circ} \mathrm{Fab}$., according to th computation of Schroeder van der Kolk (1865) from the experiment made in 1823 by Moll and Fan Beck at Utrecht.
7,26375 miles. Velocity of voltaic currents in telegraph wires, according to experiments made by Plantamout and Hirsch.
$11,433 \cdot 55$ miles. Velocity of induction currents in telegraph wires, according to experiments made by Plantamour and Hirsch.
185,164 miles. Velocity of light, according to experiments of Foucault.
288,0048 miles. Velocity of the discharging current of a Ley den jar in a copper wire of 1.70 millimeters thickness according to Wheatstone.

## Distillation by Cold.

Alfred H. Smee, the inventor of the voltaic battery named Alfred H. Smee, the inventor of the voltaic battery named
after him, has communicated to the Royal Society a method after him, has communicated to the Royal Society a method
which he has devised, and which he names "distillation by which he has devised, and which he names " distillation by
cold," by which he believes the detection and determination cold," by which he believes the detection and determination
of ammonia and other organic impurities existing in the at of ammonia and other organic impuri
mosphere will be greatly facilitated.
A glass funnel-usually of 8 or 9 inches-is drawn to point and closed. It is supported in an ordinary stand, and filled with ice. Condensation of the watery vapor of the at mosphere then takes place; the dew collects into drops, which trickle down the outside of the funnel, and at las fall from the point, under which a small receiver is placed to catch them. The total quantity of liquid collected in a given time is measured, and the quantity of ammonia determined by Nessler's test.
By the method of distillation by cold, the author found it possible to distil many substances which are decomposed at a high temperature. Thus many delicate odors of flowers were distilled by placing the flowers under a bell glass suff ciently large to cover the funnel containing the ice. The odors were found to be more rapidly and completely ab stracted by placing a dish with a little ether under the bell glass at the time of distillation.
The paper was accompanied by tables giving the results obtained in 107 experiments, together with the atmospheric conditions prevailing at the time. The experiments were made in a garden, in a bedroom, in hospital wards, in the open country, etc. A few of the numbers obtained are here given by way of example:

| Fluid collected, | Ammonia ingrs. | Source. |
| :---: | :---: | :---: |
| 150 | 1.9742 | Erysipelas. |
| 120 | $0 \cdot 1791$ | Garden. |
| 55 | 6.8807 | Drains. |
| 90 | 2-1000 | Bedroom. |
|  | 2:9568 | Stables. |
| 150 | $0 \cdot 0985$ | Victoria Park |

The celebrated cathedral of Canterbury, England, was badly damaged by fire on September 3. The same sort of carelessness that has led to the destruction of many other valuable public buildings by fire was the occasion of the present injury, namely, a charcoal furnace, used by workmen who were repairing the roof, was accidentally upset. men who were repairing the roof, was accidentally upset.
One hundred feet of the roof was completely destroyed. This One hundred feet of the roof was completely destroyed. This
cathedral is one of great antiquity, dating back to A. D. 500 ; cathedral is one of great antiquity, dating back to A . D.
many important historical events are with it associated.

Two new locomotives have recently been put in use at Connellsville, Pennsylvania, for regulating purposes, or fon making up trains. These locomotives have bumpers on both ends, the tender is done away with, and water is carried in a tank placed over the boiler. The fireman's fowt board is so made as to hold sufficient fuel for several wars'.consumption.

## IMPROVED FLUSH STRAP HINGE:

The chief defect of the ordinary straphinge; such as is used for hanging trap or scuttle doors, has been that the joint made by its two parts forms a projection above the floor or roof which, being very easily overlooked, proves a stumbling block and thus a cause of troublesome accidents. To remedy this difficulty, the invention shown in our illustration is devised. It consists of whatis known as a flush strap hinge, so constructed as to present a perfectly smooth surface and be hardly observable when the door is closed, while it permits the latter to be swung all the way back when opened.
Fig. 1 shows the device in perspective; Fig. 2 is an edge Fig. 1 shows the device in perspective; Fig. 2 is an edge
view with the door, A, closed, and Fig. 3, a similar view with the door open. Referring to all three engravings, B and C the door open. Referring to all three engravings,
are the straps of the hinge, on which are formed are the straps of the hinge, on which tightly enclose the pivot pins. $D$, shown more clearly in Fig. 1, is a clasp, which is received in the openings cut in the parts of the straps which form the eyes, and the ends of which are bent around and move freely upon the pivot pins. It will be seen that a double joint is thus formed whereby the hinge when extended as in Fig. 1 presents on its upper portion a uniformly flat surface. E is a plate attached firmly to the strap, C, and projecting under the eye of the strap, B. Its object, as shown in Fig. 2, is to receive and support the inner edge of theclosed door. Fig. 3 plainly represents the location of the different parts with the door open and also shows the movement of the hinge in permitting the door to be thrown flat back, the clasp, $D$, working freely around the pivot pins and eventually assuming with the latter a perpendicular position.

This useful invention, which will doubtless attract the attention of architecte and builders, is manufacturễd by the Stanley Works at New Britain, Conn. Patented through the Scientific American Patent Agency, January 3, 1871, by J. S. Jenness, of Bangor, Maine, of whom, or by addressing Mr. A. T. Young, agent, 139 Federal street, Boston, Mass. further information may be had.

## GOLD PEN MAKING.

Pure gold, pure silver, and pure copper are the materials from which the alloy used in the manufacture of gold pens is made. Gold alone, from its softness, cannot be used, but combined w th the baser metals, in degrees of 14, 16, and 18 carats, it forms a composition of great harảness, durability, and elasticity.
If the reader will accompany us in imagination through one of the manufactories in this city, the largest perhaps of its kind in the world, owned by Messrs. Mabie and Todd, we will endeavor to point out the many ingenious processes through which the metal, or rather the alloy, passes from the time it undergoes its first melting to its final exit into the world in the shape of finished pens.
Our attention is first called to the uncombined metals; vir gin gold in little irregular shaped nuggets so soft as to be easily scratched by the thumb nail, silver in like form, and copper in odd pieces of wire and thin plate. Into a delicate pair of scales, certain portions of each of these metals are thrown. A nice adjustment of weights, a few. seconds of wavering of the beam, and, the operation being finished, the contents of the scale pan are handed over to the melter. This workman we find busily engaged in blowing a small charcoal fire made in an open furnace. As soon as a fierce heat is obtained, a hole is raked in the coals and a small crucible containing the metals placed in the fiery bed. More coal is heaped on, the blast is made stronger, and we can see the crucible gradually turn white hot as the fire increases. Meanwhile, the workman is preparing his mold, two simple pieces of iron which, fitting close together on their edges, leave a space between for the shaping of a small ingot. T'his he places conveniently at hand, and then, with his tongs, lifts the crucible from the fire: Out flows themetal, a liquid stream of dazzing brilliancy. A moment of waiting, the mold is opened, and a dull yellow ingot lies before us; seizing it with his pincers, the melter thrustsit among the coals. This is the annealing process, and we watch the bar gradually turn to a deep cherry red. Then it is quickly withdrawn and plunged, hissing, into a bath of very weak sulphuric acid water. It cools quickly, for not a minute seems to elapse before the ingot is placed in our hands for examination. It is about a foot long, two and a half inches wide, and about three sixteenths of an inch thick. Its value is about $\$ 250$. A small set of rolls, which a workman has been adjusting during our inspection of the ingot, is now ready. The machine is set in motion, and into it passes the bar of metal: once through, it is very slightly flattened but not much changed; back again, the workman tries it with his gage, but it is far too thick. It goes between the rollers again and again, until finally the before solid bar is but a thin ribbon of elastic metal. . Thin, we say, but still much too thick for its final condition in the shape of pens.
Thus prepared, the gold is passed to another operative who proceeds to cut it into blanks; that is to say, he holds the ribbon under a small press, in which a punch and a die of the proper shape and size are fitted. By this means, the first crude form of the pen-the blank-is cut out in the shape shown in the engraving, A, Fig. 1. The ribbon of metal, af ter these pieces are removed, is more particularly intended to be shown by this illustration, the blanks being so cut out as to economize material to the greatest extent.
A quantity of blanks being completed, the next process is to fit them with so-called "diamond" points. A gold point
would wear away almost immediately; even platinum is in capable of resisting the friction of constant use. Conse quently the point of the pen is tipped with a very hard sub stance: not diamond, as is popularly supposed, for these gems could not be soldered to the gold and could only be attached by a setting which would render the pen useless to write with: but iridium, a rare grayish white mstal furnished for the purpose in fine grains, costing about $\$ 150$ per ounce. I is generally obtained from gold.bearing ore, and is often found in the bottom of crucibles after gold has been melted in them. It is separated from the latter metal by the action of aqua regia which dissolves the gold, leaving the iridium untouched. By another process, the gold thus put in solu tion is regained. To place the iridium point, the blank must be fitted to receive it. This is done with great rapidity by a


## JENNESS' FLUSH STRAP HINGE.

small revolving stone which cuts a piece from the end of the blank, as shown enlarged in Fig. 2. Some twenty blanks, being thus prepared, are ranged on a table before a work man, who, with the aid of a lens, selects bits of iridium of the proper size to fit the points. These bits he places in the notches before cut, together with a drop of a solution of borax and water. Then picking up each carefully, he spreads he blanks along on a piece of charcoal, and brings to bear by means of a blow pipe, upon every point an intense flame.
The gold around the nibs is thus fused, and the borax, formThe gold around the nibs is thus fused, and the borax, form-
ing a flux, flows around and solders the iridium firmly into position. The blanks are next passed through sets of rolls until they are squeezed into the shape shown at Fig. 3, the metal, of course, being rendered much thinner by the com pression. The rolls employed are steel cylinders, on the lower one of which is an arrangement whereby the iridium point of the blank is prevented from receiving any pressure, as in such case it would be crushed or broken. In their pres

of a hammer, tue object being to give them temper, elasti pun hardness. They are then placed under another punch which, descending, forces the metal into a die, whence it emerges shaped as shown in Fig. 4, a small projection termed a "tit" being left at the end in order to guide the pen during subsequent operations. While the pen is in this condition, the manufacturer's name, its number, etc., are stamped upon it
If the reader will examine an ordinary gold pen, he will notice that its shape is peculiar, that its middle portion is constructed on a curve of much greater radius than the upper part, while around its nibs and point the metal is almost flat. In order to cliange the pen from its present form-a
simple flat blank-to the required shape, a very ingenious machine is used. Described briefly, it consists of a convex plunger, of a length equal to that of the pen, which fits into a concave die of steel placed beneath it. The blank being laid above this lower die, the plunger descends upon it, forcing it into the concavity of the former; at the same time two
concave horizontal hammers strike the pen at either side hus turning up its edges around the vertical plunger. A perpendicular section of this instrument is outlined in Fig. 5 A is the plunger, B , the die below, $\mathrm{C} C$, the horizontal ham mers, while the section of the blank is shown in position be ween the parts.
So far as form goes, our pen is now complete, but it is a useless as ever as a writing implement. The slit at the points is yet to be cat. This is done by very thin circular sheets of refined copper, covered with fine emery flour and oil and revolved with great rapidity. Each sheet is held by clamps, which are dressed to perfect trueness. Agrainst th edge, the point of the pen is pressed; and in a few revolu tions, it is cut through. This process requires the utmost ac curacy and delicacy of percention, as the slit must be direc ly in the middle, a cobweb's breadth to either sid ly in the midde, a cobweb's breadth to either side
ruining the pen. A steel knife fixed in a kind of hand stamp next lengthens the slit, the uppe end of which is cut square by means of a rapid ly revolving and extremely fine saw.
The pen now passes to the grinders. These men have before them a number of copper cyl inders, of varying diameters, which are covered with a paste of emery and oil. To these the points and sides of the pens are held. As fas as a little metal is removed, the pen is tried and the somewhat tedious process is continued until the operator is satisfied that his work is com plete. The inside of the pen is then smoothed with a kind of steel burnisher, and finally a cut ting wheel is allowed to rotate for a second or two in the slit to remove any roughness which may remain. The pen is next polished by hold ing it against revolving cylinders made of cir cular layers of felt. The outside surface of the cylinder is composed of the edges of the layers and is covered with a mixture of fine Germa tripoli and candle wax. The inside of the pen which cannot be reached by this method, is burnished by a small revolving spindle covered with cotton and jeweler's rouge. Rubbing with Scotch hoye roughens or frosts the metal inside of the nibs, and so pre vents the ink flowing too rapidly to the point. Lastly, the pen is sent back to the grinder, who sets the nibs and ad justs the pen to write with perfect smoothness. Nothing now remains to be done but to pack the finished pens in boxes and send them to the market.
The bar of gold, which we first saw cast and which we val ued at $\$ 250$, is now made into pens worth $\$ 350$, and yet ove 40 per cent of the metal has been lost or unused during the processes of manufacture. The unused gold is in the form of scraps and cuttings, which are remelted. Ten per cent however, of the entire amount of the gold brought into th factory is irretrievably lost. It is carried off in fine particle on the clothes, disappears in the machines, is blown away by drafts, and, in fact, it is hardly known what becomes of it Every year a large quantity of metal is reclaimed from the water the workmen wash in, from their working clothes and from the sweepings of the factory. In the establish ment visited by us, where 60 hands are employed and 1,500 pens are produced weekly, eighty dollars worth of gold ha been found in the dirty water during a period of six months, and it is estimated that $\$ 1,500$ is yearly reclaimed from the sweepings and refuse.

Curious Preservation of a Dead Body.
At South Bend, Ind., the body of a deceased lady, buried ten years ago, was lately uncovered for re-interment, when the corpse was found to be in an excellent state of preserva tion. Although petrification had not taken place, the body was as perfect as the day it was .placed in the coffin. The whole body was perfectly preserved, even to such parts a the tongue, which could be moved back and forth in the mouth. The expression of the face was retained and the colo of the flesh was natural, except for its waxy appearance The shroud, when exposed to the air, fell to dust.
If the chemical nature of the soil were known, and also the medicines administered during the sickness of the de ceased, it is possible that the reason for this singular preserva tion might be ascertained. From the description given, it would seem as if it might be due to the presence of arsenic.

## White Building Stone

For a number of years, people have been aware of the ex istence of a valuable building stone, found between Glasgow Junction and Cave City, Ky., and have long been in the habit of resorting to its bed for the purpose of securing its rich treasures for hearth stones, window sills and step stones, and other purposes requiring a handsome and durable stone When first taken from its bed it presents a bright gray appearance, which, upon exposure, fades to a beautiful white slightly shaded with the faintest gray. A company has been organized under the name of the " Glasgow Granite Com pany," for the purpos
this peculiar stone.

Progress of Iron Manufacturing in Kentucky: A large furnace and nail factory is building at Ashland, Ky The capital stock of the new company is $\$ 700,000$, and nearly the entire amount has been raised. The furnace will have capacity for turning out fifty tuns of pig iron a day, to be converted into nails. Ashland and the district around it has been demonstrated, and is by iron men generally conceded, to be the place in the United States where iron can be most cheaply manufactured. It is beautifully situated on the Ohio river
city.

## GLASGOW UNIVERSITY BUILDINGS

The University of Glasgow (Scotland) having sold its old site and buildings to a railroad company, erected a new structure on Gilmore Hill, in the suburbs of the cily. Sir George Gilbert Scott was commissioned to prepare plans for the erection of a new building, large enough to accommodate the rapidly growing institution, to be built in a style worthy, both as to solidity and beauty, of the purpose for which it was destined. Of the extent of the new structure, some idea may be formed from our engraving. It is a large oblong rectangular pile, about 600 feet long by 300 feet wide, and dirided in the middle by a building which separates two quadrangles, each o which is about 180 feet square.

The great tower in the center forms the main entrance for the students; on the first floor is the cour room, with direct com munication into the great forehall. Be sides the belfry rosm, etc, in thock room, etc., in the up per stages, there is in the chamber in the sub-basement through which every hour $1,000,000$ cubic feet of fresh air are to pass, for the sup ply of fresh and hot air for the heating and ventilating of the whole building, the cold air chamber be ing fed through four large extraction shafts, in hight about 150 feet. The tower is 200 feet; the wood en spire, covered with lead and slate 110 feet high. With each class room is a professor's private room in connection with a mezzanine above, fitted up as a private library or museum as the case may be On the ground floo is the valuable collec tion of books and coins by Dr. Hunter from whom it derives its name, the Hun terian Museum. The library contains over 100,000 volumes, with extensive premise for workshops, etc. in the basement. Th attics are used fo model rooms and mu seum purposes. The professors' court, at the west of the col lege buildings, con sists of 13 houses. The stadents' recrea tion ground contains about 5 acres.

The dimensions of some of the principal apartments are as fol lows: Library, 129 feet by 60 feet; mu seum, 129 feet by 60 feet; central hall, 114 feet 6 inches by 70 feet; Latin, chemis try, natural history and Greek class rooms, each 40 feet by 40 feet; laborato ry, 52 feet 7 inche ry, 52 feet by 34 feet. mora by 34 feet; mora philosophy, 38 feet 10 inches by 34 feet physiology, 34 fee by 34 feet; medic jurisprudence, 34 feet
by 30 feet; small museums, each 30 feet by 22 feet 6 inches; ; a quantity of damp bay between the statue and the house, reading room, 73 feet by 51 feet. The amount expended is over two millions of dollars.

## PHOTOGRAPHIC HINTS.

It is sometimes desirable, if not necessary, that a photo grapher be able to take a picture of a specified object with out including in the view any other undesirable object, as, for ple, an old brick wall. The following method is exceed ingly suggestive, and, if skilfully managed, very good. W
once saw it practically tested by a photographer under th following circumstances:
In a certain garden in London, there is a beautiful statue of black marble which had been repeatedly brought under the "eye" of the camera, but always without pictorial success, on account of the close proximity of one or two trees and a brick house, which were only twenty feet behind the statue, and which invariably appeared in the picture with a Having been consulted by the proprietor, we suggested that the offensive brick building might be excluded from the view presented to the camera, either by placing a large background pren placing large backgroun
he smoke from which would obliterate the details of the latter. This advice was promptly acted upon; and the wind being in a favorable direction-that is, blowing from the direction of the camera towards the statue-three heaps of itter were quickly raked together and ignited, these being placed in a line about ten feet behind the statue and a few feet apart. A plate was now exposed, and, so fantastical had part that, when the photographer developed the picture, the statue stood out in excellent, nay brilliant, definition on a
background upon which neither trees or brick edifice were visible. The success of the experiment was most complete. In repeating this experiment, however, care must be take hat not a curl of smoke, even of the most delicate kind, be llowed to obtrude between the camera and the object being photographed, otherwise failure will be the certain result or smoke is frequently of a highly intense actinic color. British Journal of Photography.

Prices and qualities of Rubber Springs.
So long as the market price of crude rubber rules as high as it now does and is likely to do for some time to come the as it now does and is likely to do for some time to come, the
minimum price of a fair standard quality of spring cannot fall below fifty-five cents per pound.
The first essential of a good spring, says the National Car Builder is a suitable quantity of fine Para gum, pure and dry. A good quality of fine sheet Central Ame can may be used with the Para in proper pro portion. These will ab. orb a certain amoun of dry white lead and bolted whiting, but no more than is requise Sulphur is also use ulphur is alo ere its a vilcanizing gent, its action bein nalogous to that o east in bread making There is a definite and fixed relation between the quality of the pure crude gum and the quantity of foreign in redients necessarily ombined with it, not or the purpose of adul erating and cheapen ing, but to impart to the mass of material onstituting the spring body and solidity ould and solidity it ther way The any prings $f$ cheap arket do not conta more than tot er cent of good gum he remainder consist ing of coarse and infe rior grades, with old rub ber frequently mixed with it, and capable of absorbing a much great or quantity of adulter ing material tha good and fine gum.
The tenacity, power and durability of the spring are impaired jus o the extent that ba material enters into it composition, and the foreign ingredients are out of proportion to the rubber. Springs tan be made to weigh less b using less lead and more whiting, but the quali $y$ suffers in a corre ponding degree, as the lead has a metallic and durable body, and the whiting a perishabl one.
It requires but a very little figuring to form an idea of the adulteration of low priced prings. Fine Pararub ber is worth to-day ighty-five cents in the arket, and fine Cen ral American shee dive cent and the difference beand the difores and he lowest spring quo tations indicates ver clearly the nature of

THE Chicago and Aton Raliroad Company have just com pleted, and are now running as day express on their road one of the most complete trains in the world. It consists of a baggage and mail car, four coaches, and a palace dining car. It is equipped with Thornton's spark arrester and patent dust shield, Goodale's steam brake, Creamer's safety brake, Black stone's patent platform and coupler, and Reniff \& Buttolph's ventilators. The managers announce'that the whole road will shortly be equipped in the same way.

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The Edttors are not responsible for the opinions expressed by their Corre spondenis.

## Theology and sclence

To the Editor of the Scientific American:
As a constant reader of your paper, I was very much grieved and disappointed by your editorial on "Science and Theology" in your issue of Sept. 7, 1872.
I presume, indeed, upon what I know of scientific editori als in religious papers, that your criticisms may have been just with regard to the editorial which called forth your remarks; but I must strongly object to the style and facts of your reply.
Why do you entitle the Bible a "mutilated and obscure tradition?"' Why do you treat that figure of speech, so often used not only in the Bible but everywhere else, called "anthropomorphism" (or representing God as man) as an "absurd assertion" and a "blasphemous idea?" That science has helped, and most wonderfully helped, to a true interpretation of the Bible cannot be denied. But why charge upon theologians a constant change in their interpretation of the Bible, while it is equally true that scientists have been as constantly changing their interpretation of Nature?
You and your readers will know what I mean when I say that the theory of "a single creative act," which has ever since been successively developing its principle in necessary results, is essentially of deistic, and not C'hristian, origin.
Again I would ask: Why do you as a scientist undertake to "judge the teachings of theology, and to decide which are true and which are erroneous?" It seems to me that an attempt to judge of theology from a scientific standpoint isjúst as absurd as to judge of science from a theological stand point and while you have been shocked yourself, as I have often been, with the mapping out of the Deity, so prevalent in the so called "orthodox" churches of the day, I have been shocked, as F doubt not many of your readers have been, with the whole style and manner of this editorial of yours, which only repeats the language and shows the spirit of cer tain scientists of the present day. Men who will labor days, weeks, months, and even years on a small point respecting molecular motion will after wards, in the most careless, heedless and flippant way, dogmatize upon prayer and miracles, and the method of the Divine government. Nothing is more untheological than for men to theologize about science, and nothing is more unscientific than fur men to scientize about theology.
But I do not stop here. I am willing to join issue with you on your statements as to facts as follows: "Theology trught that the earth was flat," "that the earth was a stationary center," "science proved that the earth was formed many that at no time have theologians asserted any thing different from what has been the accepted faith of scientists them selves, and that what was finally developed into the Copernican and Newtonian system was, since Christ, first originated among the Christian "theologians," as you call them. In St. Augustine's writings, you will find the antiquity of the earth suggested, and the very interpretation of the Christian narrative, which scientists pretend to despise as modern make shifts, announced, more than thirteen centuries ago.
Indeed I think that it may be proved by actual quotations that the Copernican system was promulgated, as a theory, by Christian theologians against the objections and the ridicule of the scientists of their days
In fact, whether this can be done or not, it does appear, to me at least, a gross misrepresentation of facts to state that theologians have made these assertions with any more confidence than scientists have made them themselves; or that they are the cast-off clothing of theology, rather than of philosophy.
The advance of science to day is as antagonistic to the sci ence of yesterday as it is to the theology of a thousand years ago. How lately was the fixedness of species a doctrine alike of theologians and scientists? But now behold we have the new doctrine of the evolution of species, held by both. It is just as difficult to harmonizg the two theories as to harmo-
nize the old with that new theology which is growing up nize the old with that new the
around our scientific progress.
A few months ago you had a most excellent editorial on these very subjects, but now you have taken the unscientific position of the anti theologians, which you then denounced. Why is this? A Theologian and also a Scientist.

The One Hundred Thousand Dollar Canal Boat Prize.
To the Editor of the Scientific American :
I have been a constant reader of your valuable paper for almost six years, and in that time I have not seen anythin s in the paper to displease me until last evening, after returning from Buffalo. I picked up last week's paper, and saw therein an article headed "New Canal Steamer," giving a flattering account of Captain Goodmin's boat now being built at Buffalo. One would naturally infer from the account th
Captain Goodwin's boat would certainly win the reward.
Captain Goodwin's boat would certainly win the reward.
Such articles have a tendency to discourage other compe Such articles have a tendency to discourage other competi-
tors for the prize, who make the remark that, if friends tors for the prize, who make the remark that, if friends
and relatives, money and secret orders are to have influence with the commission, the sooner that inventors who have not these advantages withdraw from the field the better, because the expense of building a boat for compatition is great.
Besides, there is the opposition that an inventor meets around Buffalo and other ports. For instance, a man has his boat completed and removed from the docks; while going to some place of leyel water for trial, some littls tug with a
loaded boat will smash into her, giving her no chance fo getting out of the way. It is ten chances to one that th damaged boat must return to the dock to repair, at the in ventor's expense. These things are done because, if steam should be used on canal boats, the tug business will not be more than half as good as it was. These oppositions are enough, without their being backed up by such articles as that in No. 9 of present volume of the SCIENTIFIC AMERICAN If the papers would but state the speed, construction, time of building or changing from the old canal boat, it would be a help to all instead of a detriment.

Now, as to the boat, it was distinctly urderstood by all that the boat was not to exceed 90 feet in length, nor 18 feet in width, because old canal boatmen say that some of the present locks (not all) are too small to let a boat exceeding these dimensions through. If this is the case, how is the Goodwin boat of 96 feet in length, together with the wheel in front and the peculiar construction in the rear for the connec tion of other boats, going to get through? Again, the law says the construction must be applicable to the old canal boat; and on the Goodwin plan it cannot be $£ 0$ with a boat carrying 240 tuns, or much over 210 tuns; but if new canal boats of such extensive dimensions as the Goodwin be permitted, others, of many principles, can carry 250 or 275 tuns. Bat most in ventors want to come to the requirements of the law as near y as possible.
I hope you will take no umbrage at this little statement o he feelings of many inventors.
Fagundus, Pa .
a Compettror.
[We are surprised that our correspondent should fiod any hing in the article he mentions to justify a suspicion that friends, relatives, money and secret orders" would be able to irfluence the commission, or a statement that we have " backed up" the conduct of the Buffalo tug boat men. Will he please read the article again? Captain Goodwin mus suffer the loss of his time, trouble and money if his boat is too long.-EDs.]

## Detection of Sulphuric acid in Vinegar.

## To the Editor of the Scientific American

The question as to the value of a prescription, for the chemical manipulation of a common test, depends on its practical cature and by no means on the fact that a roundabout operation may be defended by an ingenious scienti fic reasoning. In the name of common sense, I ask what practical chemist, when he obtains several samples of vinegar to test for adulteration with sulphuric acid,will commence with going through all the operations described on page 120, of evaporation, cooling, trituration with alcohol, filtration, dilution with water, again evaporation, again filtration, and acidulation with hydrochloric acid before he applies the actual test with a soluble salt of barium? Surely any such will commence by applying this lattor test at once, as mentioned by me on page 132 , and, in at least ten cases out of twenty, he will find no precipitate, proving that neither free sulphuric acid nor sulphates are present. If so, he has disposed of the matter without much unnecessary trouble and oss of valuable time
In case the vinegar naturally contains salphates without being adulterated with sulphuric acid, every chemist of experience knows that the appearance of the precipitate produced by such a cause is quite different from that produced by an adulteration with free sulphuric acid. In the first case it will be a mere milkiness; in the second case, a much more copious precipitate will be thrown down. But if any doubt is left, advantage may be taken from the facts that the natural sulphate in vinegar is (if not always, at least very often) sulphate of lime, and that chloride of calcium will give no precipitate when only this sulphate is present while at the same time it will give a precipitate if free sulphuric acid is present, in a quantity more ihan one tenth of one per cent only. Another simple test is the mouth; any liquid containing free sulphuric acid even in compara tively small quantities, will act on the teeth and take their natural smoothness away; while vinegar without mineral acids will not. Notwithstanding such a test is only good to aid other tests, there are experts in the business who re y upon it to a great extent
If, however, the combination of the three tests mentioned he barium salt, the chlorice of lime, and the taste, whic all may be made in a few seconds, leave doubt, we may add the first step of the operation described on page 120, about which one of my critics says: "The evaporation of the vin egar to the consistency of an extract volatilizes all the acetic acid contained in it." If this be so we may stop there, as any acid left and indicated, by the usual test, must be the non-volatile sulphuric acid, except, perhaps, some traces of tartaric acid in wine vinegar, or malic acid in cider vinegar, which are easily neutralized by a single drop of liquid ammonia, which would be insufficient to neutralize the powerful sulphuric acid, except when this was only present in such small quantities as to amount to very little, even after the concentration. In order to be sure in regard to the removal all the acetic acid, some alcohol may bo added while the iquid is yet hot; this will, as I have stated, change the acetic acid, if any be present, into the more volatile acetic ether, which may then be driven off with the alcohol, when the moval of all traces of acetic acid is more certain.
I am aware that Fehlig, in his chemical dictionary, besides describing the iodide of starch test, brought forth in the last number of the Scientific American, describes also the test mentioned on page 120, but disposes of it in three lines, while on page 120 this is expanded into 15 lines, and some totally unnecessary details added; for instance, the acidulation with hydrochloric acid. This added complexity and elaboratinn prejudiced me against the whole operation; then
from many samples of vinegar of different origin I have tested, none gave proof of adulteration with sulphuric acid
and only one a slight indication of sulphates. I must con fess that from these causes I attacked the prescription with more severity than it deserved.
The plan of Mr. Wilder to distil the vinegar and test the distillate with barium will fail, as the sulphuric acid is not volatile enough to go over with the acetic acid. It remain behind with the sulphates. P. H. Vander Weyde.
New York city.

## The Dangers of Car Coupling

To the Editor of the Scientific American
One of the oldest and most respected men employed on the Michigan Central Railroad was killed, while coupling cars n the 24th ult. I was at the depot yesterday, and met shipping clerk checking cars, whose face was familiar. I nquired of him at what spot was the man killed a few day go. He burst into tears and pointed with his hand at the place, and said, through his sobs: "It was my father. Oh such a good father ; there was no other like him. We never shall get over it. My mother, or any of us, cannot realize it yet. He left us at the breakfast table, in such good spirits. Before noon he was brought home, crushed but still living, and died amid terrible sufferings."
There is no railroad yard but kills or cripples a man now and then; in the yards of Kansas city four men were crushed last month. This city of Detroit has had as many victims of bad couplings wibin two months, and at that rate they would number thousands throughout the continent during a year. And it is our best young men who are thus sacrificed they must be steady, faithful, active and strong. To the wrought iron draw bar, and to the false economy of railroad managers, belong most of these murdere. Any one, who has to handle such couplings, reading this, will say: "Yes, confound the wrouglt iron draw bars. I don't see why they use them, any how." I ask now through your columns the opin ion of master mechanics, yard masters, conductors and brakemen on the subject of wrought iron draw bars. The public will soon learn from them that those narrow mouthed and open back draw bars compel them to hold the link with their fingers till the cars almost touch each other, or the link will strike the edge of the opening. and be pushed back in the open space; and the men would be compelled to move the train again to make the coupling, Consequently they fun any risk to make the connection. Perhaps a Congressional committee could find a coupling in the Patent Office which would save life and not fill our streets with armless and crip pled men
Detroit, Mich.

## An Improved Flooring.

## To the Editor of the Scientific American

In one of the late numbers of your admirable paper (the reading of which is a weekly soarce of pleasure to me), I perceive a notice of wooden carpeting, made by a company of your city. This induces me to explain a method I have adopted for summer use in my dining room:
I first had the floor made perfectly smooth and flat; then I stretched good strong cotton cloth ("domestic") all over the floor, and soaked it well with very hot strong glue. This completely fustened it to the floor. When perfectly hard and dry, I laid down, with paste, a good quality of wall paper (marble pattern), having both edges of the paper trimmed so as to make no ridges, and afterwards varnished with three coats of cach varnish, permitting each to dry thoroughly. By this means I have a solid floor, very beautiful in appearance, and, after six months' wear, quite as perfect as the first day it was used. Twelve years before the war, I had a room covered in this manner at the plantation; and in 1864, when the house was burned, the floor was still in a much better state of preservation than other rooms covered with oil cloth that had less wear. I have often thought, if thin wood of different kinds could be laid down in the sama manner, that perfect floors could be made, quite as handsome as the inlaid floors I have seen in Europe, and at a very trifling cost, which, in the impoverished condition of our southern country, is a great desideratum.
Natchez, Miss.
H. L. Selleris.

## A Hint to Chemists.

To the Editor of the Scientific American:
A few experiments with animals, similar to those that Salm-Hortsmar and others have made with plants, would be of great advantage to our knowlege of physiology
By rearing animals on pure starch and gluter, with varying and known kinds of mineral substances, and then examining their bodies chemically to see that no other matter had obtained admittance, the essential elements of animal life might be determined.
By feeding animals for a long time on food with a very mall proportion of a non-essential mineral substance added, and then examining, both chemically and microscopically, to ascertain to what extent the substance under experiment had accumulated, and whether it had substituted any other ele. ment, or existed as a foreign aggregation merely, some light might be thrown on the action of accumulated mineral

It is known that animals grow by digesting and decompo ing vegetable products; on the contrary, it is also known that hogs fed on madder absorbed so much of it in an unde composed state as to change their bones to a red color. By dosing animals with small quantities of vegetable acids, alkaoids, etc., and then testing their bodies, the question as to whether all vegetable substances may be decomposed by the
stomach, when presented in not too large quantities, might be answered.
I would suggest that rats, mice and guinea pigs would be cheap and convenient animals for experiment.
If any of the above experiments have already been made, doubtless many of the readers of the Scientific American would be glad to see an account of the particulars.
Charlotte, Me.
H. A. S.

## Mron Pins.

## To the Editor of the Scientific American

One of the abominations of this nineteenth century is mak. ing iron pins in place of brass ones, and making them, too, so that even careful housewives are imposed upon, until rusty clothing, bad points, and bad temper of both pins and or
betrays the swindle on peaceful unconscious humanity. betrays the swindle on peaceful unconscious humanity.
In vain good old-fashioned pins are called for and prices
paid to fully cover the difference in value between brass and paid to fully cover the difference in value between brass and iron. To prevent the imposture, the writer hit upon a happy expedient, namely, testing them with a magnet; even the magnetized blade of a pocket knife is sufficient. If the least
disposition is shown, in the innocent but truthful household disposition is shown, in the innocent but truthful household implement, to hop towards the blade, refuse them at onc and tell your deal

Novice.

## Medina, Ohio.

## KNITTED GOODS AND THEIR MANUFACTURE.

The material used for making knitted garments, such as are employed for ordinary underwear is a mixture of cotton and wool. The industry is a growing one, and is largely carried New York.
The wool is received in the bale, and is first cleansed. This process consists in scouring it in a hot solution which removes the grease and dirt, and then passing it through rollers which wring out the moisture. Drying follows, in summer by means of a blast of air, in winter by exposing the material
in rooms heated to about $120^{\circ}$. The wool is then burred, sharp in rooms heated to about $120^{\circ}$. The wool is then burred, sharp
steel teeth separating its fibers, which afterwards pass into steel teeth separating its fibers, which afterwards pass into
an enclosed case, where a current of air tosses them about an enclosed case, where a current of air tosses them about
until they become in a literally perfect fleecy condition. Indeed, it is difficult to recognize the pure white substance which leaves the burring machine as the coarse filthy matted masses which are first encountered on entering the factory. Meanwhile the cotton is also being cleaned and separated Ingenious machines take it as it comes from the bales, pull it apart, remove its impurities, and finally leave it in a condition as soft and pure as its future companion, the wool. Now comes the mixing of the two ingredients, so to speak, which form the knit web. The proportions vary according to the articles made and the peculiar ideas of the manufacturer. Garments of this nature are seldom. The mingling is done by pickers, steel points which work the two kinds is done by pickers, steel points which work the two kind
of fiber intimately together, turning out the mass evenly inof fiber intimately toge

The material is now complete and ready to undergo the processes preliminary to weaving, or rather knitting. It first finds its way to a "lapper" or machine which detaches the fibers and then passes them to the outside of a wire
gauze rotary cylinder, to which they are forced to adhere by gauze rotary cylinder, to which they are forced to adhere by
means of a partial vacuum produced inside by rapidly revolving fans. On this cylinder, the fibers become slightly felted together so that the material is removed in the form of loosely made batting, and in this state is rolled upon large reels. In the next machine, a " double lapper," four rolls of this mixed wool and cotton batting are used at once, being made to "lap" over each other and to pass through rollers so that they finally emerge combined in the shape of a thick loose fabric.

Carding is the next process, the same machines being' employed as are used in all cotton or other weaving mills. As this operation is doubtless familiar to almost every body
we shall not stop to describe it, but simply note the change we shall not stop to describe it, but simply note the change which it produces in the material from a cloth or batting to
the form of a soft thick rope. This, passing through another machine, emerges in shape of a cord resembling worsted. Then it is taken to the spinning apparatus and finally comes out a stout firmly made yarn, which, being wound upon bobbins, is ready for the knitting machines.
It is difficult without the aid of diagrams to convey to the reader an accurate idea of these last mentioned somewhat intricate pieces of mechanism. New improvements are con stantly being made in their construction. Some manufacturers have special appliances of their own devising, which they reserve for use in their particular establishments; so tha tails to be applicable to all. There are some points, in common, however, to nearly every pattern, which may be generally cited. The needles resemble in form those used in making crochet work. They are arranged in a circle, the number used depending upon the fabric to be knit. The measure
for their number, technically termed the "gage," is so many for their number, technically termed the "gage," is so many
needles to three inches space on the circuinference of the circle. Thus, a machine having 14 needles within the above limit is called of "14 gage" and makes a coarser material than one, for instance, of " 18 gage." The strand of yarn passes around the circle and is brought under the hooks of the needles. The latter mova up and down successively,
while a suitable device holds each row of loops as it is while a suitable device holds each row of loops as it is
formed until the next row is made. The fabric is thus knit in the form of a tube and passes upwards to a large roller, suspended above the machine around which it is tightly wound. From fifty to one hundred yards of finished knitting are thus daily produced.

The cloth is next washed and either hung in heated apart ments to dry or else the moisture is removed by passing a
current of hot air through its length, it being still in the current of hot air through its length, it being still in the tubular form in which it is finished.
From the laundry, the cloth passes to the hands of an army of women. Some, provided with huge shears, spread the material on long tables in layers of six or seven thicknesses, placing upon it wooden patt rns and rapidly marking and cutting out garments. Others, seated before long tables on which are sewing machines driven by the power of the establishment, baste, sew, and finish, in a sin
as many as 200 dozen underclothes per day.
The fin'shed goods then pass to the packers, who fold them and press them in a powerful steam press. Next comes the sorting of sizes, packing in boxes, and, lastly, the labeling with trade mart, etc., when the garments are ready for the wholesale dealer.

## gCIENTIFIC AND PRACTICAL INFORMATIOR.

## PICKLES.

The following recipe for pickling cucumbers, etc., has been sent us by a valued correspondent, and will be general y acceptable at this season of the year: Wash the cucum bers clean. Place about a dozen leaves of a grape vine on the bottom of the pickling vassel (a barrel or stone jar will do). Pack a layer of cucumbers snugly on the leaves, and sprinkle over them a small handful of salt. Then lay vine leaves again, and then cucumbers and salt, and repeat the
cover over with vine order till the vessel is nearly full. Cover over with vine stone on the top. Fill the vessel with water till the cucumbers are covered; the board will prevent them from swimming on the water and so becoming exposed to the air. Taste he liquid; it should be pleasantly salt; add a little salt if it too flat. Let the whole stand, in a not too cool place, for hree weeks, when the cucumbers will be sour and ready to eat. They will keep all the winter if put in a cool place. No
vinegar is necessary. The pickles will be of an olive color, vinegar is necessary. The pickles will be of an olive color,
and are more wholesome than poisonous bright green sul. phuric acid and brass kettle pickles sold in almost every tore. The Germans use altogether the above recipe for pickles; but it is a fact that dentistry is more perfect in merica than in Germany, and our correspondent does not wonder that the pickles here have done much to give that science its present perfection.
to detect sulphuric acid in vinegar.
We have received so many letters on this subject that we re compelled to decline publishing many good methods which our correspondents have forwarded. The following,
however, will give housekeepers, and others to whom chemical processes are not accessible, an opportunity of testing the purity of the article: F. S. G., of D. C., sends Fresenius' test implified for general purposes: Put a wine glassful of the inegar into a china tea cup, and let the cup float in water in pint cup of tin or other metal that will stand heat. Boil the water till half the vinegar has evaporated, then drop into the cup a iece of (cane) loaf sugar about the size of a grain of wheat. Continue the boiling till the liquid in the cup has cid, thed, when, if the vinegar contains free sulphuri charring of the sugar is due to free sulphuric acid. The presence of sulphates does not affect this test.
E. C. H., of N. H., puts a clear solution of a few grains of ugar of lead with the vinegar; and he states that if the mixture remains transparent, the vinegar is pure, but sul phuric acid betrays itself by forming a milky precipitate.

## New Method of Printing on Cloth.

Mr. E. Vial, of France, proposes to first impregnate the issues to be printed with a solution of nitrate of silver, or f some other metallic salt, which, when brought into con act with zinc or copper, will be reduced to the metallic state. His design is in this way to print upon the impregnated tis sue with a zinc (or copper) pattern. The result of this process, is that, wherever contact is made between the metal plat and the cloth, there is formed a metallic precipitate of silver (if the nitrate of silver was used to saturate the tissue) which is firmly fixed upon it. The color of the precipitated metal may be varied, according to the strength of solution used to be very fast, withstanding acids, alkalies or soaps.

## A New American Steamer.

The citizens of Philadelphia, represented by the American Steamship Company, are determined to have a first class teamer line of their own, to run between that city and Liv erpool. The first vessel of the new line, named the Pennsylvania, was lately landed at Philadelphia with much success. She is a large and splendid vessel. Length, 355 feet; beam, 43 feet; depth, 33 feet 6 inches; capacity, 3,854 tuns; draft 20 feet 6 inches. Is to have accommodations for a thousand passengers, is to run $11 \frac{1}{2}$ knots per hour on 40 tuns of coal per day. We heartily wish for the success of this new enterprise.

Professor King and Mr. Schaeffer made a balloon ascen ion from Rochester, N. Y., on September 3, went up 6,000 eet, staid up an hour and twenty minutes, and then landed Rochester.

Professor De Volson Wood of the University of Michi gan has accepted the professorship of mathematics in the Stevens Institute of Techrology, Hoboken, N. J. Professot
Wood is one of the most able and distinguished mathemati cians in the country.

The Whistling Lantern--A $\begin{gathered}\text { Miners. }\end{gathered}$ Miners.
Dr.A. K. Irvine, Glasgow, lately read before the Iron and Steel Institute a paper on "A new safety lamp for miners for indicating by sound the presence of explosive mixture of as and air, based on a new form of singing flame and on a fog horn on the same principle." In the course of his paper, Dr. Irvine stated that, when a mixture of any inflammable gas or vapor with air in explosive proportions passes through and is ignited upon the surface of a disk of wire gauze of such mesh as to prevent the passage of flame, and a suitable tube or chimney is placed above, and surrounds at its lowest end, the disk, preventing admission to the chimney except through the wire gauze, a musical sound is produced varying in pitch, etc., with the size of flame and dimensions of the chimney. In this, as in other flames singing in tubes, the sound is caused by the vibration of the flame determined or intensified by the current up the chimney, and commu nicated to the column of air or gaseous fluid within the chimney, whose length commands and times the rapidity of the vibrations so as to produce a given note, just as the flutter of the air originating at the embouchure of an organ
pipe is commanded by the length of the pipe. The condipipe is commanded by the length of the pipe. The condi-
tions under which this flame is produced differ considerably, ions under which this flame is produced differ considerably,
rom those of other singing flames. The hydrogen jet or instance, is burned in an open tube, to which air is freely admitted at the lower end, and it is necessary that the tube enclosing the jet should be lowered more or less till the inging point is found. In Irvine's singing flame the tube is not open at the bottom, and no admission takes place except through the wire gauze, and the note is produced when the flame is at the lower extremity of the tube or chimney. The fact of the combustion of an explosive compound on the The fact of the combustion of an explosive compound on the
surface of a material impervious to flame (namely, wire surface of a material impervious to flame (namely, wire
gauze, originally employed by Sir Humphrey Davy in the gauze, originally employed by Sir Humphrey Davy in the
construction of safety lamps) suggested the possibility of construction of safety lamps) suggested the possibility of
employing this flame for the purpose of giving warning by ound of the presence of an explosive atmosphere, or else where, by means of a lamp suitably constructed. Accordingy, Dr. Irvine said he had had lamps made for giving light which, while the atmosphere is not contaminated by fire damp or other inflammable gas, burn in the usual way, but which, soon as such a gas mixed with air in explosive proportions enters it, appeals to the ear by a loud musical sound, as well as to the eye by its effects on the appearance of the flame in the lamp-just as is in the Davy. In one form of the lamp, which is more particularly adapted for the use of the viewer, he air is made to enter near the top of the lamp, obviating he necessity of turning the lamp on its side, as is frequent y necessary with the Davy when but a thin layer of the fire damp is floating at the ceiling of the mine. In another form the lamp is adapted to the use of the working miner, and a uperior light is obtained by the use of paraffin oil. In a hird form, specially constructed with the object of being a warning apparatus as well as a stationary light, the sound is riven forth when an atmosphere of gas and air under the explosiva point enters it. Another application of this sing ing flame was its use as a fog horn, which, on account of it portability, simplicity, and cheapness, might take the place f a costly apparatus, and would be highly suitable for rail way junctions or other situations of davger. All the above pparatus were made to sound during the reading of the paper, and elicited much applause.

## An Electrical Fire.

A fire recently broke out in the flooring of one of the of fices of the Western Union Telegraph Company in this city, which was found to have originated in a cable of cotton cov red wire saturated with paraffin, through which the line entered the office beneath the floor. From some cause, prob ably lightning, a connection had been formed between tw hrough wires attached to large main batteries at the general office, and which were connected with opposite poles to the ground. Two large batteries were thus connected and thrown into short circuit, developing an intense heat and setting fire to the inflammable paraffin covering of the wire. If this singular occurrence had happened after the closing of the office at night, it might have resulted in the destruction of the building, and the cause of the fire would have remained a mystery. Of course an accident of this kind could hardly have been for eseen, but it serves to point out the necessity of caution in running wires under the peculiar conditions described.

Romance of the Telegrapi.-A telegraph clerk of London, who was engaged on a wire to Berlin, formed an ac quaintance with and an attachment for a female clerk, wh worked on the same wire in Berlin. He made proposals
of marriage to her, and she accepted him without hay of marriage to her, and she accepted him without hav
ing seen him. They were married, and the marriage result ing seen him. They were married, and the marriage result ing from their electric affinities is supposed to have turned out as well as those in which the senses are more apparently concerned. These young clerks, however, wera not very rash, nor did they marry without due acquaintance with each other, as many prudent persons might suppose-for, according to Mr. Scudamore, a clerk at one end of the wire can readily tell, by the way in which a clerk at the other does his work, "whether he is passionate or sulky, cheerful or dull, sanguine or phlegmatic, ill natured or good natured."

There are now in daily use on the Michigan Central Rail rond fifty one cars fitted up expressly for carrying butter beef and eggs from Chicago to Boston and New York. An verage of four of these cars start east each day, and are in spected and re-iced at Detroit before they go further. Each car consumes four tuns of ice on the trib

## IMPROVED ROAD OR FARM GATE.

The object of the invention shown in our illustration is to afford a means of opening and shutting gates without re quiring the occupant of the vehicle passing through to de scend for the purpose. The device is at once simple and ef fective, and but few words of description, added to its graphic delineation in the engraving, are needed for its explana tion.
The gate is constructed, as shown, in a firm and substan tialmanner of any suitable material, and is freely suspended by means of a pivot passing through the extremities of the three braces represented as extending from the lower corner and from the center of the bottom rail, between two swing ing posts. The upper extremities of the latter are connected together while the low er ends are arranged to pivot readily on the solid blocks of wood or stone set in the ground. The highest bar of the gate, it will be noticed, is prolonged, and passes loosely through a slot cut in the upper part of one of the adjoining fence posts. To the ends of the two uprights by the road side one of which is represented in the fore ground and the other beside the wagon single pulleys are suitably attached, while at the top of the swinging posts which sup. port the gate, a similar pulley is fastened. A rope passes through all three of these pulleys, its ends hanging beside the up rights.
The method of working this apparatus is as follows: The gate being closed, the dri ver of the vehicle pulls upon the rope. which extends down to a convenient distance from the pulley on the upright beside him. The other extremity of the line being stopped by means of a knot cast in it, the strain is brought to bear upon the swinging posts of the gate. These, moving freely on their lower pivoted extremities, are lifted from a diagonal to a vertical position, and then swinging pass their center, fall as shown by the dotted lines in the engraving. The gate which is guided by the prolong. bodily lifted, and its upper left hand corner describes the arc of a circle which, dotted in the illustration, it is repre sented as beginning to tiaverse. At the end of its movement, the gate is found to have been transported sideways clear of the road, and to rest beside and parallel to the fence. The position of its parts and the direction which the rope as sumes are clearly represented by the dotted outlines. After passing through, it is only necessary for the driver to repeat the foregoing operation, pulling on the other extremity of the rope, when the gate returns to its former position and is closed. By the useof a balance weight,the gatemay be easily lifted.
This device has been successfully employed in several of the Western States for some three years past. Further par ticulars concerning it may be obtained by addressing W. C Hooker, Abingdon, Ill.

GROSVENOR'S SELF-LUBRICATING LOOSE PULLEY.
The self-lubricating loose pulley which forms the subjec of the present article was patented April 9, 1872, by Mr. J. P. Grosvenor, of Lowell, Mass., some of whose previous in ventions in this and other directions have been already illus trated and noticed in the Scientific American.


Our engraving represents the pulley, which has part of the face broken away to show a detail section of the working parts. It is composed of a hub and disk, which are made fast to the shaft by set screws, one of which is shown in the engraving. The pulley is made in two parts, as represented, and it revolves on the outer circumference of the disk. The parts are fitted together by an oil-tight joint, and are secured to each other by set screws, by which construction the disk is introduced within the pulley, to the interior of which it is fitted on its rim. The oil chamber is annular and runs entirely round the sides of the disk. It is formed by curving
the sides of the pulley outward, and then around and withi the annular projections shown on each side of the disk. The chamber is supplied with oil by removing the set screw hown in one side of it.
As the pulley revolves upon the disk, every part of its bearing surface passes through the oil at each revolution, and at the same time the peculiar form of the sides of the oil chamber and the disk prevents any oil escaping while it is being carried round the top of the pulley by dripping down for it is carried round to the lower side. It may be taken off the shaft and carried in any position without the oil escaping It will be seen that this pulley is constructed upon a nove principle, the oil chamber being placed within the circumfer ence of the bearing upon which the pulley revolves. This


HOOKER'S ROAD OR FARM GATE
amilies. the management of their papers. The liability to danger and destruction on railroads is greatly lessened, and disasters averted, through the use of electrical signals. The engineer, as his locomotive dashes along the iron rail at speed which outstrips the wind, can, at a glance at the signal by the road side, know the condition of the line for miles head, and whether other trains are likely to be encountered or misplaced switches and open drawbridges invite him to death and destruction. Our bells are rung by electricity, our locks are regulated by the electrical current, the fidelity of watchmen is assured or their lack of vigilance recorded with nfailing accuracy by the electrical tell tale. The conceale ring s of the burgla and thief, and our gas is lighted by electricity.

The uses to which the electric current and the telegraph have been and shall yet be adapted are so numerous even now as to surpass our comprehension. It is the mighti est agency of modern times, the true wizard's wand, which manipulates and controls the affairs of mankind.
In the science and administration of this mighty agency, many thousands of people are constantly engaged, and their number is yearly and almost daily augmented. They constitute a large community, and upon their intelligence, capacity, and fidelity the most momentous and important interests constant ly depend.
It is impossible even now to predict what advances and discoveries may yet be made in electrical science and telegraphy. Astor ishing as these have already been, there i undoubtedly much yet to be learned, and new adaptations will continue to be made and those who would profit by them profes sionally must be diligent and persevering in their studies and efforts to acquire and main tain an advanced state of knowledge and in formation. In science and art, there is no royal road to success.-The Telegrapher.

## WHEEL AND ROLLER SASH CATCH

insures the constant lubrication of all the parts by reason of the centrifugal force developed by its revolution; and it is stated that in consequence thereof there is hardly any wear in the pulley or its bearings. The inventor says these loose pulleys have been run at the rate of one thousand revolu tions per minute for eight weeks without re-oiling and with out escape of oil, and sufficient oil was then left in the cham ber for a longer run
Further information may be obtained of the patentee and manufacturer at the address stated above.

## Catching Shad with Hook and Line

Mr. Thomas Chalmers, after repeated experiments, has succeeded in devising a bait by which he has been enabled to book shad without difficulty. He says: A careful examina tion of the stomach of the shad gave nolight as to what they fed upon. Various kinds of bait, natural and artificial, were tried, and for a considerable time without satisfactrry result At length some flies were dressed in a peculiar manner, and these the shad took and were captured in considerable numbers with hook and line. In July, 1871, 168 shad were taken on two poles. Three flies were used on one line, and some times as many as three shad were taken at one cast-the whole weighing eight and a half pounds. The present season has not been so good, owing partly to roily water, but the sport has been fair. In one evening, between 7 and $8: 30$ himself and a companion took in twenty shad on hooks and lines. Mr. Chalmers says that from boyhood he has been given to sport with rod and line, and thinks the catching of shad with hook and line the best angling he has found. He desires that this method of shad fishing be tried in other waters than the Connecticut. His experiments were made in that river, at Holyoke, Mass.
New Route between New York and Boston. A new route for travel has just been opened between New York and Boston. Passengers take the cars at Brooklyn, N. Y., and ride to the east end of Long Island at Greenport ninety miles, where they go on board a steamer and sail thirty miles, across Long Island Sound, to New London, Conn thence by rail over the Northern and Boston, Hartford and Erie roads, one hundred and twenty-six miles, to Boston Time, nine hours-about the same as the other routes. This Long Island route was operated some years ago, but, no proving profitable, was abandoned.

## The Adaptation of Electricity and the Telegraph <br> to General Use

The telegraph and electricity are yearly entering more and more intimately into the daily service and convenience of the people. It sounds the alarm and brings speedy succor when fire threatens devastation and ruin. It furbishes to every merchant, broker, and business man who desires it, in the more important business centers, a constant record in his own office or counting room of the condition and transactions of
our exchange, and the quotations of leading articles of traffic and commerce. It calls messengers and assistants; when needed, to any locality, at all hours of the day and night. It furnishes communication between the offices, manufactories, and places of business of merchants, manufacturers, shippers, and others. The editors of our great newspapers can sit in their libraries at home and direct, by means of telegraphs, easily operated by themselves or members of their

The sash catch herewith illustrated is a most simple con trivance, and apparently of a very effective character. It onsists simply of a wheel and roller cast in one piece, and fixed in position to do duty very readily.
Fig. 1 shows the catch applied to the frame and sash, and Fig. 2 gives a perspective view of the wheel roller
A is the sash, B the window frame, and C the covering strip. In order to insert the catch, the wedge-shaped hole ex possed in the frame is cut to receive the roller, and a mortise is also framed for the reception of part of the wheel, while recess is formed on the under side of the covering strip for the remainder of the latter to pass through. The roller and wheel are placed in the excavation made for them, and the covering strip is attached, when the parts occupy the position represented in Fig. 1, where the situation of the covered part of the wheel and the mortise are indicated by dotted ines. For the better understanding of the foregoing, the reader will bear in mind that, in our engraving, parts of the frame and covering strip, together with such part of the wheel as would be otherwise disclosed by their removal, are broken a way in order to show the shape of the recoss and he position of the roller therein
The operation is as follows: The tendency of the roller is the operation is as into the wedgeshaped cavity formed by he frame and the juxtaposed sasb, by its own weight, and when a very slight partial rotation is caused in it by the fricion of the descending sash, this tendency is so much aug mented as to instantly wedge it tightly therein, and thereby secure the sash at whatever altitude it may happen to be. To elease the sash, all that is necessary is to push up the pro ecting edge of the wheel; which is very easily done, as it is

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sufficiently roughened to be readily rotated by the fingers The window stops instantly at whatever point it is pushed up to, and is so firmly wedged there as to prevent rattling of the sash, should the same be loosely fitted.
The catches are said to answer well for weights of house sashes; they are not liable to break or to get out of order, do not mar the sash, and are furnished very cheap.
The device was patented July 23, 1872, and further infor mation in regard thereto may be obtained of the inventor, $T$ McDonough, Montclair, N. J.

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## SERIOUS MARINE DISASTERS.---IMPROVED SAFETY

A fearful record of loss, both of property and life, has filled the columns of the daily press during the past week. The somber category shows four fine vessels of our merchant ma somber category shows sour ine vessels of our merchant
rine totally wrecked and scores of human lives sacrificed.
The propeller Metis, plying between New York and Provi dence, on the morning of the 29th of August last, while in Long Island Sound, five miles off Watch Hill, Rhode Island, came in collision with a coasting schooner and speedily sank. As the ship sank, her spar deck was lifted bodily clear of the hull, and remained on the water a floating raft, thus saving many passengers who would otherwise have perished. As it was, some forty lives were lost.
The Metis was constructed with three compartments formed by bulkheads placed athwart her hold. It is stated that she had just been thoroughly refitted, and was to all in tents a new vessel. How "thoroughly" this work was done is amply evidenced by the fact that two compartments, which should have remained intact and floated the vessel even if the third had filled, must have given way-the bulkheads bursting in-so that they were no protection whatever.

There is no subject which calls for peremptory legislation more than the proper construction of the hulls of vessels. The compartment system should be made obligatory in every passenger ship, and the spaces divided off should be actually, not theoretically, watertight, and totally distinct from each other. Cases are numerous where the safety of vessels has been solely due to this method of construction. The collision off Newfoundland, resulting in the sinking of the ill fated Arctic, injured the propeller which she struck only to the ex tent of breaking in a portion of one of her compartments, which did not prevent her from making the nearest port in safety. The Great Eastern, built with a double skin and amply strong compartments, struck on a rock, during her passage through Long Island Sound, tearing open the plates of her bottom for a length of some twenty fett, and yet no difculty was experienced in keeping her afloat. On the other hand, the terrible calamity of the United States frigate Oneihand, the terrible calamity of the United States frigate Onei da, which had no compartments, and consequently foundered
a few minutes after being injured, is yet fresh in the public a few minutes after being injured, is yet fresh in the public
mind. In our own experience, we have seen one of the larg. mind. In our own experience, we have seen one of the larg.
est and most powerful steam frigates in the navy compelled to bring by the wind, shift all her guns and heavy weights, and range all her crew to leeward, in order to heel her over suf ciently to raise the outboard delivery opening, which is below the water line, out of water. Some of the valve gear had been carried away, and a stream of water twenty inches in diameter had already risen above the fire room floor and menaced the fires. Luckily the weather was calm and the sea smooth, as otherwise the difficulty in stopping the leak would have rendered the ship in imminent danger. Had she been pro perly constructed, a single compartment would have filled and there the mischief would have ended.
The great corporations owning lines of steamers, though lavish in expenditure for elaborate upholstery and gorgeous decorations, with strange inconsistency are parsimonious in
the extreme in matters of the most vital importance regardthe extreme in matters of the most vital imp
ing the safety of their vessels and passengers.
ing the safety of their vessels and passengers.
The cases of the side wheel steamer Bienv
The cases of the side wheel steamer Bienville, of the Pa cific Mail Company, which was burned at sea on her passage
from New York to Aspinwall on the 5th of August, also of from New York to Aspinwall on the 5th of August, also of the America, another large steamer belonging to the same
company, burned at Yokohama, Japan, August 24, and that of the propeller Nevada, consumed by fire in New London
harbor on the 31st of the same month, are similar in many respects. Both doubtless owe their loss to spontaneous combustion taking place in their cargoes. The Bienville, though fitted with steam pumps and other fire extinguishing appa-
ratus, found in the hour of danger that they were useless. ratus, found in the hour of danger that they were useless. Complete immunity from the dangers of marine conflagrations we hardly expect. As if in mockery of man's best efforts, the news comes to us from Yokohama (Japan) of the burning of the magnificent steamer America, belonging to the Pacific Mail Line, and one of the largest side wheel vessels in the world, in the harbor of that city. She contained every improved appliance, and her fire regulations were supposed to be nearly perfect. She arrived at Yokohama on the morning of August 24, and at 11 o'clock on the same night the freight deck took fire, and immediately the whole ship was enveloped in flames, defying all efforts to exWhole ship was enveloped in flames, defying all eff orts to ex-
tinguish them. The vessel was totally destroyed, together tinguish them. The vessel was totally destroyed, together
with the mails, freight, and the luggage of the passengers and officers. The rapid progress made by the fire forced al hands to jump into the water, there not being time even to lower the boats. The America measured 4,454 tuns, hull of live oak, divided into compartments by means of three bulk. heads. Her engine was 2,230 horse power, steam cylinder 105 inches in diameter, piston stroke 12 feet, wheels 42 feet diameter, 12 feet face; four boilers, each having six furnaces.

For use, in case of fire or leakage, the vessel is said to have been provided with an independent boiler and pump upon each deck, throwing from seven to ten streams, besides other devices for extinguishing fire.
There seems to be no really valuable system for extinguishing fire aboard ship. Even closing all hatches and ports ing fire aboard ship. Even closing all hatches and ports so, jets of steam or of gas from extinguishers are of little avail. A mode of completely flooding a vessel is needed, and avail. A mode of completely flooding a vessel is needed, and
the subject is worthy of the attention of inventors. We published, a short time since, a valuable method of laying pipes through factories and other large buildings, by means of which the most spacious apartment can be completely drenched in a few seconds. Repeated tests have proved the efficiency of this system, which may be easily modified for
vessels. We are of opinion that owners should be compelled vessels. We are of opinion that owners should be compelled
to locate pipes through which water might be forced into to locate pipes through which water might be forced into every part of the cargo without breaking bulk, and more es of the Nevada, the vessel is loaded with dangerous materials.

## CAR COUPLING DANGERS

We publish in another column the letter of an esteemed correspondent, who complains very strongly against the rail way companies for their neglect in not supplying proper means or enforcing proper regulations for the coupling of their cars. It is undoubtedly true, as he states, that many lizes are annually lost, and many families reduced to bitter distress in consequence of this neglect
How to remedy the matter in an effectual manner appear o be a question somewhat difficult of sclution.
The common method of coupling is by means of an open ink, each end of which is secured in the end of the platform buffer or drawhead by means of an iron pin. In the act of coupling, it is common for the brakeman to stand between the two cars that are to be connected, for the purpose of holding up and guiding the link into the mouth of the opposite buffer; the engineer now backs the train, and, as the cars ap proach, the brakeman directs the link with one hand and with the other drops in the pin when the link has reached its place in the buffer. This is a quick and simple operation, and would not be especially dangerous if the track were al ways level, the carsall of uniform weight, and engineers al ways areful and dextrous in the management of their locomo brought together with such rapidity and force that the poor brakeman is crushed before he can jump out from between them.
Of all people in the world, railway operatives are the mos reckless in regard to their lives, which they do not hesitate to hazard for the purpose of saving themselves the slightest rouble. This matter of car coupling is an example. We believe it to be entirely unnecessary for the brakeman to
stand between the cars in the act of coupling. He may stand stand between the cars in the act of coupling. He may stand
upon the platform and, by the use of a loop of twine or a upon the platform and, by the use of a loop of twine or a
crooked stick, hold up and direct the link into its proper place and so avoid all danger to his person. But this precaution is attended with the trouble of climbing to the car platform, providing the string, keeping it always in readiness, etc. Rather than do this, he recklessly places himself between the cars, and runs the terrible risk of his life.
Multitudes of self acting car couplers have been invented and some of them have been brought into use. But the link and pin is so simple, so well adapted to cars of varying hights and sizes, so easily renewed when broken, so quick, effective and safe if properly treated, that their dieplacement by a more Wensive or complicated device is difficult, if not We should be glad to receive the views of other corres
pondents upon the subject, especially of practical railway men.

## an auction sale of models at the patent

 OFFICE.For the past few years the Commissioner of Patents has been puzzled to kno $W$ what to do with the great number of models of rejected applications which have accumalated during more than thirty years, and occupying, as they have done until the past year, the whole of the west wing of the
model room in the Patent Office. But an act of Congress, approved July 8, 1872, solved the problem, by authorizing
he Commissioner of Patents to restore to the respective ap plicants such of the models, belonging to applications that have been finally rejected for one year, as he should not think proper to be preserved, or to sell or otherwise dispose of them
as he might think proper. In considering in what way he as he might think proper. In considering in what way he could dispose of these models, he conceived the idea of using them to educate the youth in the different institutions of learning throughout the country, and accordingly, by an Associated Press dispatch, made known the fact that such institutions of learning as desired the models could have them subject to a stipulation that they were to be preserved in good condition and returned to the Office upon the order of the Commissioner. This was a little more than a year ago since when some seventy institutions have availed them selves of the privilege afforded of getting these models, and have received in all upwards of seventy thousand of them. Each institution sent a representative, who selected such of the models as he thought proper, and of these was made a list, which is preserved by the Commissioner, so that, in the event of any of the models that have been given out being required, the Office can obtain them. Of the models not wanted by any institution, there were some thousands, mostly in a broken and dilapidated condition; and these were a few days since sold at auction, in accordance with an advertise ment which had appeared in the papers for a month previ ously. On the day of sale, the models and fragments were heaped together in sixty lots on the floor of the west hall of the Patent Office building, and the sale of them realized to the Office between seven and eight hundred dollars only, the prices varying from five dollars to one hundred and twenty five dollars per lot. One lot of lamps sold for forty dollars to a gentleman, to be taken to Chicago; and another, a lot of sewing machines, some sixty in number, together with a quantity of odds and ends of sewing machine attachments, brought sixty dollars.

THE CINCINNATI INDUSTRIAL EXPOSITION,
The third Industrial Exposition in Cincinnati opened on September 3, and, we are informed, will surpass anything of the kind ever before held in that city. The buildings de voted to the fair have been greatly enlarged, until at present nearly four acres of ground are under roof, while altogethe there are seven acres of exhibiting space. The exhibitor this year at present number 1,500, with 4,000 entries.
The premium list for this year is especially attractive There are ninety medals of gold, three hundred and ten of There are ninety medals of gold, three hundred and ten of
silver, and three hundred and seventy of bronze, the whole silver, and three hundred and seventy of bronze, the whole
costing some $\$ 12,000$. The interior of the main hall is beau costing some $\$ 12,000$. The interior of the main hall is beau
tifully decorated, while the floral hall contains three miles of vergreens. The latter covers 21,000 square feet of ground space, and is surmounted by a reof containing 12,000 feet o glass. A superb display of rare and exotic plants, rustic work and ornamental gardening is to be exhibited. In the natural history department, which is not yet completed, in numerable fossils, skeletons and shells are being arranged The power hall is not large enough, as it covers only abou two thirds of an acre. Machinery of all descriptions will be represented. Fifteen engines are now in position, most of them running. Altogether over three hundred machines will be actually worked by steam power, the conditions of their exhibition being such that they will not be allowed to remain at rest. Wood working machinery, it is stated, will prepon derate. The art hall contains five hundred oil paintings, contributed by citizens, many of which are by celebrated masters. Besides oil paintings, there will be a large display of water colors, engravings and photographs.
This exposition will be one of the largest ever held in this country and is especially remarkable as contrasted with it predecessors, which, though of much interest, were of no great magnitude. The railroads, extending in all over some 15,000 miles, communicating with Cincinnati have made liberal half fare arrangements, to continue during the fair and the hotels of the city are making every preparation for the reception of the expected throng of visitors.

MEETING OF THE BRITISH ASSOCIATION.--ADDRESS BY
A NEW YORK HERALD REPORTER.--LIVINGSTONE IN AFRICA.
The British Association met this year at Brighton, August 14, and on the next day Dr. Carpenter, the newly elected President, delivered his inaugural oration. But the great fea are of a following meeting was the address of Mr. Henry M Stanley, a correspondent of the New York Herald, who ha suddenly achieved fame, if not fortune, by a successful adventure in Africa in search of the famous traveller, Dr. Livngstone. The Doctor had not been heard from for nearly hree years, and much anxiety was felt in England in regard to his safety. The public interest in his befialf reached such pitch that the Government finally organized an expedition for a search after the missing explorer, while a voluntary contribution for supplies and other assistance, amounting to some $\$ 25,000$, was gath $\epsilon$ red. The starting point for these re lief expeditions was Zanzibar, a well known settlement and steam packet post on the east coast of Africa, six degrees south of the equator. On this parallel, the width of the Af rican continent, from the Indian ocean to the Atlantic, is only about eighteen hundred miles. The headquarters of Living tone were known to be somewhere in the vicinity of a collec tion of native huts, designated as Ujiji, on the banks of a grea lake, discovered by previous travellers, and called Lake Tan ganyiza. The route from Zanzibar to Ujiji is well known distance about seven hundred miles, the first four hundred of which are very difficult to pass on account of the marshy nature of the ground and the extreme warmth of the climate The newspaper discussions, preparations and movement connected with the sending of the relief expedition excited
much interest in Great Britain, and it occurred to Mr. James Gordon Bennett, proprietor of the New York Herald, who was in England at this time, that it would not be a bad idea to dispatch one of his reporters to Zanzibar, and if possible send him on ahead of the relief party to interview Dr. Livingstone, and bring back news of the celebrated traveller in done. A reporter was selected in the person of a young American rover, named Henry M. Stanley, who at once started for ican rover, named Henry M. Stanley, who at once started for
Zanzibar, where he engaged guides and men to accompany Zanzibar, where he engaged guides and men to accompany
him, and then pushed on through the forest for Ujiji, which him, and then pushed on through the forest for Ujiji, which
place they reached after some difficulties, and here they place they reached after some difficulties, and here they
found Dr. Livingstone, waiting for long expected supplies. found Dr. Livingstone, waiting for long expected supplies.
The reporter was enabled to relieve the Doctor's immediate necessities; and after procuring from him letters giving an outline of his discoveries, with messages for friends at home, the enterprising Stanley posted back to the sea coast, then on to England with the great news, first directing further supplies to be sent from Zanzibar to Dr. Livingstone, who will proceed with his explorations. Stanley's recent arrival in England produced, as might have been expected, an immense sensation. His pluck in walking six hundred miles through the woodsand mires, under a broiling sun, to interview Livingstone,and the enterprise of the New York Herald in send ing him, have formed the subject of many columns of laudation in the various British papers.
At the meeting of the British Association, Mr. Stanley, by special invitation, gave an account of his African march be fore a very large and distinguished audience, composed of the members of the Association and their invited guests, among whom the nobility were strongly represented. The Ex-Emperor Napoleon, Eugénie and son were among the most interested auditors.
In the discussion which followed, some of the geographers pointed out the improbability of certain deductions made by
Livingstone in respect to the sources of the Nile, while other Livingstone in respect to the sources of the Nile, while other places, reporfed by Stanley as the discoveries of Livingstone, were declared to have been visited by other travellers, among them Dr. Schweinfurth, the celebrated German savant. One of the reports says that Stanley "did not content himself with refuting Dr. Beke or Sir Henry Rawlinson; he abused them in a rhetorical way for differing from his friend Dr. Livingstone. Every one was glad to see the brave and absent and ancient explorer have so stout a champion present at the meeting. The Doctor must have charmed and inspired Stanley, or Stanley, with the generous heroism of youth and sympathy for common danger and suffering, resolutely liked the Doctor, and took his part against all adversaries and critics. Sometimes he answered by a dramatic grimace alone, and anon by a thundering denunciation of those who sat at home and criticized maps to contradict those
who, by travel and peril and patience, have penetrated the who, by travel and peril and patience, have penetrated the
dangerous lands and seen for themselvep. When he referred to Schweinfurth, he exclaimed, 'I never heard the name of that German Doctor before. Ladies and gentlemen, there never was an Englishman who discovered anything, lake or land, river or mountain, or went anywhere, but immediately arises some red haired Gorman and says he has been there party. This thrust at the Germans delighted the inperia ment. The Empress contrived to understand it, and for the first time was convulsed with laughter, in which her son also joined."

From the letters brought home by Stanley from Dr. Liv ingstone, it appears that he has been principally engaged during the past three years in tracing out the watershed o the Nile, and thinks that he has now nearly finished the business. He has discovered some very remarkable regions,
full of great fountains, streams, and lakes. "I have ascertained," he says, "that the watershed of the Nile is a broad upland, between $10^{\circ}$ and $12^{\circ}$ south latitude, and from 4,000 to 5,000 feet above the level of the sea. Mountains stand on it at various points, which, though not apparently very high, are between 6,000 and 7,000 feet of actual altitude. The springs that rise on it are almost innumerable.'

## the opening of the american institute fair

 The forty-first Annual Exposition of the American Institute was formally opened at the building of the association on the corner of 63d street and Third avenue, in this city, on the morning of the 4th ultimo. The exercises consisted of music by the orchestra, and an address delivered by Hon. F.A. P. Barnard, the President of the Institute in which the A. P. Barnard, the President of the Institute, in which the prominent position and rapid progress of the United States in Industrial matters, and the value of the efforts of the American Institute in for warding and fostering native talent, were especially dwelt upon. The speaker considered that the productive power of manufacturing industry has more than doubled since the foundation of the Institute, and has increased tenfold since the Declaration of Independence. The relation of the industrial arts to civilization, the progress of modern industry, and the influence of science upon improve ments, were learnedly discussed. In speaking on the last mentioned topic, the latest discoveries ard inventions in
dyeing, weaving, printing, ice making, explosives, intercom dyeing, weaving, printing, ice making, explosives, intercom-
munication, and transportation were cited as examples. An munication, and transportation were cited as examples. An
earnest advocacy of iaternational exhibitions in general, and an appeal in behalf of the coming Vienna Exposition in particular, concluded the cration.
As is usual on every opening day, the internal arrangements of the building were in a state of disorganization, and workmen were still busy in the different departments, completing the alterations necessary to accommodate the in-
creased demands for space. Very few articles were in posi-
tion, though exhibitors are now sending and arranging their goods with all possible dispatch. The applications for space, we learn, are more numerous than ever before, so that the Exposition bids fair to be far superior to that of last year. The managers are using every endeavor to finish the preparations for the reception of visitors, and they state that everything will be in place in a few days.
The department of engines and machinery, at the time of writing, is quite unprepared. All the boilers but two have been placed, and most of the shafting has been hung. We notice a rotary engine and a portable saw mill among the novelties. In the large hall, a vast variety of articles is present, which, in their present confused condition, it is impossent, which, in their present confused condition, it is impos-
sible to particulariza. In the art gallery, an elaborate dissible to particularizz. In the art gallery, an elaborate dis-
play of photographs, drawings, etc., is expected. The deplay of photographs, drawings, etc., is expected. The de-
partment of the dwelling, which is rather more advanced partment of the dwelling, which is rather more advanced
than the other portions of the fair, contains several unique improvements in household furniture and appliances, which we shall notice in detail hereafter. In the center of the main floor is a huge eoda water fountain surmounted by a colossal statue, which will doubtless prove an ö́ject of considerable attraction. The interior of the building is quite tastefully decorated, and will be brilliantly illuminated.

## the american association for the advancement OF SCIENCE.

The twenty-first session of the American Association for the Advancerment of Science has recently been held at Dubuque, Iowa. Several of our most eminent scientists were unfortunately absent, so that, as compared with those of last year, the transactions of the meeting present much fewer points of interest.
We regret to notice that the proceedings were not conduct ed with that gravity and dignity which we might expect from ed with that gravity and dignity which we might expect from a learned body strictly devoted to the investigation of scien.
tific subjects. The much vexed subject of temperance and the political discussion, into which the resolutions relative to the disposition of the Chinese indemnity fund seem to have drifted, were entirely out of the province of the meeting, and have only served as a text for the inane ridicule in which certain of our daily journals seem to revel, whenever they perceive anything at all extraordinary in the, to them,incomprehensible proceedings of scientific associations.
The session terminated with the usual excursions of the members to the interesting localities in the vicinity of Dubuque. The place of meeting next year, on the third Wednesday of august, will be Portland, Me. The officers elected for 1873 are Professor Joseph Lovering, of Harvard University, President; Professor A. F. Worthen, State Geologist of Illinois, Vice President; Professor F. W. Putnam, of Salem, of Ininois, Vice President; Professor F. W. Putnam, of Salem,
Mass., Permanent Secretary; Professor C. A. White, General Mass., Permanent Secretary; Professor C. A. White, G
Secretary, and W. S. Vaux of Philadelphia, Treasurer.
We shall give from time to time brief condensations of the nost interesting and valuable of the papers read.

## a new species of fossil elephant

J. W. Foster, LL. D., of Chicago, pronounces a fossil tooth which has been found near Terre Haute, Indiana, to be that of an elephant, but of a particular species of the animal which differs specifically from any yet discovered. He states that ot only is the tooth admirably adapted to the three fold work of crushing, grinding, and triturating the food as it passes in the various stages of mastication through the mouth, but that there seem to be high ridges of enamel and deep valleys of cement in it, which lend peculiar efficiency to its work, the arrangement of the teeth and jaws being
like a curiously devised hopper with an upper and a nether like a curiously devised hopper with an upper and a nether
millstone, in which the coarsest fibrous materials could be reduced to a pulpy mass. The characteristics of the teeth of all known species of elephants, fossil or surviving, brought into comparison with the tooth in question, exhibit striking differences-which are held to be sufficient to constitute the new species of Elephas Mississippiensis, whose hight did not probably exceed six feet, being diminutive in comparison with the gigantic Elephas Primigenius; but nevertheless equally a mammal of the post-pliocene epocb, deserving o the closest study by American palæontologists.
positions for astronomical observations.
Astronomical observations should be made from high elevations. Professor Young reports the whole number of lines in the chromosphere seen from Sherman, a lofty station on
 number as have been observed before. In these localities, owing to this fact that a star has been recognized at these high altitudes as having a companion or being a double star not previously known as such.
An observer on the Pacific coast reports to Professor Pierce that he can see the companion of the star Polarisfrom a high point on the Sierra Nevada. It is well known that this is a
test of great nicety, requiring the utmost purity of atmosphere. Telescopes will hereafter be placed higher than eve before-in Europe, probably on the Alps.

## the locomotion of animals.

One of the most interesting papers read was prepared and delivered by Professor E. S. Morse, of Cambridge. The sub ject was the locomotion of animals, and the lecture, intended
not merely for scientific consideration, was admi abably adapted to popular comprehension by the graphic drawings made by the Professor on the black board during his discourse. Microscopic animals were first treated. These move rap idly through the waterby means of little oars or cilic. There are creatures which are destitute of shape and yet can form any part of themselves into stomach and digestive organs, or
can temporarily assume forms which give them means of
locomotion. Others throw out arms and seize their food, but yet have no specific shape when at rest.
Belonging to a higher order are the jelly fish. These strange creatures which, while in the water are perhaps as large as a wash tub, if dried scarcely weigh an ounce. They do not move by means of muscles, but by cells independent of each other, which, by contraction and expansion, answer the purpose of paddles.
The star fish is among the most curious of ocean forms, having his mouth in the center of his body, his eyes at the end of his arms, and a series of suckers, constituting locomotive appendages, thrown out from beneath the animal in the water. If the star fish wishes to travel, he attaches these suckers to whatever is ahead on the ocean bed before him and pulls himself forward. The common fresh water mussel has large muscles which give motion to a long foot which it wedges into the sand, and then, by contracting the foot, draws the shell after it. As they work along the shore, these fresh water mussels make grooves in the sand by which they can be tracked; in fact, wherever such a groove is, a mussel can usually be found at the end of it. There is another freeh water shell fish which darts out its foot with great rapidity and as suddenly contracts it, and by this propulsion swims through the water. The shell that pincushions are made of -the scollop-is that of an animal which swims by opening and closing its shells, forcing the water out from between them. The cuttle fish has two broad fins behind and a series of long arms in front. It draws in water as most shell fish do, but, unlike others, pumps it out in front so that it swims backward, though it has also, by other means, the power of wimming forward.
Worms move by means of little bristles which stick out from the sides of the body, and are used to hold part of the body while the rest expands, or while part expands the rest contracts, and thus the worm is drawn forward in sections. This is the case with the common angle worm. Among the crustaceans, the lobster either crawls forward with his legs or jumps backward by strokes with his tail. The eyes mounted on the end of long feelers can look over the shoulder of the animal while he is jumping backward.
In commenting upon lepidopterous and hymenopterous insmall, the lecturer stated that, as with birds, if the wings are smal, they move rapidly; if large, slowly. The grasshopper was referred to as having a variety of modes of locomotion and the cheese mite or "skipper, it was stated, hopped by
coiling his head and tail together in a ring and pulling them suddenly apart with a snap. After illustrating the movesuddenly apart with a snap. After illustrating the move-
ments of the fish and frog, those of the snake were explained. Its locomotion is obtained by means of scales, which are thrust against the ground by motions of the ribs, actuated by powerful muscles. It results that if a snake, though capable of the most rapid movement on the ground, be put on a smooth surface like that of glass or varnished wood, he will wriggle with great efforts, but make no forward pro gress.
The variety of functions performed by the muscles of the birds and the singular shapes of their bills, adapted to their various modes of feeding, were next illustrated. The arms are to become the organs of flight, and the bones are bridged, and trussed, and modified so as to give the requisite power. Below the heel and bones are extended and anchylosed sn as to furnish the requisite prehensile strength. The tendons naturally close the toes when the weight of the body rests so as to bend the leg; thus the bird rests securely on its perch. Hence, also, the fowl always shuts its toes as it lifts them because bending the leg draws the tendons. The modification of the arm in the bat still leaves it an organ of flight.
In the lower vertebrates we have simple fins; going up tep by step the functions of the arm by degrees escape the need of use for locomotion. The higher the grade of animals,
the greater the power of the arm for other purposes than that of locomotion. The monkey uses the arm and hand for a great variety of other purposes, such as for feeding itself, and the female monkey holds its young to its breast by means of its arms. At last with man the arm becomes a cephalic appendage, and is no longer used for purposes of locomotion, unless, indeed, he drives a hand car. Step by step among the lower animals we may trace the improvement of organ and of function until we reach its highest development in a species where only the lower limbs are employed to carry the body, and the upper become exclusively the servants of the brain.

## table of velocities

We publish in another column a list of one hundred and hirty velocities, interesting to engineers and mechanics, compiled by Dr. E. Hartig, Professor at the Royal Polytech nic School at Dresden, and translated for our journal by Dr. Adolph Ott. Information is given regarding the velocity of parts of almost every kind of machine, of mechanical tools, water and air under varied circumstances, of vessels, of grain in elevators, of the flight of birds, of the transmission of sensation through the nerves, of railroad trains, of sound, f light, and finally of the electric current. The lowest ve locity given is that of the burning of Beckford's fuse, which is consumed at the rate of 39 inches per second; the highest
is that of the discharging current of a Leyden jar in copper wire 1.7 millimeters in thickness, by which the inconceivable speed of $288,004 \frac{8}{10}$ miles is obtained in the same space of time. The table is worthy of careful perusal and preserva. tion, as it contains many curious and interesting facts obtained by comparisons of the data given. Thus the highest velocity of the express trains on German railways (about 50.3 miles per hour) is greater than that of a strong wind. The velocity of the transmission of irritation in our sensa
tory or motatory nerves is exceeded in rapidity by the flight of the swallow or eagle.

The compilation is of direct practical value, as it gives not only the highest admissible velocities, but also those that are the most advantageous in running a large number of the me chanical appliances in common use

## EXTENSION OF PATENTS. VALUE OF THE INVENTION.

To one who is conversant with the proceedings of the Patent Office upon application for the extension of patents, it is painful to observe how many of them fail, though they deserve success, because the requisite formalities have not been well understood and observed. While it is often obvious that the patent ought to be renewed, yet the privilege has to be denied, because the proper information has not been furnished to justify the Commissioner in granting it.
Before acting favorably in such cases, he ought to be satisfied, for instance, that the invention covered by the patent is fied, for instance, that the invention covered by the patent is
of sufficient importance to warrant his action. It is a very of sufficient importance to warrant his action. It is a very
common incident to find the device wholly frivolous, or so common incident to find the device wholly frivolous, or so
poorly adapted to practical use as to be of no value whatpoorly adapted to practical use as to be of no value what
ever. Yet the patent for it may stand in the way of others who are endeavoring to achieve some highly useful improve ments, but cannot bring them to perfection without infringing the patent. It not unfrequently happens, also, that the patentee has received a greater or less sum from his invention, and the question will arise whether that is not as large a remuneration as his invention is entitled to. There are abundant reasons, in short, why the petitioner should make the value of the invention to appear. Accordingly the applicant for an extension is required in every instance to give a detailed statement of the value under his owroath, and to corroborateit by the evidence of disinterested witnesses. Something more is intended by this than a naked avermen that the invention is worth a certain specified sum. The commissioner stould have the means of judging for himself
what it worth. T'he data should be furnished upon which what it is worth. The data should be furnished upon which
he can decide for himself, and form an intelligent estimate he can decide for himself, and form an intelligent estimate
of his own. Otherwise he might just as well take the petitioner's naked assurance that the invention is of sufficient value to entitle it to an extension.
The most satisfactory way in which this requirement is usually met is to show how many machines (if such is the invention) have been built and put in operation under the patent, and what is the net gain per day, or year, of running such a machine over those of the same kind which were known before. It can generally be made to appear that the products are so many more in number, or are worth so much more. If these statements are confirmed by disinterested witnesses, they constitute data from which a very fair calculation of the value of the invention can be made, and one that can usually be relied on.

When the invention is merely an improvement on some old instrument, a similar course can be pursued, and a comparison instituted between the instrument without the improvement, and the n9w one which embodies it.
It sometimes happens that, through poverty or injudicious sale of the in vention, the patentee has been prevented from in troducing it into use, as he might otherwise have done, and hence cannot furnish such a statement. He should explain this in making his application, and should satisfy the Commissioner by other means how much more valuable his machine is than others intended for the same purpose, and also whether it would go into use if he should obtain an exten sion of his patent. He may by these means furnish the Commissioner with good grounds for granting his petition.
These examples may serve to illustrate the measures ne cessary to be taken in order to establish the importance of the invention, to show that the patent deserves to be pro longed, and that the remuneration already received is less than the patentee is justly entitled to. The point to be kept in view is to furnish the Office with such information as will enable it to form an independent judgment upon the subject.
The facts are what are wanted, not the opinions of others The facts are what are wanted, not the opinions of others The affidavits of the most skillful experts that the invention is worth any particular sum, or is of great consequence, are
of no use, because they undertake to substitute the estimates of no use, because they undertake to substitute the estimates
of ocher men in the place of those who have been designated of ocher men in the place of those who have been designated
by law to exercise their own facilities in forming the esti mates to exercise their awn fache think of asking a judge sitting in a court of law to rest his decision upon the views entertained by the ablest of his bar. Neither should the Commissioner, in determining whether a patent should else has formed, however competent he may be. His country holds the Commizsioner responsible for what he decides, and relies on him for being guided by his own views.

## A New Fuel for Locomotives.

The Russian Steamship and Railway Company announces that it has found the use of naphtha for steam generation, with locomotives, very advantageous. The material employed by the company is the crude oil from the Cauca sian and Volga regions, and, compared by weight, the amount consumed was about one half that of coal. The arrangement for burning naphtha is stated to be of such a nature that no difficulty will be experienced in substituting one for coal consumption in place of it, should it be found desirable so to do.

Careful and repeated experiments made in this country during the past five years, in the burning of crude petroleum as a fuel for locomotives and ocean steamers, established the fact that the oil was a much dearer fuel than coal. Reports of these experiments will be found in the back volumes of the Scientific American.

Facts for the Ladies. - Mrs. C. G. Dodd, Bloomfield, N. J., has used
a $\$ 50$ Wheeler \& Wilson Lock-Stitch Machine since 1860, in family and gene a $\$ 50$ Wheeler \& Wilson Lock-Stitch Machine since 1860 , in family and gene
ral sewing, without repairs, and but one needle broken. See the ne ral sewing, without repairs, and but one need
Improvements and Woods' Lock-stitch Ripper.

## Business and cersomal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices
exceed Four Lines, One Dollar and a Half per Line will be charged.
The paper that meets the eye of manufacturers throughout Rotary Hoisting Machines; Reversible, no centers; recom mended by best Engineers. Send orders to Lighthall, Beekman \& Co.
Gauge Lathes for Handles, and all kinds of straight and taper turning, $\$ 20.00$. Wm. Scott, Binghamton, N. Y.
T. R. Bailey \& Vail, Lockport, N. Y., Manf. Gauge Lathes.

Wanted-A large iron Cylinder Tank, six or eight feet in diameter, suitable for preparing wood under pressure. Address Baugh dlameter, suitable for preparing wood under press
Sons, 20 South Delaware A venue, Philadelphis, Pa.
Manufacturers of Water Meters and otber Water Works The Berryman Steam Trap excels all others. The best i lways the cheapest. Address I. B. Davis \& Co., Hartion
Wanted-Hydraulic Press, ram 6 to 8 in . diam., platen about 40 in . between bolts. Address Joseph C.Hewitt,17 Burling Slip,New York Wanted-Machines for making percussion caps. Address A. Ott, P. O. Box 2705, New York city.
For Sale-Machine Shop for light work, complete. Term easy, or real estate. Address M. Cooke, 95 Liberty Street, New York. Wanted-Copper, Brass, Tea Lead, and Turnings from al parts of the United States a
Broad Street, Philadelphia, Pa
Engine and Speed Lathes of superior quality, with hardened Steel bearings, just finished at t
Free Institute, Worcester, Mass.
Brick and Mortar Elevator and Distributor-Patent for Sale See description in Scr. American, July 20, 1872. T. Shanks, Lombard and Sharp Streets, Baltimore, Md.
Millstone Dressing Diamond Machine-Simple, effective, du rable. For description of the above see Scientific American, Nov. 27 th
1869. Also, Glazier's Diamonds John Dickinson. 64 Nassau st., N. Y. Brown's Coalyard Quarry \& Contractors' Apparatus for hoisting le. W.D.Andrews \& Bro,414 Water st..N. Y For Machinists' Tools and Supplies of every description, address Kelly, Howell \& Ludwig, 917 Market Street, Philladelphia, Pa.
Williamson's Road Steamer and Steam Plow, with Rubber Tires. Address D. D. Williamson, 32 Broadway, N. Y., or Box 1809.
Sixty Rotary Engines, 2 to 80 H.P., working in and about New York city, as Steam Engines, Hoisting Machines, and Air Pumps
Send for Circular to Lighthall,Beekman \& Co., 5 Bowling Green, N. Y.city Alcott Lathes, for Broom, Rake, and Hoe Handles. S. C. Hills, Alcott Lathes, for Broom, Ra
$32^{\circ}$ Courtlandt street, New York.
Belting a.3 is Belting-Best Philadelphia Oak Tanned. C. W Arny, 301 and 303 Cherry street, Philadelphia. Pa
Models and Patterns of all kinds made in the best manner a lowest prices. Geo. B. Kilbon, 35 Market St., Sprin ${ }_{\mathrm{S}}^{\mathrm{fl}} \mathrm{fid}$, Mass.
Who fits up and furnishes the tools, machinery, and fixtures for factories of shos lasts, especially polishing and grinding machines Offers, with illustrated catalogues and prices, to be addressed
i86, care of Messrs. Baasenstein \& Vogler, Stuttgart, Germany.
Tested Machinery Oils-Kelley's Patent Sperm Oil, $\$ 1$ gallon Engine Oil, 75 cts. ; Filtered Rock Lubricating Oill, 75 cts. Send for cer tificates. 116 Maiden Lane, New York.
The Berryman Heater and Regulator for Steam Boilers-No one using Steam Boilers can afford to be without them. I. B. Davis \& Co Flouring Mill near St. Louis, Mo., for Sale. See back page. Steel Castings to pattern, strong and tough. Can be forged and tempered. Address Collins \& Co., 212 Water St., New York Walrus Leather for Polishing Steel, Brass, and Plated Ware. Greene, Tweed \& Co., 18 Park Place, New York.
Kelley's Chemical Metallic Paints, $\$ 1, \$ 1 \cdot 50, \$ 2$ per gallon, mixed ready for use. Send for cards of colors, \&c., 116 Maiden Lane,N. Y. Kelley's Pat.Petroleum Linseed Oil, 50c.gal., 116 Maiden Lane Ashcroft's Original Steam Gauge, best and cheapest in the market. Address E. H. Ashcroft, Sudbury St., Boston, Mass. Ashcroft's Self-Testing Steam Gauge can be tested without removing it from its posit:on.
Air Pumps-Rotary Air Pumps, the simplest, lest and cheap est. Send for c
New York city.
Brown's Pipe Tongs-Manufactured exclusively by Ash n , Mass.
For 2, 4, 6 \& 8 H.P. Engines,address Twiss Bro.,New Haven ,Ct. American Boiler Powder Co , Box 797, Pittsburgh, Pa., make Windmills: Get the best. A P.Brown \& Co.,61 Park Place,N.Y Boynton's Lightning Saws. The genuine $\$ 500$ challenge. Will cut five times as fast as an ax. A 6 foot cross cut and bu
E. M. Boynton, 00 Beekman Street, New York, Sole Proprictor
Better than the Best-Davis' Patent Recording Steam Gauge. Simple and Cheap. New York Steam Gauge C $0 ., 46$ Cortlandt St., N. Y. Peck's Patent Drop Press. Milo Peck \& Co., New Haven, Ct The Berryman Manf. Co. make a specialty of the economy
 For Solid Wrought-iron Beams, etc., see advertis
dress Dnion Iron Mins, Pittsbarkh, Pa., for uthograph, etc.
For hand fire engines,address Rumsey \& Co., Seneca Falls,N.Y. All kinds of Presses and Dies. Bliss \& Williams, successors Mining, Wrecking, Pumping, Drainge or Irrigating Machir ery, for sale or rent. See advertisement, Andrew's Patent. inside psge.
To Ascertain where there will be a demand for new Machin. ary, mechanics, or manatactarars' sapplien see Manufacturing
United States in Boston Commercial Bulletin. Terms 03 ear

Old Furniture Factory for Sale. A. B., care Jones Scale Works, Binghamton, N. Y. Presses,Dies \& all can tools. Ferracute MchWks,Bridgeton, N.J. Also 2-Spindle axial Drills, for Castors, Screw and Trunk Pulleys, \&c. New Pat. Perforated Metallic Graining Tools, do first class work, in less than half the usual time and makes
Grainer. Address J. J. Callow, Cleveland, Ohio.
or Hydraulic Jacks and Presses, New or Second Hand, send E. Lyon, 470 Grand Street, New York.

For Steam Fire Engines, address R. J. Gould, Newark, N. J.

## Motesequweries.

[ We present herevoith a series of inquiries embracing a variety of topics of reater or less general interest. The questions are simple, it is true, but w refer to elicit practical answers from our readers.
1.-Printing on Metal.-Can any one inform me if print ng with ordinary type can
iron, and how?一T. S. R.
2.-Injector.-Will any of your readers tell me how to make an injector for the boiler of half horse power steam engfne? F. F.
3.
3.-Parasite of the Black Cricket.-I recently crushed a common black cricket, about three fourths of an inch in length; and there
came out of the body of the insect a brownish colored water snake more came out of the body of the insect a brownish colored water snake mor
than 9 inches long, about one sixteenth of an Inch at the largest diameter than 9 inches long, about one sixteenth of an inch at the largest diameter
or center, and about one thirty-second of in inch at the smallest, or neck, with ome appearance of a head, it has lived now 48 hours in water, and ther is no diminution of vigor. It is very active. The cricket was very lively vith its strange burden which was packed into the body between the sof arts and the external shell. Can you tell me what the phenomenon means? Did the cric
H. E. C.
4.-SAW MILL Queries.-I am about erecting a saw mil on a small stream, under a 10 feet bead; and I propose using a center vent
wooden wheel of 5 feet diameter, with 14 inches depth of bucket. What vooden wheel of 5 feet diameter, with 14 inches depth of bucket. What
number of inches of water under that head will it be necessary to use to drive a $5 \frac{1}{2}$ feet circular saw at the speed of from 900 to 1,000 revolutions pe minute with a capacity of 6,000 feet of lumber in 12 hours? What numbe of revolutions would such a wheel make per minute when laboring under
the full capacity? Is there any system of feed works whereby feed can be he full capacity? Is there any system of feed works whereby feed can be
regulated while the saw is running? I do notlikethe system of cone pulleys or the sliding belt cone feed. I wish to arrange so that I can change the cut of the saw to light or heavy feed, without shifting belts. If there is any such device, 1 would like to have a description of it.-P. P. S

## Answers to Correspoudeuts.

SPECLAL NOTE.-This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a
purely business or personal nature. We will publish such inquiries purely business or personal nature. We will publish such inquiries
however, when paidfor as advertisements at $\$ 1.00$ a line, under the hea however, when paid for as ad

Makina Wood Airere. S. C's query is too vague Does h WOOD AIRTIGH. Does he mean stopping
pores of porous timber?
B. F. C.-The mineral you send is iron pyrites-sulphur and iron; it is of no special value.
W. M., of Minn.-We do not recommend the use of any patent eye cups for improving the sight. If we ever advocated their use, it The Transparent Liquid of the Organs of Vision.-J. De W. C.'s suggestion can easily be tried by himself or the nearest pho
tographer. How does he propose to make the liquid deposit a film? Rust induced by Soda and Chloride of Lime.-S. A. T., of Pa., should be careful not to leave any salts exposed to the air near
bright steel goods. Chloride of lime will absorb moisture till all the bright steel goods. Chlorite of lime whi absorb moisture till and
chlorine is set free, and will then yield it again to the atmosphere.
Removing Iron Rust.-To R., query 1, page 122.-Put one fron rust, froit and other stains. Exposure to the sun will remove - Mrs. P. of Tenn. [Yes, and the acid will destroy the fabric unless washe off soon after its application.-Eds.
Chloroform.-C. T. B., query 1, page 170, is informed that chloroform consists of three atoms of chlorine and one atom of formyl,
which latter is a bicarburet of hydrogen. It may be thus called terchlo which latter is a bicarburet of hydrogen. It may be thus called terchlo ride of formyl, and it has the formula

## $\mathrm{C}_{2} \mathrm{HCl}_{3}$.

Its marufacture is always a complicated process, one of the simples forms being as follows: Put three pounds chlorinated lime into two gal lons alcohol of sp. gr. 844; distil a gallon from this mixture, and rectify
by redistillation, first from a great excess of chlorinated lime and afterby redistillation, first from a great excess of chlor
wards from carbonate of potassa.-D. B., of N. F .
The Jawsharp.-B. query 15, page 170 , may be assured that the various tones of the jawsharp are caused by the different pres
sures of the breath on the tongue of the harp, which tongue is kept sures of the breath on the tongue of the harp, which tongue is kept in motion by the touch of a finger. The vibration of the vocal organ would
not affect 1 t , unless the player sang on to the instrument.-D. B., of N. $\mathbf{Y}$. Mile and Ink Stains.-P., query 3, page 170, is informed that the milk, being left to dry in the fabric, develops lactic actd, whic is the only matter in milk that could affect an ink stain. T a diected by thf
an ink blot that had been dry for a few weeks could be afect acid.-D. B., of N. $\mathbf{Y}$.
Koumiss.-Query 4, page 170.-W. R. J. will find some difficulty in preparing koumiss unless he has access to a horse breeding
farm. The genuine koumiss of Tartary is distilled from mare's milk while undergoing fermeatation, and the milk will yield the large propor tion of 14 ounces of an alcoholic fluid for every 21 ounces milk. This fluid matter, and consequently yields less alcohol in distillation.-D. B., of

Rust Joints.-Query 9, page 170.-Has D. M. tried the effect of heat, applied externally, so as to expand the socket?-D. B., of N. Y Spontaneous Iqnition.-To G. T. R., query 9, page 122.Mix a tablespoonful of chlorate of potassium with about the same amoun
of brown sugar. If a few drops of ordinary sulphuric acid be poured on this mixture, it will ignite and burn with a beautiful violet colored flam e this mixture, it will ignite and burn with a beautiful violet
giving sumficient light for your purpose.-P. T. B., of N. Y.
Soldering Lead.-To J. C. H., query 4, page 138.-Plum bers' solder is an alloy of 1 part lead and 3 part tin; apply with an ordi-
nary soldering nary soldering iron, the joint having b
with tallow or rosin.-C. O. I., of Pa.
zecent Ancricam and forcign edatents.

## Under this heading we shall publiss. nent home and foreign patents.

Drbdaing Machins.-Hyacinthe Gonellaz, of Houma, La.-This invention elates to a new dredging machine, to be used in rivers, canals, or
lakes ; and consists in in a novel arrangement of colters and buckets with swinging backs or dumplng spoons, receiving pans, and operating gmechan-
ism ism. Whenever a filled bucket arrives in front of the receiving pan, the
latter is swung toward the same into position to receive the contents discharged therefrom. The pan is then carried back and dumps its contents
int bucket arrives in front of the pan, in position for discharging its contents, bucket arrives in front of the pan, in position for discharging its contents,
the spoon in such bucket is vibrated by gravity and by its connection, or Ins Fountain for Printing Priss.-Henry B. Allen, Brooklyn, N. Y.
Thisinvention has for its object to facilitate the adjustment of the bot--Thisinvention has for its object to facilitate the adjustment of the bot-
tom of an ink fountain during operation of the press with which the same tom of an ink fountain during operation of the press with which the same thereby controlling the eflux of ink. It was difficult to reach the screws
under the fountain, and occasioned at times injury to the hands of the attendants, which were jammed between the fountain and the ink disk. This
invention consists in applying the screw by which the bottom of the invention consists in applying the screw by which the bottom of the
fountain is adjusted above the bottom through a bridge that extends across the top of the fountain. The screw or the nut thereon is thereby exposed and inconvenient position for adjustment.
Carriage Runnify Gear.-William Hemme, Michigan Valley, Kan.This invention reters to an improved running gear in which the two axles are connected with each other, not by a perch, as usually, but by a rod
Which is jointed at both ends. This rod keeps the axles in the middle a
certain distance apart and certain distance apart, and at the same time permits their being easily
turned in a horizontal direction. By an improved connection at the hounds the hind axle will, whenever the front axle is turned, be swung in the opposite direction, carrying the hind wheels into the track in which the front wheels are running. The turning of the vehicle and its management are
thereby materially facilitated. The claims allowed cover the combination with the axles of the rod jointed at each end to one of said axles, the slotted Glove-Solomon J. Clute and Daniel M. Durfee, Rockwood Glove.-Solomon J. Clute and Daniel M. Durfee, Rockwood, N. Y.of a plain piece and two fourchettes, the former being cut so as to lap and
constitute the back of the first and fourth fingers, and the latter to form the back of the second and third fingers- By the new method of cutting out
gloves the palm piece is made of such form and size, and so much of the love is taken up by the three fourchettes, that a skin which is defective glove, labor being always a small item of expense as compared with the stock, or material used, thus saving a great amount of stock.
Covan Lozence.- Edmond Gauvreau, Quebec, Canada.-This invention
or discovery relates to a new and useful compound, in the form of lozenges, for the cure of coughs, colds, and affections of the throat and lungs, and all diseases of the respiratory organs. The inventor takes two parts of pul-
verized ipecacuanha and opium, sixty-four parts sugar, one part citric verized (secacuanha and oplum, sixty-1our parts sugar, one part citric
acid (solution) two parts alcohol, one part sirup of pine apple ; tragacanth
sulfcient for coloring. These in $\begin{aligned} & \text { reedients are mixed together to form a }\end{aligned}$ sutfcient for coloring. These in rredients are mixed topether to form a
solid mass of paste, which is then cut into lozenges, and put up in boxes for

Perambulator.-Thomas Galt, Rock Island, Ill.-This invention relates to a new perambulator whose handle is connected with the front axle, to
steer by means of the front wheels, and it chiefly consists in a new maner of connecting the handle with the axle; also, in a reversible feature which of connecting the handie wilh the axie; also,
.allows the handle to be applied to the front of the vehicle to convert it
into a four wheeled carriage that is drawn forward instead of pushed ; and, into a four wheeled carriage that is drawn forward instead of pushed; and
further in the use of stops on the under side of the carriage for arresting the perambulator handle during the
Motive Powrr for Operating Sewing Machines.-Henry Warren and Charles H. Luther, Providence, R. I.-This invention consists of a nove and effcient arrangement of a spring winding, holding, regulating, and
transmitting apparatus. A crank shaft has a drum inclosing a spring fixed loosely on it, said spring being connected at its outer end to said drum, and
at the inner end to a hub made fast to the shaft. The face of this drum through a shaft and pulley. A disk at one side of the drum, attached to through a shaft and pulley. A Alsk at one side of the drum, attached to
brackets, projects from one side of the frame, andihas a ratchet toothed
hub, on the outside, for holding the shaft after the spring has been wound up by a pawl, pivoted on an arm of said shaft. There is a friction holding disk on one side of the drum, opposite to the one where the ratchet is ar
ranged. Its hub is pivoted in the ends of a crotched shifting lever pivoted top the machine or slow the motion, as required. It also holds the disk stop the machine or slow the motion, as required. It also holds the disk
while winding up the spring, which is done by turning a hand crank. This arrangement affords a simple and efflcient apparatus, which may be wound
up by a few turns of the crank, and will run a sewing machine or other light much longer than the time required
Flour Packer.-Charles E. Zimmerman, Frederick, Md.-This invention
is an improvement in flour packers of the class in which an ascending and is an improvement in flour packers of the class in which an ascending and
descending platiorm for carrying the barrel is operated by a counterpoise
weight and graduated conical roller, said platform acting in connection weight and graduated conical roller, said platform acting in connection
with a fixed curb that enters the barrel, and within which the packing devices proper are rotated. The invention consists of a drop plug for cut ting off the flour, and contrivances, to be set free by the descending plat-
form, for dropping the plug at the proper time; and it also consists of a register arranged in connection with the apparatus, and having a weighted
lever for actuating the pawl so arranged as to be tripped by the platform when it goes down, so as to register each time.
RanN Water Cut Off.-John abercrombie and Elijah D. Miner, o
Morrisania, N. Y.-This invention consists of a spout pivoted to a leade pipe at a hole in the side of said pipe in such manner that it will swing up against the pipe, close the hole, and constitute a part of the side of the
pipe when it is desired to have the water run straight down through the pipe when it is desired to have the water ran straight down through the
pipe to the cistern below; and when it is desired to shut the water off from
the cistern and spout it out upon the ground or into a trough or the like the cistern and spout it out upon the ground or into a trough or the like
the said spout will swing down to a standing position, close the passage down the pipe, and open the one through the side. The inner end at this
time closes up against a curved deflecting plate fitted on the inside of the leader pipe in such manner as to fit snugly into the upper side of the spout and make a tight joint
side of the leader pipe.
Piston Rod Packing.-James Melledge Flagg, of Providence, k. I.-
The object of this invention is to furnish an article for packing the pisto rods and valve rods of steam engines that can be easily applied, and that will stand heat and pressure without being injured. The invertor takes a covering of cotton yarn, then soaks the cord so arranged in a solution o alum, and then applies. with a brush or in some other manner, a mixture
composed of: argillaceous mineral, silica, water; a trace of magnesium iron, and lime, ground asbestos, powdered plumbago, alum, and common
hard soap are adde. After two or trree coats of the mixture have been hard soap are added. After tist and while yet in a moist state, a coating of undressed hemp, twine or similar material is braided over it. Other coats of the mixture are applied until the packing is of the desired diameter; it is then finished with a
braiding of cotton yarn. The packing after being soaked in a solution of braiding of cotton yarn. The packing after beling soaked in a solution of
the argillaceous mineral and alum is wound spirally around an arbor and the argillaceous mineral and alum is wound spirally around an arbor and
by means of a screw forced into a mold or tube of the desired size. Finally s removed from the mold it retains the spiral shapa, so that it can be ap plied to piston or valve rods by what is known as "cork screwing"
ushed "home" intothe gland, which it is designed to exactis fit.
 Kennedy
holding an arched form to the metal head, to which the lifting handle or baill is ap. plied, and in ifting its circular edge in a $V$ shaped croze. The combination of a concavo convex metal head, with a wooden body or keg, provided
with a $V$ shaped croze, for the purpose specified, is the claim allowed in the letters patent.
Corn Plantrr. - Robert M. Bowman and William H. Bowman, London, 0.-This invention has for its obiect to furnish an improved seed droppe
for corn planters so constructed that it cannot clog or choke with chaff, at the same time simple in construction and easily worked. By the construc-
tion, it is claimed, the chaff can pass out freely, and cannot clog or impede tion, it is claimed, the chaff can pass out freely, and cannot clog or impede
the slide, which at the same time has no flanges or grooves for the chaff to get into and thus clog it.
Churn.-Henry C. Bell, Edina, Mo.-This invention has for its object to ranged as to bring the butter quickly and with little expenditure of labor and it consists in the construction and combination of the body of the churn, cover, and a dasher handle, made hollow and closedjat its lower end by a hard
wood plug. To the side of the lower part of the tubular handle is attached the end of a curved pipe, which communicates with the interior of the said pipe is a hood made hog a hole in its side. To the rear or free end of th or more cross bars, and with its smaller end toward the end of the pipe.
When the tubular handle is revolved, the rear end of the pipe and the hood When the tubular handle 1s revolved, the rear end of the pipe and the hood
are carried rapidly through the milk, the form of the hood increasing the are carried rapidy
force of the current past the end of the pipe, causing a vacuum, and thus
drawing milk, ahd causing, in connection with the currents formed by the move-
ment of the pipe and hood, a violentagitation in the milk. Detachable curment of the pipe and hood, a violent agitation in the milk. Detachable cur and churn body are other novel features in the invention
Sectional Boat.-Wiliam H. Philip, Brooklyn, N. Y.-This invention consists in the construction of small row or sail boats in short transverse
sections, for extending and shortening in the lengthwise direction in the manner of a telescope, the said sections being so tapered that in extending them to adjust the boat for use the inner ones bind in the outer ones,
similarly to telescopic drinking cups, so as to make watertight joints. Bewhen the boat is to be shortened up. The object is to provide boat3 for shortened up into a compact package for economizing space in storage transportation.
Filtter for Cane Juioz and other Liquids.-Enos Tuttle, Jeanerette, La.-This invention consists of a reel similar to the reels of flour bolts,
with a cover of flannel, wire or hair gauze, or other suitable flltering sub-stance, arranged in a suitable case provided with a vat at the head, with grate in it, into which the juice flows to retain the coarse matters-such a
leaves, pleces of stalk, etc., - where they can be removed from time to time by hand; thence the juice flows into the reel and percolates through the gauze to a
Barril Machinery.-M. T. Kennedy, New Brighton, Pa.-This invention relates to machinery for the manufacture of cooper work-barrels,
kees, etc. ; and consists in a machine for squaring the end of the barrel or git to a given length, beveling the chime and cutting the keg or barrel have been put together amd securred by truss hoops, which
hoops are afterward removed and replaced by ordinary hoops. The barre or keg trussed in this manner is placed in a revolving hollow cylinder, an aljusted centrally therewith and fastened, and the cylinder is revolved by
means of a belt, and the machine levers for squaring, beveling and crozing are then applied.
Cansl Boat.-Lewis Howard and Chas. Howard, Watkins, N. Y.-The down and is adjusted at anv point in rigid perpendicular guides; whereb all motion of the shaft out of its proper axial line is prevented. The adjustable bearingsthat are pendent have been found to vibrate and cause the
propeller shaft to lack that uniformity in its line of motion which is desiraentio the propeller, to depress and remove from the wheel the growth of grasi
that springs up on the bottom of canals. The invention also consists in an adjustable bearing plate (on the inside of the boat) which will ena
ORe Separator.-David Gross, Maxatawny, Pa.-The object of this especially designed tor iron ores, but not confined exclusively thereto ; an it consists in an upper coarsesieve and in a lower fine sieve arranged par aliel or nearly so in an inclined position, and suspended by linkss and piv-
oted at opposite ends, respectively, and connected with a double crank shaft by rods in such a manner as to be simultaneously vibrated in opposite tions is to largely relieve the frame work and operating mechanism of th jar and consequent wear and tear which obtains in
sieves vibrate simultaneously in the same direction.
Fire Place.-Michael Haughey, St. Louis, Mo.-This invention has for heating a room with a grate, and which usually passes off through the chimney, so as to beat the room quicker and more thoroughly, and at th the back of the fire place from which the air heated by the firerises to another enclosed space situated above the grate, thence passes to a spiral
ccamber winding around the fue, from the upper part of which it enters the room to be warmed through a register. Openings are also made in the
side and back of the first mentioned air chamber, that in the tormer com municating with the apartment while the other leads into another rer com into the open air. A trough of water designed to moisten the air and ab orb the carbonic acid gas drawn from the atmosphere in the room is place
the spiral chamber.
Steam Engine Gove
Steam Enaine Governor.-William C. Freeman, Louisiana, Mo.-This
nvention relates to a new steam engine governor in which the rotation on an eccentric within a chamber fllled with a liquid, and having spring ing vessel and a consequent adjustment of the steam valve.
Powder PaCking Apparatus. - Kendall F. Knowles, New York city. This invention relates to a new - apparatus for and method of fllling, at one time, a large number of small bottles, boxes, or other vessels with in
sect powder or other powder making the separate handling and fill ing of each bottle, box, or vessel_unnecessary. The invention consists in the combination of a movable sieve, with a conveying hopper and with
receiving box, into which the powder is discharge, and which can be vial hundred of bottles or small vessels may be flled in a few minutes, wher heretof ore it took hours to fll the several bottles or small vessels singly. Bale Tir.-Joseph L. Haigh, New York city.-This invention has for its Bject to furnish a simple, convenient, and reliable wire band for baling
ay, straw, cotton, and other substances put up in bales. A wire band, apon one end of which is formed an eye by turning the end of the wire
back uponitself, and twisting said end and the body of the wire together back uponitself, and twisting said end and the body of the wire together,
has its other end doubled back upon itself to form a hook, and the said are twisted togeth orm another eye of suffcient size to allow the first mentioned eye to pas hrough it. In using the band it is passed around the bale; the first eye is then passed through the second eye and over the hook. By this means the
strain or spring of the bale upon the toward the bale, so that, however great the strain may be, the hook canno upon the hook in the ordinary manner.

Calculating Magine.-William Robjohn, New York city.-This inven
on is by one of New York's oldest and most distinguished inventors. It relates to a new adding machine, which is operated by means of numbered in working order, as all keys are locked as long as any one is more o less depressed, and as the key depressed cannot be restored to its elevated
position unless it has first been entirely pushed down. Errors that might arise from depressing some of the keys partly, and thus adding only frac tions of the numbers which such keys represent, are thus entirely obviated, and rapid action, insuring absolute accuracy, can be performed. The in-
vention consists, first, in combining with the shank of each key a toothed portion, which holds the key as long as it is only partly lowered; also in
the use of a cam which serves to throw the toothed portion of the shank of the key out of contact wth the catch as soon as the key has been entire Iy depressed, and thereby enables the key to ascend after having completed
its stroke, though not betore: also in the arrangement, under the several eys, of a pivoted L-shaped plate, which is turned under the non-depresse keys by the one descending, and prevents such other keys from being de-
pressed until the descending key has again been elevated to its neutral position, when the $L$ plate is swung out of the way of the other keys. Ac tion on any key is thus automatically prevented until all keys are raised,
while, as before stated, none can be raised until its downward stroke has rst been completed.
Boring Machine.-Edward C. Cole, Pawling, N. Y.-This invention ha
frits object to furnish an improved machine for boring the hubs of car riage wheels which shall be simple, convenient, and effective, being so con-
structed as to borethe hub perfectly true with the rim, and to allow the Wheel to be put on an
Wagon Shert and Tent.-Milam M. Fitzgerald, Gonzales, Texas.-Th vention consists in providing the ordinary wagon sheet or cover at the sides with pleces of canvas or other fabric, which can be let down and aytime, or while the concern is in motion, can be rolled up and secured a the sides of the cover to be entirely out of the way. The tent sides are
provided with lapels which form the ends of the tent when let down. No poles, rods, or bars of any kind need be carried, and the tent can be
itched in a very short time, and also rolled up quickly. It is a capita contrivance for emtgrant wagons.
Cat Hoor and Stopprr.-David H. Cousins, Surry, Maine, assignor to
imself and James H. Knowles, of same place.-The object of this inven ion is to provide means for supporting anchors upon the side of a vessel topper attached to the vessel, so constructed that it will take hold of the chain or anchor and support the anchor out of the water, and so that it may be made to "let go" and free the anchor instantly. This cat stopper
consists of two main bars pivoted together. One bar has a mortise and op at itsend, by means of which loop the nipper is attached to the vessel The other bar has a projecting hook or horn, which is made to engage with ter, while leaving the chain free to be overhauled on the deck of the ves-
sel. The second bar is held in position by means of a hook plate pivoted the end of the bar and passed tirough the mortise, and it hooks onto th opposite side of the first bar. The plate is secured in this position by a key.
When it is desired to let the anchor "go," the erey is knockedout and the late is raised in the ar, when the anchor drops. By this arrangement the chain is released,
nd may be overhauled at any time, and the anchor may be dropped with out delay.
staliz
STALE CUTTER.-Robert F. M. Flack, Columbus City, Iowa.-This in
vention is an improvement in rotary stelk cutters, and consists in theman ner of arranging the frame, cutter wheel, and hoisting device, so that whe the wheel is out of action, the frame in which the sameis mounted may be
elevated, whereby the hoisting rope may be relieved of strain and certain elevated, whereby the hoisting rope may be relleved of strain and certain
other advantageousresnlts secured. Among other advantages claimed for other advantageousresnlts secured. Among other advantages claimed for
the improvement the inventor states that the cutters are double edged, and the improvement the inventor states that the cutters are double edged, and
they are fitted in slots in the ends of the arms and secured by bolts in such become dull.
machine Gun.-William A. Miles, Salisbury, Conn.-This invention reates to a batterygun, which is provided with sliding barrels. The entire
mechanism is rendered simple by the use of the sliding barrels, and all the tricate devices usually applied to battery guns dispensed with. The in y side, and connected with rotary cams or levers, whereby they are suc essively or jointly moved back and forward. During their backward mo tion they close over the cartridges that have dropped behind them upon
siding supports. When quite moved back their motion is arrested and the sliding supports. When quite moved back their motion is arrested and the
cartridges are exploded. The barrels are next moved forward to allow cartridges are exploded. The barrels are next moved forward to allow
the empty cartridge shells to drop down behind them. The invention also loading mectanism, which is composed of arriers that convey the cartridges from a receiver to the upper sides of inglsupports. The firing mechanism is also quite novel, and the whole gun
taken together exhibits very great ingenuity on the part of the inventor. Pinno Srool.-Charles A. Schindler, West Hoboken, N. J.-This inven trong, durable, inexpensive, and ornamental. The seat of the stool sis at trong, durable, inexpensive, and ornamental. The seat of the stool is at the rear part of the seat of the stool are attached the lower ends of two iron
rods. The lower ends of these rods are bent forward to cross the top flange the seat frame and then bent downward across the inner edge of said im, and are secured flrmly in place by screws. The rods are bent into orward side of the said back rest being upholstered in the same manner as
 ndenal device or center piece which may be made in the form of a harp, igned to give strength to the back, and enable it to have the requisit

Lardand butter Cutter.- William M. Bleakley, Verplanck, N. Y.r, tallow, tar, or other vi another. The invention consists in providing such stick with a slide,
whereby it can be cleared without soiling the fingers of the person hand ngit. Th
Railway Car Seat and Cough.-This invention consists in a new mode combining the eseau back with sliding frames, and in the use of auxiliary
backs to utilize as fully as possible the space within the car. Proper head osts may be removably applied to the ends of the couches. The outer part of the seat may be supported on a circular metallic track sunk into the
loor of the car, and arranged with sockets or catches, or both, to lock th eat in any desired position.
Brick Kiln.-Francis Strayer, Clinton, Iowa.-The object of this inven lon is to economize fuel and lessen the amount of labor required in burn
lag brick; and it consists in the arrangement of a kiln, constructed of ma onry, of square, rectangular, or other form, and of any required size, in lling which a succession of arched apertures in which the laced for burning the brick is formed. These apertures or pockets are
distributed throughout the mass of brick, belng made as the brick ar acked in flling the kilh. The coalis introduced as the arches are mad or through the sides of the kiln, as may be most convenient. There ar the process of burning. These apertures are closed with plugs which can be removed as required. To supply the requisite ammunt of oxygen for the
consumption of the fuel, one or more bellows are employed. The blast of cach bellows may be used separately and on opposite sides of the killn, al ternately, or the bellows may be used alternately. A fan blower or blow placed loosely in the kiln, so that the heat can circulate freely through it

Chili Platr and Flask.- Dennis Long and Samuel A. Miller, Louis-
fille, Ky.-The Anvention consists in a fask havi ag a flange provided with lugs, combined with a chill plate having a flange provided with notches, whereby the flask and chill plate are centered an
to each other with grea; convenience and facility.
Walifial Seid Plantre. - Lather C. Ives, Land of Promise, Va.-This nvention relates to an improvement in walking seed planters, and consists distributing disk, through the medium of a combined transporting and covering wheel and a system of double crank shafts and connecting rods.
Pad Crimp and Last for harness.-Richard R. Calvert and William Michael, Mansfield, Ind.-This inventlon relates to a new device for stretch-
ing the leather for all kinds of harness pads, and also to a new sectional ing the leather for all kinds of harness pads, and also to a new sectional last for keeping the pads distended while being stitched in the stitching
horse. It consists, also, in making the last, for holding the pad distended, of a series of blocks, which are made in sections, obliquely divided, to pre vent displacement, but permit their ready removal from the stitched pad. Cider bitters.-Thomas P. Devor, Millerstown, Pa.-This invention has for its object to furnish improved cider bitters, to contain lactic acid but no acetic acid, producing a good drink for warm climates and seasons, and which shall be beneficial in bilious complaints and in many forms of dyspep. sia; and it consists in preparing cider from apples, allowing it to ferment,
after which apple twigs are boiled in a portion of this cider in the proportions of one pound of apple twigs to one gallon of cider. In this decoction, when cool, are dissolved the whites of eggs, in the proportion of six eggs to one quart of the decoction. One quart of this solution is pouredinto each barrel. Refined white sugar, birch bark, and wild cucumber (magnolia
glauca) pods or bark are also put in to each barrel in certain proportions. Machines for Doweling Frilizs.-Joseph P. o'Brien, Kewanee Ill Machines for Dowrling Friliss.- Joseph P. O'Brien, Kewanee, Ill.-
The old mode of doweling fellies was to bore a hole in the end of each of the sections of the felly which were to form the joint and insert the dowel pin sections of the felly which were to form the joint and insert the dowel pin
into one of the holes and then drive the two sections together. The latter and improved mode is to butt the twe onds of the sections together and then make one or more slots or kerfs with a circular saw across the joint, and in-
troduce a thin piece of metal into such slot, which the tire of the wheel troduce a thin plece of metal into such slot, which the tire of the wheel
holds in place. This machine is designed for the latter mode of doweling, and consists in a clamping device with one or more saws connected therewith for sawing the dowel plate slots, and a feeding lever in combination with the saw arbor.
FLowrr Por. - Matthias Ludlum, Middlebury, Vt.-This invention has fori its object to improve the construction of a flower pot patented March 1, in use, and to adapt it to be removed from plants too bushy or brittle or twining to pass through it; and it consists in the combination of a saucer with a bottomless body, made in sections, which is intended to allow the of the the flower pot to whe opened up and removed from the soil and roots through the pot, or when they are long or twining vines, so that they mas be repotted or set in the ground without injuring them or even checking their growth.
Sod Carrirr.-Charles D. Meigs and Montgomery C. Meigs, Romney, Ind.-This invention has tor its object to furnish an improved sod carrier,
designed especially for use in carrying off the stiff prairie sod turned over by the plow in opening ditches, grading roads, etc. It is simple, convenient, and effective, enabling more work to be done in less time and with less labor for man and team than when the ordinary means are employed.
Skirt Elevator.-M. H. Bergen, Brooklyn, N. Y.-The inventor states
that there is a necessity for a skirt elevator, to be attached to every dress for the convenience of a lady in case she should be overtaken in a storm, or When the streets are damp and muddy. She offers to the public an elevator
in the use of which a trained dress can be converted, with one minute's adjustment, into a walking costume which cannot be recognized as a long dress. This gives the advantage of using the same dress either for an evening, toilet, or a walking dress. The invention consists of a tape with rings attarhed and a cord passing throug
waistband in the center of the back.
Churn--Nicholas Hospers, Pella, Iowa.-This invention relates to a machine which may be applied to the operation of any ordaary dasher churn. the dasher handle is attached a gulde rod which passes through holes in the upper part of the frame. A socket in the lower portion of the guide rod, to which is pivoted a forked connecting rod which communicates with a pin block detachably secured to a crank arm, connects the latter and the churn
dasher, and gives to the dasher acombined reciprocating and rotary motion. dasher, and gives to the dasher acombined reciprocating and rotary motion.

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American inventions, even if already patented in this country, can be patented in Canada provided the American patent is not more than one year old.
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## FOREIGN PATENTS---A HINT TO PATENTEES,

It is generally much better to apply for foreign patents simultaneousis It is generally much better to apply for foreign patents simultaneousis
with the application in the United States. If this cannot be conveniently done, as itttle time as possible should be lost after the patent is issued, as the laws in some foreign countries allow patents to any who first make the application, and in this way many inventors are deprived of valid patents
tor their own inventions. It should also be borne in mind that a patent is for their own inventions. It should also be borne in mind that a patent is
issued in England to the first introducer, without regard to the rights of the real inventor; therefore, it is important that all applications should be entrusted to responsible agents in this country, who can assure parties that their valuable inventions will not be misappropriated. The population of Great Britain is 31,000,000; of France, 40,000,000; Belgium, 5,000,000; Austria
$38,000,000$; Prussia, $55,000,000$; German Confederation, 40,000,000; Canada 4,000,000: and Russia, 70,000,000. Patents may be secured by American citizens in all of these countries. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections Writh the principal capitals of Europe. A large share of all the patents se-
 in favorable terms.

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## How Can 1 Obtain a Patent

is the closing inquiry in nearly every letter, describing some invention Which comes to this offlice. $\Delta$ poositive answer can only be had by presenting
a complete application for a patent to the Commissioner of Patents. An pplication consists of a Model, Drawings, Petition, Oath, and full Specification. Various offcial rules and formalities must also be observed. The
efforts of the inventor to do all this business himself are generally without suscess. After great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning. It the parties consulted are honorable men, the inventor may sately confide his
ideas to them: they will advise whether the improyement is probably deas to them: they wil advise whether the improyement is probably pat.

## How Can I Best secure My Invention ?

This is an inquiry which one inventor naturally asks another, who has hac some expert:
and correct:
Construct a neat model, not over a foot in any dimension-smaller if pos. New York, together with a description of its operation and merits 37 Park Row ceipt thereof, they will examine the invention carefully, and advise you as tc its patentability, free of charge. or, if you have not time, or the means a hand, to construct a model, make as good a pen and ink sketch of the im provement as possible and send by mail. An wer as to the prospect of a
patent will be received, usually by return of mail. It is sometimes best to aave a search made at the Patent Ofllce; such a measure often saves the cost of an application for a patent.

## Preliminary Examination

In order to have such search, make out a written description of the inver
 due time you will receive an acknowledgment thereot, followed by a written report in regard to the patentability of your improvement. This specia search is made with great care, among the models and patents at Washing.

To Make an Application for a Patont.
The applicant for a patent should farnish a model of his invention it sus.
ceptiole of one, although sometimes it may be dispensed with; or, if the in vention be a chemical production, he must furnish samples of the ingredients of which his composition consists. These should be securely packed, the inventor's name marked on them, and sent by express, prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to
remit money is by a draft, or postal order, on New York, payable to the or remit money is by a draft, or postal order, on New York, payable to the or-
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Quicksilver and amalgam saving apparatus, electro.....................................
Quilting machine, Harper and Newman
Railway r ails, machine for patching, Moore and Mills
Railway rails, securing flsh plates to, A. E. Braymer
Refrigerator, B. N. Har, L. Talcott.
Riveting, tool for belt, M. D. Lawrence
Roller and harrow, land, L. French
Roofing and sheathing felt, manufacture of, W. P. Arnold.........................................
Sash holder, E. H. Sweetser
Sash holder, A. R. Judd.
Sash teeth, insertable, H. G. Powell
Sawing machiue band, H. D. Bliss
Sawing machine scroll, D. R. Willi
Sawing machine scroll, w. E. Dean
Scoop, wire, J. Taber.
Screw driver, J. S. Armstron
Seeding machine, I. Tristram.
Sewing machine, A. H. Wagne
Sewing machine, W. B. Bartram
Sewing machine, E. P. West.
Sewing machine post, R. Ashe........
Sewing machine, wax thread, R. Ashe
Sewing machines, motor for, W. Manson, (reissue)..................
Sewing machines, corder for, J. F. Sullivan...........
Sewing machine, ruffling attacement for, T. G. Perkins
Sewing buttons on shoes, etc., machine for, J. Keith.
Shirt, J. A. Peters.
Signal, electric railway, Warren and Odell................................. 130,612
Slag, treating, J. M. Hartman.
Sleigh knee, J. P. Dorman..
Soldering machine, E. W. Bliss.
Spinning machines, spindle bolster for, J. Birkenhead
Spirits, manufacture of, H. Purd
Stamp holder, H. v. Dem
Staves, machine for iointing, L. R. Palmer
Steel, and treating metals, manufacture of, I. Hersey. Stove, cooking, H. Ingraham.
Stove,
Stoves, ventilating apparatus for cooking, H. Rasmussen
Table and skirt board, combined Ironing, Robin son and Harris.........
Table slide, extension, P. Marx
Tank, oil, W. C. Strickler.......


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6,031.-CA
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6,033to 6,037.-CARPETs.-J. Fisher, Enflold, Coun. 6,038 to 6,051.-Carpets.-O. Heinigke, New York city.
6,052 to $6,057 .-\mathrm{CarPEts}$ - H. Horan, Newark, N. J. 6,058. -CARPETT.-C. S. Lilley, Lowell, Mase, N. 6. ©59.-CARPET.-D. McNair, Lowell, Mass. ,749 6,060 to 6,063.-OIL Cloth.-C. T. and V. E. Meyer, Lyon's Farms, N. J


6,072.-Car pet.-J. M. Christie, Brooklyn, N. Y

6,074 and 6,075. - Printing Type.-H. Ilenburg, New Yor'z city. 6,076 to 6,088.-Syawls.-F. Wink, Philadelphia, Pa.

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Applications have been duly fled, and are now pending, for the extension
of the followingLetters Patent. Hearings upon the respective applications are appointed for the days hereinafter mentioned:
2,133.-Bustle.-G. V. and E. A. Pierce. Nov. 6, 1872.
Nov, 13,1872
22.174.-Preventingİnjery to Watch Springs.-D. B. Fitts. Nov. 13, 18i2
22,216.-Hay and Cotton Press.-H. Barnes. Nov. 13, 1872.
EXTENSIONS GBANTED
15,693.-Horse Power.-A.' W. Gray.
21,20.-Lathe for beaded Work.-F. Baldwin.
$21,268 .-$ Horse Ratie. - M. Morgan.
21,272.-Metallio Bale Tie.-I. C. Plant.
21,275.-ICR STAND.-H. A. Roberts.
21,286.-TEMPERING WIRE.-H. Waterman. DISCLAIMER.
21,268.-Horse Rake.-M. Morgan. Filed August 20, 1872.
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Button" Battery.-A. C. Garratt, Boston, Mass.
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Eleactical Apparatus.-J. Moses, Hartford, Conn. eleotromagnetio Signalling instrument.-F.L.Pope, Elizabeth, n. J Fish Joint Fastringg.-W. B. Chapin (of Wickford, R. I.), London,Eng
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