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NEW YORK, SEPTEMBER 25, 1875.

 through freezing or other causes, the water pipes burst, in case of an overflow of tanks,
basins, etc., or when bad leaks basins, etc., or when bad leaks occur in the roof, necessitating considerable outlays for re pairs or to cover the losses.
The invention illustrated in the annexed engraving has for its object the prevention of this flooding. It consists of a metallic pipe, A, "leading continuously from the top floor of the building to the street sewer or drain. Metallic water ways or collecting basins are sunk in eachfloor at the point where the pipe passes through, and these pipe passes through, and these communicate wing bipe by a suitable opening in the latter, which is covered with wire gauze in order to prevent the entrance of obstacles. Each basin is provided with a grated cover, as shown in Fig. 2, which, being flush with the floor, will enable the whole floor space to be occupied. If desired, the leader from the roof may be turned inward and also connected with the pipe (avoiding the use of an outside leader), extending the full hight of the building, and allowing the same to be kuilt in the walls or otherwise, so as to be out of sight

The use of the invention is graphically told by our large engraving. The water, instead of accumulating on the floor and finally making its way through, as is shown to be the case in the building on the right, runsinto the basins and thence down the pipe. As many pipes as may be desired can be employed, suitable diagonal connections led across the cellar serving to attach their lower ends to the sewe their lower ends to the sewer conduit.

Fig. 3 illustrates a form of water way or basin which is provided with a swinging valve, A, to prevent back flow of air or water. The valve is rubber-lined at the edges
The patentee, in his circular, gives the following information:

1. The object of this invention is to provide a means of preventing warehouses and other buildings from being flooded in case of fire, as is now commonly the case when a fire breals out in any of the apper stories of a building and thereby to save a large and thereby to save a large
amount of goods, which might otherwise be destroyed by water soaking through the floors to the rooms below, often, despite the efforts of the insurance patrol, exceeding the damage done by the fire itself, thereby reducing the risk to a considerable extent.
2. It is an auxiliary to the fire department, as firemen can more readily get at, handle, and safely dispose of goods and valuables, on the floor where the fire exists (without scutling), at the same time rendering the covering of the goods, or the removal of the same from the floors below, in most cases entirely unnecessary, facilitating generally the saving of goods and valuables, as well as time and labor.
3. The invention also provides a means of escape for wate


MORRELL'S FLOODWAY FOR WAREHOUSES
4. It is always ready for use without any personal aid, and requires but little or no attention in any building, whether occupied or not. The arrangement is such that no impur air can enter the building from the main pipe.
5. It also affords protection to expensive ceilings, valuable furniture, and other property, in case of an overflow of ba sins, tanks, etc. It is also a protection in case of bad leaks occurring in roofs.
6. The apparatus is simple complete, and effective, and can be applied to buildings o any description, old or new in any part of the floors o walls, without the slightes injury, so that the whole ca be occupied as though it did not exist. It simply has the appearance of a register, which can be made as ornamental as desired, at so small an expense and with so little trouble, tha property owners generally both real and personal) should not fail to give it their imme diate attention.
In short, it is the one thing substantially needed for the purposes herein set forth and described, principally in case f fire. Architects, builders, insurance companies, and th public generally are respect fully invited to examine the same.
Patented through the Scien tific American Patent Agency July 6, 1875, by Mr. John H Morrell. Patents have als been secured in Europe and Canada. For further particulars address or apply at Th Morrell Storage and Safe De posit Buildings, corner Fourth venue and 32 d street, New York city, where it can be seen in use.

## Satety Valve Tests.

A committee appointed by the Board of Supervising In spectors of Steam Vessels begin a test of steam boile safety valves, at the Washing ton Navy Yard, on the 13th inst. All valves presented must have a uniform area of opening of five square inches, and will be submitted to the following trials (in competi tion).

1. Capability of discharging any excess of steam above fixed working pressure.
2. The limits of pressure within which the valve will open and close
3. Uniformity of action at different pressures.
4. Reliability of action under continued use. 5. Simplicity of arrange ment and facility of management.
The valves will be tested at a pressure of not less than twenty nor more than eighty lbs. to the square inch, an are not required to be provided with an inclosing case. Al valves must be operated by the pressure of the steam, and the greatest diameter of opening for double seated valves will be the same as for single seated valves. The flange for attaching to boiler must be eight inches diameter-flat face, without bolt holes.

THE French government is considering a project for con structing a canal, by which the vineyards of the Rhone may be flooded as a remedy for the phylloxera. The canal will cost twenty million dollars, but it will bring into fruitful ness 60,000 acres of vine lands, which will yield forty mil lion dollars annually.

## Srientifir Ammricam.


O.D. MUNN. A.E. BEACH.

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INSECT-EATING PLANTS.
The Scientific American for July 3,1875 , contained a page of engravings representing the principal plants wbich capture insects, with a summary of what had been published in regard to their strange habits. An immense addition to this new and marvelous department of knowledge has just been made in Mr. Darwin's "Insectivorous Plants," in which he sums up the results of some fifteen years of ob servation and experiment: a contribution to Science as note-,
worthy as his work on " The Fertilization of the Orchids," worthy as his work on "The Fertilization of the Orchids,",
or that on "The Structure and Distribution of Coral Reefs," or that on "The Structure and Distribution of Coral Reefs,"
works which the most determined adversaries of Darwinism have not presumed to denounce as unscientific. More than half the volume, whish com prises nearly five hundred closely printed pages, is devoted to the study of the common sundew of Eogland,drosera ro'undifolia. Sis other species of drosera from various parts of the world were also brought under observation; also the Venus fly trap (dioncea muscipula) of North Carolina; the aquatic aldrovanda vesiculosa; the fly catcher of the Portugese. drosophyllum lusitanicum: roridula dentata, from Cape of Good Hope; byblis gigantea, from Western Australia; several species of pinguicula, and a number of urticularia. The nepenthes, studied by Dr. Hooker, are of urticularia. The nepent
merely noticed incidentally.
The characteristic feature of drosera rotundifolia is the abundance of gland-bearing filaments-tentacles, Mr. Darwin calls them, from their manner of acting-which cover the upper surface of its round leaves. There are on the average about two hundred of these tentacles to each leaf; and as their terminal glands are always surrounded by drops of extremely viscid secretion, which glitter in the sun like dew arops, the plant gets from them its poetical common name.
It gets more-and that is its living; for its short and simple It gets more-and that is its living; for its short and simple
roots are capable only of absorbing water. It is by means of roots are capable only of absorbing water. It is by means of
the secretion of the glands and the inward bending of the tentacles that its prey are caught, digested, and absorbed. The glands are wonderfully sensitive to pressure and repeated touching; and when excited, the tentacles bend inward to the center of the leaf and remain inflacted over the captured object according to the amount of nutrition it affords. Extrennely minute particles of glass, cinders, hair,
thread, etc., when placed on the glands, cause the tentacles to bend; but the inflection is not so energetic nor so persistent as when the exciting substance is organic and soluble. So sensitive are the glands that a bit of human hair, exerting a pressure of not more than a millionth of a grain, suffices to induce a movement of the tentacles. The pressure of the delicate feet of gnats causes them to be quickly and securely embraced. The tentacles are indifferent,however, to single touches and even hard blows; also to the repeated blows of
drops of rain; greatly to the plant's advantage, Mr. Darwin
remarks, for it is thus saved from much useless movement The absorption of animal matter and various fluids, heat,an galvanic action, also cause the tentacles to become inflated the movement beginning in about ten seconds when a bit of raw meat is applied to a gland.
The bending of the tentacles is effected by a process of ag. gregation of the protoplasmic contents of the glands and ten tacles. This aggregation is excited by all the stimulants which produce movement: the quickest and most energetic
of the many stimulants tried being carbonate of ammonia, a of the many stimulants tried being carbonate of ammonia, a ation goes on only as long as the protoplasm is in a living vigoruas, and oxygenated condition. Immersion in warn
water causes the leaves to be inflected and increases thei water causes the leaves to be inflected and increases their emperature between $115^{\circ}$ and $125^{\circ}$ Fah. Temporary paralysis ensues on exposure to $130^{\circ}$, but the leaves recover on being left for a time in cold water. Exposure to $150^{\circ}$ causes death : so does prolonged exposure to $145^{\circ}$. Different leaves, however, and even separate cells in the same tentacle differ considerably in their power of resisting heat.
By testing the leaves with various nitrogenous and non itrogenous fluids, Mr. Darwin found them able to detect with almost unerring certainty the presence of nitrogen. Results so obtained led to the enquiry whether the plant possessed the power of dissolving solid animal matter, that is.. whether it really had the power of digestion like that that possessed by animals. Numerous experiments proved digestion, and that the glands absorb the digested matter: the most interesting, Mr. Darwin thinks, of all his observations on this remarkable plant, as no such power had previously been known to exist in the vegetable kingdom. The resemblance of drosera digestion to that of animals is singularly close. The digestive secretion is more copious in the pre sence of nutritive material, and is distinctly acid, like that of the animal stomach. It also contains a ferment closely
analogous to or identical with the pensin of animals, which is secreted only when the glands are excited by the absorption of already soluble animal matter. Albumen (bard-boiled egg),roast meat, fibrin,areolar tissue,cartilage, fibro-cartilage bone, milk, casein, legumin, and other substances were found to be acted on by the plant secretion precisely as by the gastric juice of animals. Fresh gluten was too strong ment with weak hydrochloric acid, it was digested rapidly. Starch is indigestible, and so are epidermic substances, such as human nails, hair, quills of feathers, fibro-elastic tissue, mucine, pepsin, urea, chitine chlorophyll, cellulose, gun cotton, fat, and oil: all of which are similarly unaffected by gastric juice, though some of them are acted on by other se cretions of the animal alimentary canal. The plants are also,
to a limited extent, vegetable feeders, having power to digest some parts of leaves, and to partially dissolve pollen and living seed. Like animals, too, these plants suffer grievously from dyspepsia, in case of surfeit,even of the most digestible ubstances.
The sensitiveness of the leaves to carbonate of ammonia has already been mentioned. Like effect,in varying degree, s produced by all the other salts of ammonia. The citrate least,and the phosphate most,powerful. Of the latter, les an one twenty-millionth of a grain in solution, applied to bend to suand bend to the center of the lea. Many other salts were ex perimented with, the nature of the base proving, as in the case of animals, far more influential than that of the acid
Nine salts of sodium all caused well marked inflection, and none were poisonous in small doses; whereas seven of the oine corresponding salts of potassium produced no effect, two causing slight inflection. Some of the potassium salts were pcisonous. The so called earthy salts produced little effect on the other hand, most of the metalic salts caused rapid and strong inflections, and were highly poisonous. To this rule there were some odd exceptions; for example, the chlorides of lead and zinc and two salts of barium did not cause inflection, and were not poisonous. Twenty-four acids were tried, much diluted: nineteen caused the tentacles to be more or less affected. Most of the acids were poisonous. Benzoic acid is very poisonous, though innocuous to animals. Many of the poisonous acids caused the secretion of an extraordinary amount of mucus,long ropes of it hanging from the leaves when they were lifted out of the solutions. Allied acids act very differently, formic acid, for instance, producing
but slight effect, while acetic acid of the same strength $i$ poisonous and acts powerfully.
A large number of vegetable alkaloids and other substances were experimented with, developing some very curious redrocyanic tem of anima's, are also poisonous to drosera, but probably excite inflection by acting on elements in no way analogous to the nerve cells of animals. The poison of the cobra, so deadly to animals by paralysing their nerve centers, is harmless to these plants, though causing quick and strong inflection. The absence of nerve elements is made still more probable by the indifference of the plant to morphia, hyoscyamus, atropin, veratrin, dilute alcohol, and other substances which produce a marked effect upon the nervous systems of animals.
To summarise the physiology, so to speak, of the plant's sensitiveness,and the manner of its manifestation, would expand this article beyond limits. The structure and movements of six other species of drosera have been studied though less extensively than those of the common sundew. More wonderful in its adaptation to a carnivorous life is
the Venus flytrap. found only in the eastern part of North Carolina. Its poorly developed roots, like those of drosera are capable only of absorbing water, so that,lacking its pre daceous habit, it would soon cease to exist. Its manner of catching insects and general behavior have already been de scribed in this paper in the observations of Mrs. Treat. Like the sundew, it is extremely sensitive to the touch of edible matter, yet indifferent to rain drops and gusts of wind. This is the more remarkable in the case of the Venus flytrap, since it captures its prey, not by means of a viscid secretion, but by a sudden shutting of its leaves, trap-fashion. The digestive power of this plant varies somewhat from that of drosera. The secretion from its glands dissolves albumen, gelatin, and meat, if too large pieces are not given. Fat and fibro-elastic tissue are not digested: nor is chemically prepared casein or ordinary cheese. The mechanism of the dionœa trap is such that minute insects escape, while the relatively large ones are retained : an arrangement which Mr. Darwin regards as very beneficial to the plant, inasmuch as it would manifestly be a great disadvantage to the plant to waste many days in remaining clasped over a minute insect, and several addi tional days or weeks in afterwards recovering its sensibility The amount of nutriment would not compensate for the effort. There is evidently room, however, for further inves tigation in this direction, since,owing to the limited digestive power of the leaves, a single large insect is often too much for them. As in the drosera, the impulse which causes motion in the leaf travels in all directions through the cellular tissue, independently of the course of the vessels of the leaf. It was in this connection that Dr. Burden-Sanderson made his wonderful discovery that there exists a normal electric current in the bladeand foot stalk of these leaves, and that when the leaves are irritated, the current is disturbed in the same manner as during the contraction of the muscle of an animal.
The characteristics of the less known insectivorous plants will be summarized in another article.
completion of the hell gate excavations.
On July 4, 1876, the great explosion which is to shatter the submarine rocks at Hallett's Point and open a navigable channel for vessels of large draft, coming and going through Long Island Sound, to and from New York city will take place; such, at least, we understand to be the pre sent intention of those in charge of the work. The excava tions were completed about two months ago, and the opera tion now in progress consists in the boring of the holes in which the heavy charges of nitro-glycerin are to placed. These borings are about half finished, and will require the labor of two or three monthslonger afer which two month more will be occupied in inserting the charges.
The entire surface undermined measures $2 \ddagger$ acres, ond the cuttings aggregate 7,542 feet in length, varying in hight from 8 to 22 feet, and in width from 12 to 13 feet. There is a roof ten feet thick between the mine and the water; and the latter, at the outer edge of the excavation, is 26 feet deep at low tide. Between the headings and galleriesheavy piers are left, which now sustain the immense weight of rock and water above. In each pier from ten to fifteen 2 and 3 inch holes are being drilled, and in the roof similar apertures are being made at intervals of 5 feet apart. All of these open ngs will be filled with nitro-glycerin, in charges of 8 and 10 pounds, and all will be connected together by gas pipe filled with the same explosive. This will be done during the cold weather, when the danger of hauling the nitro glycerin is greatly diminished.
Previous to the explosion, the coffer dam will be broken way and the water allowed to fill the entire excavation, so that it will serve as a tamping. Then, by means of an electric fuse, the nitro-glycerin in the gas pipe will be fired which will determine the blowing up of the whole affair No fear is apprehended as to the result, since it has been determined that the explosion of half the charges will be suffi cient to cave in the roof, and cause it to fall to the sunken foor, deepening the water at once to a proper depth, or ne cessitating but little dredging to complete the work.
The new operations at Flood Rock will involve still great er cuttings than at Hallett's Point. The shaft is now down to a depth of 50 feet. The Hallett's Point work has been un der way since 1869 , but has been greatly delayed by the failure of Congress to provide sufficient appropriations; if the same course is to be followed with reference to the Flood Rock excavations, it will be manifestly impossible to form any estimate of their time of completion.

## DRUGGING HORSES.

There is a subject in connection with our four-footed ser vants, which is worth more attention than ordinarily is ac corded it; and since it is an abuse, a remedy or means of prevention is needed. We allude to the drugging of horses, either to tive them temporarily the appearance of being in fine condition, or to have the opposite effect, by making them ill to defeat their chances of success in a race. Both of these practices are cruel and inhuman, as well as criminally fraudulent, and hence commend themselves to the notice of societies for the prevention of cruelty to animals, while at the same time indicating a possible necessity for severe pen alties.
An act of Parliament has recently been passed in England, the olject of which is summarily to put a stop to these ne-
farious practices. It provides that if any one, other than a farious practices. It provides that if any one, other than a
member of the Royal College of Veterinary Surgeons, shall member of the Royal College of Veterinary Surgeons, shal
give any snimal any of thedrugscontained in a givenschedule without the consent of the owner, he shall be liable to fine or imprisonment. The drugs and preparations enumerated are as follows: Arsenic and its preparations, prussic acid
cyanides of potassium and all metallic cyanides, strychnin and all poisonous vegetable alkaloids and their salts, aconite and its preparations, tartar emetic, corrosive sublimate, cantharides, savin and its oil, ergot of rye and its preparations, oxalic acid, chloroform, belladonna and its preparations, almond oil, opium with its preparations, sulphuric acid, nitric acid, hydrochloric acid, butter of antimony, sulphates of iron, of copper, and of zinc. Of these perhaps arsenic is the most commonly administered, since its effect upon the horse, in point of appearance, is to give an artificial plumpness and sleekness which might easily pass for fine condition. This all disappears, however, in a few days, leaving the animal wretched.
While some such law as the above might tend to mitigate present evils here, we doubt if such would be the case other than in very small proportions. Veterinary surgery in this country has not arisen to the hight of a special profession generally recognized, although there are plenty who are adepts in the art. It requires no license to practise ; and until the same restrictions are thrown about its practitioners as are now about regular physcians, it would be difficult to designate who may and who may not administer mendicaments in the absence of the owner, with anything like the certainty exp

## College," etc.

The matter lies exclusively in the hands of the societies above named and in those of horse owners. The former are already empowered to prevent cruelty, and drugging comes under that head. The latter, if their horses are in the charge of servants, can prevent the injury only by careful guardianship. A horse owner disposed to defraud cannot be prevent. ed from doing so by any legislation; but if he tortures his animal, he comes under laws; and if he sells him under false representations, he becomes doubly liable. About the only enactment available in addition would be one imposing heavy penalties for selling doctored horses, in addition to those already mentioned in the statute books for the peculiar degree of fraud, and empowering local societies for the prevention of cruelty to sue for and collect the same, devoting the money to the furtherance of the objects of the said societies.

## CELLULOID.

A destructive fire, attended by an explosion, recently occured at the celluloid works, Newark, N. J. One life was lost, several persons injured, and property to the extent of
$\$ 150,000$ destroyed. It is alleged that, when the fire was dis$\$ 150,000$ destroyed. It is alleged that, when the fire was dis-
covered, the engineer immediately turned on steam into the covered, the engineer immediately turned on steam into the
apartment, when an explosion instantly ensued, the inference being that the steam assisted the explosion. But this we think, is a mistaken inference.
Celluloid is a manufacturer's name given to a species of collodion, or dissolved and dried gun cotton. Common cotton, the refuse of cotton mills, and other vegetable fiber is dipped in a liquid composed of nitric acid and sulphuric acid; then drained, washed in water, and dried, when it is found to possess highly intlammable and explosive qualities, and is termed gun cotton, as it may be used as substitute for gunpowder; it has twice the power of the latter. This prepared cotton may be dissolved in ether and alcohol, when it forms a thick transparent liquid, known as collodion. This
is the material used by photographers, who,in taking a poris the material used by photographers, who,in taking a por-
trait, spread a thin film of collodion liquid on a glass plate. trait, spread a thin film of collodion lequid on a glass plate.
The ether and alcohol soon evaporate, leaving the dissolved cotton to dry upon the glass in the form of a thin membrane or skin, which receives the silver compounas used in taking photo pictures. Collodion, when dried in any considerable mass, forms a tenacious, transparent substance, somewhat resembling horn. If whiting, zinc oxide, and other coloring substances are added to it while in the liquid state, and then dried, substances resembling ivory, hard rubber, bone, e result. All such forms are, however, very inflammable.

The use of alcohol and ether is expensive as a solvent, and the celluloid makers substitute camphor, the use of which forms the basis of their patent. By peculiar manipulation,
involving the combined employment of heat and pressure, involving the combined employment of heat and pressure,
they are enabled to produce plates and blocks of dried collothey are enabled to produce plates and blocks of dried collo-
dion, of beautiful texture and color, possessing a certain dedion, of beautiful texture and color, possessing a certain de-
gree of elasticity, with great strength and toughness, and litgree of elasticity, with great strength and toughness, and lit-
the weight. From these plates and blocks, a great variety of merchantable articles are made, such as harness trim mings, jewelry, dental plates for artificial teeth, billiard balls, knife handles, etc. They are a complete substitute for hard rubber and ivory for many purposes, and considerably cheaper.

But not only is the manufacture of the crude celluloid dangerous, but even the most finished articles made from it will readily inflame. As a practical experiment, any one may take a strong and highly polished martingale ring of cellu to its surface a lighted match, and it will quickly ignite like to its su
a torch.

Celluloid factories must be classed among the extra hazard ous risks, so far as fire insurance is concerned, and their presence in large cities is not desirable. The manufactories
should be isolated; the finished goods should only be stored or exposed in small quantities in the shops.

## STEAM BOILER PHENOMENA.

We recently took occasion, while giving an account of the
work of the United States Commission on Steam Boiler Explosions, to explain the principles involved in such phenomena, and to indicate when danger might arise, and when explosion might not follow the introduction of the feed water. We have just received accounts of two cases of low water, neither of which resulted in explosion, and one of
which gave such a striking example of a rare phenomenon (apparently contradicting our previously expressed views)
that we place the case before vur readers as we receive it, that we place the case before our readers as we receive it,
and trust that we shall learn the particulars of similar ocand trust that we shall learn the particulars of similar oc-
currences, should any have become known to them. We currences, should any have become known to them. We that the explanation is a perfectly simple one, but prefer to leave the point open to discussion by the correspondents of the Scientific American for the present.
In the first case, a plain cylinder boiler, nearly new, had been left, with the furnace door standing wide open, and with a very low fire on the grate. The boiler became absolutely dry, and heated up to a temperature which is estimated at somewhere between $600^{\circ}$ and $1,000^{\circ}$ Fahrenbeit. When it became known that there was no water in the boiler, it was also found that steam pressure had fallen nearly or quite to zero by the gage. An independent feed pump, taking steam from a neighboring small boiler, was started and the boiler filled up without producing any apparent injury. Immediately after starting the pump, however, steam jumped to 190 lbs. pressure per square inch. The safety valve was found to be loaded to nearly 200 lbs . The shell of the boiler was subsequently carefully examined and appeared to be entirely uninjured; no worse symptom was discovered than the scorching of the paint on top of the shell. Even the valves remained tight; but an india rubber joint under the safety valve was melted, and a leak was produced there.

In the other case, the boiler was also of the plain cylindrical type, and the circumstances of the case were very similar The fire was dull; the furnace door was open; the steam pres sure had fallen very low, and the water seems to have entirely left the boiler. The temperature could apparently not have been far different in the two cases. In each, the boiler had been standing, as we are told, a half or three quarters of an hour with little or no water. In the second case, also, an indepen dent pump was at hand and was put on with a full supply of feed. Here, however, to the astonishment of the attendants, steam rose to about 20 lbs. by the gage, and then as suddenly fell, the steam gage immediately índicating a complete or partial vacuum, the hand swinging quite past the zero mark, at which point there was no stop pin. So far as we have been able to judge, the general arrangement and conditions of these two cases were similar, as we have de scribed them; the accounts are, we believe, accurate

We shall hope to obtain particulars of other cases which may aid in explaining the facts. Meantime, we shall be glad to obtain light from our readers or from our friends of the steam boiler insurance companies, or from the United States Commission.

## "STRAY IDEES."

"I got five hundred dollars for it, by Jove!"
We stopped writing, and, relinquishing our pen and with it an obscure argument the thread of which, doubly tangled by the lazy hot weather, we were laboriously endeavoring to follow, gazed resignedly at the speaker of the foregoing ejaculatory remark, as he threw himself into our solitary spare chair. He removed his hat, mopped his steaming brow with a capacious bandanna, dived into the pocket of the dustiest of dusters, and extracted a dirty bundle of papers Then he beamed on us benignantly over his spectacles, and banging his fist on our desk, emphatically observed: "Them's the documents. Want you to tell about it in the paper."
"Tell about what?"
"About the five hundred dollars. Why, man, I got it for just nothin', nothin'. There never was no such luck. Look here: you remember that ere patent you Scientific AmeriCan people got out for me, nine year ago-one of a lot'bout an ice masheen?'
As this agency had been instrumental in the obtaining of several thousand patents in the period mentioned, we naturally were unable to recal the special one alluded to by our visitor, and in reply hinted as much

Forgit it, hey? Wa'l, no matter, here it is," he said hitching his chair close beside ours, and pointivg with the stub of an amputated forefinger at a time-worn drawing 'You see, I was tinkerin' at ice masheens about that time and patented a lot of them. One day, while I was fussin' at
a model which wouldn't go, it kinder struck me that if I a model which wouldn't go, it kinder struck me that if I
turned that ere pump over and changed round the valve, it would make a better pump out of it. I didn't know whether the thing would be worth anything or not. Any how was busy at somethin' else then, and couldn't tend to it; but I thought to myself : Here I'm takin' out patents lively now I might as well have one for this too. So I came to your peo ple, and they got the papers for me, for the masheen as it then was, and a claim mixed in for the pump. Wa'l, after a fact, as I soon had a dozen bigger patents a goin'. I worked away, tryin' to get the masheens in the market, and was doin' pretty fair until the panic and the strikes came along, and them busted our company and left me poorer than Job's
cat ever since.
" I went back to the iron works as foreman, and got along good enough to keep the pot a bilin' home; but-you see,
I've got a boy. As lively and smart a young feller as ever l've got a boy. As lively and smart a young feller as ever
handled a tool. Just oughter see him jump a lathe; yer oughter see him run-oh, wa'l, I'm his father; and fact is, now he's served his time, I made up my mind to send him to that 'ere Stevens Institoot, and have him learned to be a engineer. It was all well enough to decide he was to go ; but the next question was stamps. I didn't have none laid by ; and couldn't sell anythin' to raise enough money. I was
thinkin' it over last night, blue enough I tell yer, when wife said a man at the door wanted to see me. I went down and after passin' the time of day, and all that, the feller
asked if I ever patented a pump, which he kinder explained First, I said no; but then I thought of the ice masheens, so got the drawins, and told him to look and see if it was there. He went over them all, till he struck the one I've been tellin' yer about. 'That's it,' he says, quick, like ' what'll yer take for it?' 'Why?' says I. 'Cause my boss wants it,' says he; 'he's got a big pumpin' masheen for mines and sich to be patented, and some of it has got to be like yours, and he wants ter buy yer out. What'll yer take? I'll give yer five hundred dollars cash.'
"It took about two seconds for me to settle that bargain. I came right down to York in the early train, had the papers all fixed in the office bere, got my five hundred, which is thar" (slapping a plethoric wallet), "and now that boy makes a bee line for that Institoot this very day. Shake hands on it! Come and take somethin'? No? Wa'al; mebbe you'll write us a word to Professor What's-his-name at the nstitoot, 'cause we're a goin' now."
We penned the desired note of introduction, accompanied our radiant visitor to the door; and as we watched him and his stalwart " boy" start blithely off toward Hoboken, we thought to ourselves that there was one man at least who had found out the value of "idees." He had caged a pass ing thought, deemed of no material importance, by the time ly safeguard of a patent: and stored it away until its worth lessness had changed to worth. He had invested the evan escent product of his brain, just as he had invested the substantial products of his industry; but, the last, misfortune swept away from him, the fir $-t$ lay dormant for years, in the end to revive and aid him in his hour of necessity
Certainly "idees" are worth keeping, and if so are worth vuarding safely. Sickness may drive them from the brain, fraud may wrest them from carefully hidden memoranda, or ingenuity may fathom the secret even when concealed in cabalistic cypher; but to patent them is to lock them for years under the protection, not of oneself, nor of one's ser vants, who may betray their trust, but under the ward of a great government. Certainly it is best to cherish our ideas; but all are not equally valuable, and those that are so are often intermingled with many worthless and chimerical. Time and experience, however, will sift them away and reject them; but their worthlessness for the moment, so long as not based on opposition to the laws of Nature, should not determine us to throw them carelessly aside. It is better to remember that such stray ideas may some time, if inherenty good, doubtless will prove valuable; it is well to remembe also that, in order to originate, a man need not necessarily be a mechanic or practical worker in any branch of industry The merest tyro in a casual stroll through a shop, or in his daily domestic experience, may light upon a "stray idee" which to men of almost unlimited skill has never occurred-
a thought in which, in the future, if not now, he may find a thought in which, in the future, if not now, he may find both fame and fortune.

## THE NEW COMMISSIONER OF PATENTS.

The President has appointed to be Commissioner of Patents, vice Thacher, resigned, the Hon. R. Holland Duell, of Cort land Village, New York. Inventors will of course desire to know something of his history. He was born at Warren, 1824 received a common school and academic education; studied and practises law ; was District Attorney of Cortland county from 1850 to 1855; was County Judge of the same county from 1855 to 1859 ; was Assessor of Internal Revenue for the twenty-third district of New York from 1869 to 1871; was elected to the Thirty-sixth, Thirty-seventh, and Forty-second Congresses, and was re-elected to the Forty-third Congress as a Republican. With all these important and ex tensive experiences he ought to make a good Conmmissioner, and under his administration we shall look for many improvements in the affairs of the Patent Office
The Washington Republican says; "The appointment of the Hon. R. Holland Duell, of New York State, to the po sition of Commissioner of Patents gives, we are please to learn, universal satisfaction to all acquainted with his abili ty as a lawyer, whose large experience and valued practice
in patent law so eminently fit him to fill the place so accepta. in patent law so eminently fit him to fill the place so accepta-
bly to all having business bofore that office. Judge Duell bly to all having business bofore that office. Judge Duel is one of those rare men whom position seeks, not they posi tion-and probably no member of Congress ever gave more
general satisfaction to his constituents than did Jucige Duell during the four terms he served as such from his native State. Indeed, as some of our highest officials bave justly marked, there is no position under the government tha udge Duell is not qualified to fill; and when we conside that, to fine ability and large experience as a patent lawser udge Duell brings the rare quality of an urbane sternes o to speak, which enables a man to do stern, just things in gentle manuer, we can but congratulate the patent fratern ity upon the prospects before them-the learned and expe-
rienced in that they will meet an equal, competent to grasp rienced in that they will meet an equal, competent to grasp
and dispose of their most intricate points, and the less educated and experienced in that in him they will find one who whilst perhaps dispelling many a chimerical dream, will hift their minds encouragingly up to higher and grander accom plishments."

## Disinfectants

After an exhaustive series of practical tests of the various disinfectants sold in this city, embracing over fifty kinds, Professor Elwin Waller, of Columbia College, concludes hat the best disinfectant is carbolic acid. About one per nt of the mixture should consist of carbolic acid. Fo rompt disinfection which is only temporary, strong oxydizg agents, as chlorine, potash permanganate, nitric acid c., should be used. Of these, the cheapest and most avail

## LIFE-SAVING APPARATUS.

The life-saving apparatus and exhibits of the Société $d e$ Sauvttage des Naufragés, and of the British Board of Sauvttage des Naufrages, and of the British Board of
Trade, at the International Maritime Exhibition at ParisTrade, at the International Maritime Exhibition at Paris-
representing the official appliances for saving life from representing the official appliances for saving life from
wrecks-may be regarded conjointly, and also in comparison wrecks-may be regarded conjointly, and also in
with other means directed to the same good end.


Rogers' LIfe-saving apparatus.-Fig. 1.
In relation to the lifeboat service, the French system is virtually identical with the English; and the same remark may be held to apply to the apparatus for effecting rope communication, which practically differ from each other only in the means employed to
way. On this point the reasons assigned by the French Society for setting aside the Manby mortar and Boxer rocket are, namely, the former on et are, namely, the former on
account of the heavy powder account of the heavy powder
charge, causing frequent rupcharge, causing frequent rup-
ture of the line, the latter for ture of the line, the latter for
the uncertainty of its light. the uncertainty of its light. cal objection, common to both systems, namely, that, however successful they may be in casting a light line on the wreck, in mere contact, their success may perhaps be entirely neutralized by the fact that the persons endangered may be unable-from lack of knowledge, presence of mind, enledge, presence of mind, energy, or actual power, and from mere exhaustion-to renwhich all that has preceded which all that has preceded
must be so much waste labor must be so much wast
The subjoined statement appears in the catalogue of the British section, in the description given by the Board of Trade of their collective exhibits;
" III. Life-saving Apparatus-7. Enameled Plates.In ones ase five men tied themselves on to the rocket line, and all were drowned except one." And it is exactly because this class of appliance is dependent, for its utility and success, so much on the mere chance that reliance can be placed on the possession by the shipwrecked mariners of the ability to avail themselves properly of the means placed within their reach-it is for this reason that system is to be regarded as far from being perfect or unsurpassed
Of course, the actual circumstances render it impossible to reduce to a certainty the saving of all lives endangered by wreck; but in the only complete apparatus of the kind which can be put in comparison with the two foregoing, namely, Rogers' system of rove-rope communication with wrecks, the right principle has been adopted primariiy, by throwing a block and double line which can be worked from the shore, so as to effect as much as possible by the life saving party on land, and make little demand as possible saving par on land, and make as litle demand as possible for bare life amid the horrors of shipwreck. Practically, for bare life amid the horrors of shipwreck. Practically, this renders it possible to save life with the minimum of assistance from the mariners on board, limited to making fast the cone block. Conversely, when employed from on board ship, it is the most reliable method of getting a rove rope thrown at once on shore for direct communication. And finally, it may be remarked that it constitutes a valuable adjunct to a lifeboat, to facilitate the launching, and getting an offing, against storm and surf, withoutincurring the risks ordinarily attendant on that service, or wasting the strength of the lifeboat men, as frequently occurs.
Mr. Rogers' apparatus has undergone little modification and improvement in detail, since its introduction in 1868.

The whole, as here exhibited, is exceedingly well devised The whole, as here exhibited, is exceedingly well
compact, and easy to transport, set up, and operate.
The annexed engravings, Figs. 1 and 2, show the genera appearance and arrangement of the same as now submitted or the first time to the consideration of the seafaring inte rests: first, as packed at the station, ready for transport; and secondly, as disposed for actual use in situ. A is the plat form on which all gear is stowed, and which can be weighted, when in use, to gain stability; B, wheels and shafts, acting, when erected, as a derrick, thus giving elevation to keep the line, etc., as much as possible clear of rocks and surf; C, winch or windlass, for hauling in and out the rove rope, etc. D D are the large and small mortars, which can be used with or without the bed or carriage, as position will allow, for their respective services; $\mathrm{EE}^{*}$, the large and small cone block shot, for service with corresponding gun; E E, large block shot, for service with corresponding gun $\mathrm{E} E, \mathrm{large}$
anchor for launching service and use on board ship; $\mathrm{F} \mathrm{F}^{*}$, anchor for launching service and use on board ship; F F*,
pin boxes and tubs for coiled lines, $J ; G$, the hawser, as used for setting up to run breeches block and buoy to and fro; $\mathrm{G}^{*}$, the reel and stand for carrying hawser on, which can be de tached from the cart when in use, the bottom being formed sledge-shaped; H, the breeches block, used to suspend the buoy, I, from the hawser; K, the block and tackle for veer ing and hauling on, to take up slack and meet the mo tion of the line, so avoiding rupture of line by excessive straip; L, the snatch block, suspended to the shaft end to carry the hawser free and above obstacles; M, the guys to the derrick, serving also as drag ropes and suspending ropes in store or transit. N is the powder magazine; O , the medicine chest and means for resuscitation; $P$, the box of tools. Briefly described, a small mortar, with a light powder charge, sends a cone block shot, carrying a sheave in its base through which a rope is rove, of which the two ends are coiled in pin boxes or tubs, so as to be carried out free from turns and ready for use, as we have actually seen and record-
ed; the projectile being also fitted with a tail, whereby it can be readily attached and made fast; which, being effected, the men on shore can, by means of the rove rope, haul out a hawser, and subsequently even a man or boat, if other means the object being to establish the the object being to establish the va et-vient, or to and-fro
travel or safety buoy along the hawser, by means of the


ROGERS' LIFE-SAVING APPARATUS.-Fig. 2.
breeches block and whip line. The wheels and shafts are set up in lieu of the unstable triangle, and stayed to the platform by the guys, forming a derrick. In the inverse case of Fig. 3.

ffecting communication to the shore from the ship (as also for getting the lifeboat off shore) a heavier trifluked anchor shot or grapnel is employed. The entire apparatus is for use

Fig. 4.

when the wreck is lying within about a furlong of the shore
A greater distance, of 400 or 500 yards, a quarter of a mile
or more, the inventor justly thinks the service is rather on for the lifeboat, than suitable for this particular class or ap pliance. The hawser and whip used by the Société de Sauvetage des Naufragés, and by the English Board of Trade, do not exceed a working length of 240 yards; and as regards ex-

Fig. 5.

perience, we learn that,during nine years' use on the French coast, the maximum distance at which their apparatus has been employed is 165 yards.
To throw the line, have the whip and hawser hauled out send the traveling buoy on board, and bring a man ashore Fig. 6.

from a suppositious wreck in four minutes, at a distance of 600 yards, necessarily implies the work of rope-hauling (four journeys) at the rate of $20 \frac{1}{2}$ miles per hour; and at 300 yards n one minute, the velocity requisite would be fifty-two mile per hour. Whereas it is clear that in the one case two, and in the other three, sets of whiplines and hawsers would have to be joined up and used; and moreover, to set up a taut hawser 600 yards in length is obviously preposterous, under such circumstances and fo such a purpose.
As exhibited in Paris by Messrs. Rogers and Anderson, the apparatus contains two separate services, nawe ly , for launching lifeboats, and for saving life from wreck by rope communica tion; either of which sepa rately would be lighter than the conjoint system.
The two pairs of views, Figs. 3, 4, 5, 6, show the modus operandi of the sys tems which we have described; the first two of what may be called the contac system, and the last two of system, and the last two of the rove rope system. Un der the former the whip line has to be hauled out by those on board the wreck; but not so under the latter.
It will be seen, therefore, that, both with regard to what it does for the shipwrecked mariners, and what it relieves them from the necessity of doing, Messrs. Rogers and Anderson's appara tus is calculated to be more effective than the French or English systems previously used Machine Builders at the Centennial.
ccording to the latest reports, applications for space in the machinery department of the Centennial are coming in fairly from all branches of mechanical industries, except from the mining tool, chemical apparatus, leather-dressing, emthe mining tool, chemical apparatus, leather-dressing, embroidery, and jewelry-making machine manufacturers, and,
strange to add, the boiler men. More boilers are wanted to strange to add, the boiler men. More boilers are wanted to
supply the 500 horse power. The fact is remarkable, as supply the 500 horse power. The fact is remarkable, as
there is no lack of excellent though different forms of boilers, and certainly no lack of competition between their makers. The iron and wood working people are sending in twice as many applications as any other class. Pumps and printing presses are likewise at the front. The locomotive interests are well looked after, but still are behind expectation. The latter is the case with the silk, cotton, woolen, rubber, and paper machines, only forty applications in these great classes of mechanism having been received. The shipbuilders are tardy; but there are indications of a good show of pleasure boats. Clock manufacturers are plentifully heard from. A Connecticut company is to supply a big elecheard from. A Connecticut company is to supply a
tric clock with elec pany, and President Orton especially, are taking great interest in the telegraphic display, so that in that department a fine exhibit may be looked for. From 20 to 25 per cent of the total space, it is estimated, will be occupied by foreign machinery.

To preserve ice water, make a hat-shaped cover of two thicknesses of paper, with cotton batting, half an inch thick, bet ween. Place over the entire pitcher.

## WATER PRESSURE ENGINE.

The engine herewith illustrated is designed chiefly as a substitute for manual labor, especially in localities where the use of steam power is either inadvisable or impracticable. The cylinder is oscillating and supported on its trunnions by fixed bearings cast in one solid piece with the re spective crank shaft bearings. The two double bearings are bolted upon a foundation plate, supporting also an air vessel on its after part. The bearings are further connected by stays,as shown. The cylinder is made, on both right and left sides, with flat faces, turned and adjusted truly rectantangular to the axis of its trunnions. Into these faces open the ports of the two water passages contained in the lower part of the cylinder body, communicating at their other ends so held up as to be easy but tight against the cylinder faces, so held up as to be easy but tight against the cylinder faces,
are two boxes, one at each side, which receive the water from are two boxes, one at each side, which receive the water from
the conduits and distribute it by an admission port alternately to the two cylinder ports, and consequently fore and aft the piston. A fly wheel is provided to over ome the dead points which occur at each end of the stroke. The water which has performed its work is expelled by the returning piston back through its passage and enters the above named boxes through two separate ports to the right and left hand of the admission port, whence it flows through suitable conduits to the drain pipe into a cistern or other receptacle, whence it may be used again for other purposes. Screws in their proper positions in reference to the cylinder ports. By means of set screws, they are screwed slightly up to the cylinder to make a tight joint between their faces and still cylinder to make a tight joint between their faces and still
allow of free motion of the cylinder between the boxes. allow of free motion of the cylinder between the boxes.
This adjustment can be done, on account of the tendency of the water pressure inside to separate the boxes from the cylinder, to such a nicety that the friction between the said faces is practically nothing.
In Zürich, Switzerland, the wacer supply is elevated from the lake into reservoirs, partly by means of a water wheel placed within the principal pumping engine house, which is built upon piles in the middle of the river Limmat (the outlet of the lake of Zürich) but principally by means of large steam machinery in the same and other edifices.
At the present time 200 indicated horse power is employed, which raises 444,000 cubic feet of water per day, $55,00 \mathrm{C}$
cubic feet of which are consumed by water power engines. cubic feet of which are consumed by water power engines.
We are informed that,to such an extent have the advantages We are informed that,to such an extent have the advantages
derived from the use of this water supply as a motive power been recognized, at the present time no fewer than 75 water power engines, of from $\frac{1}{4}$ to 2 horse power, are in daily operation, besides a great number of very small motors, used for driving sewing machines and similar light work.
Lithographers, printers, joiners, turners, piano manufac turers, machine makers, locksmiths, and kindred trades drive their lathes, saws, planing, drilling, boring, and molding machines, etc., with water engines. Butchers move their meat-cutting or pulping machines; weavers and lace makers operate their looms and winding machines, distillers their pumps, cutlers their grindstones and emery wheels, with them. These engines are also employed with hoists for stores, and for raising building material to buildings in construction. The inventors point out that their application, struction. The inventors point out that their application,
however, is not limited to town industries, but that it may however, is not limited to town industries, but that it may
be used advantageously in larger proportions for natural falls of water from 64 feet upwards, there being some engines at work with pressures up to 10 and 12 atmospheres. The only care required in using the $m$ chines is that the water should not carry pebbles or sand, which in most cases can be prevented by allowing such substances to collect in a reservoir at the head of the fall.
These engines may also be used for raising and forcing liquids, sewage, etc., for cleaning pits, as fire pumps, or for contractors' purposes, by simply applying motive power to the crank shaft and converting the in and out let pipes into suction and delivery hoses respectively.
The city engineer of Zürich, Mr. Bürkle, we learn, has subjected one of these engines to a trial under the brake, with water pressures varying between 352 and 140.8 feet head, and under speeds from 06 to 2.4 revolutions per second. The average result obtained was $90 \cdot 2$ per cent. The highest duty was given out at speeds of from 1 to 2 revolutions per second. The particular engine in question was of the following principal dimensions: Diameter of cylinder, 3.5 inches; stroke of piston, 6.8 inches; diameter of water inlet pipe, 2 inches: and area of base plate, 32 inches long by 14 inches wide.
The power given off by 120 revolutions per minute, and 40.8 feet head, was 2.133 horse power. From these data it is plainly seen that the space required for the engine is
very small in proportion to the power developed. Patented in the United States to the inventors, Messrs. Wyss and Studer, Technisches Bureau, Zeughaussstrasse No. 9 Zürich, Switzerland, who may be addressed for further in formation relative to sale of patent, etc.

## Interesting Torpedo Trials at Newport, R. I

An extended series of torpedo experiments was recently made by the officers of the U. S. Naval Torpedo station at Newport, R. I., in the presence of the Secretary of the Navy and a large number of officials. The electrical instruments by which the torpedoes were fired were disposed on a lawn, or an elevated plateau, and were connected with batteries in the building. Among those instruments was an electric chrono graph, invented and perfected by Farmer worked by praph, in drive by actricity, and designed so that it pendulum driven by electricity, and designed so that it wil fire from 1 to 120 torpedoes in as few seconds. By the side of this was an electric engine invented by Lieutenan Moore, which equals at best about twohorse power. The first item on the programme was a subaqueous salute to Secretary Robeson, of nineteen torpedoes, each charged with 10 lbs . of powder, arranged in line, south of the ferry landing These were fired in the presence of the whole company by Lieutenant Manley, by the action of the pendulum of the chronograph above named, at intervals of six seconds, com mencing southward. No better description can be given than by imagining a row of nineteen giant fountains, whose streams of water rise up in massives column to the average hight of 180 feet, each opening with a loud report and concussion.

The experiments were chiefly intended to show the utility of applying electricity under various conditions to the torpedo service, and thus, as a further illustration, Mr. Merrall next exploded a twenty-five pounder north of the ferry in deep water, to show the usefulness of Farmer's machine for boats.
Torpedo No. 3 consisted of 100 pounds of powder, placed east of the landing, and was fired by Farmer's machine for ships. This was in deep water. At the instant of the dis charge it seemed as though 1,000 cannon had been fired unde water. The spray flew up nearly 300 feet, deluging the persons in the nearest craft, and causing the water to seeth like a vast whirlpool
Torpedo No. 4 was fired by the Lay torpedo boat against a

raft at about 1,000 feet distance. The boat, having a five. pound torpedo fastened on the stern, was handled from the croquet lawn by Lieutenant Bradford. The boat is made almost in the shape of a cigar, with two pointed ends, and is almost totally submerged, the green outline appearing above the water being almost like a huge green fish. The boat is fitted inside with a small oscillating engine, driven and steered by carbonicacidgas, the steering being regulated through the electric machine, and by means of which it can be made to perform the most difficult evolutions so long as there is any gas left in the receiver. The object of this invention is to attack an enemy's vessel at a distance of two or two and a half miles, and, by means of immense torpedoes or charges of gunpowder or nitro-glycerin, destroy the enemy and the boat also. After a few fancy mancu vers, the deadly looking craft made right for the target, and in a few seconds the edge posts were shivered into atoms and thrown into the air a distance of twenty feet. Then the boat was sent on cruise among the sailing boats and turned round and round with a rapidity that was astonishing, considering the dis tance
Experiments were next made with the Ericsson torpedo boat. The engine was worked by compressed air, which was forced through an inch india rubber tube from the air box of a twenty-five horse power engine. The hose supplying the air is 800 feet long. The length used is also used to draw back the biated and the two propellers, which work in opposite directions, were set in
motion. The air pressure was from seventy five to a hundred pounds, and soon the tube, like an immense tail, began to run out after the boat.
In a few seconds the boat began to sink; and as the speed of the stationary engine, on the Nina. wasincreased, she sunk deeper and deeper, until the white disk on the ten-foot iron shaft on the upper portion of the boat was only three feet above the surfäce. Unlike the Lay boat, she made no ripple, and all that could be seen above water at 600 feet distance wa the disk. The air is made to steer her through the tube that supplies her cylinder as effectually as the carbonic acid gas is made to govern the movements of the dther boat. Great interest was manifested in this invention. As soon as the pressure is taken off, the boat rises to the surface ; when speed is gained she sinks completely
Next a group of torpedoes, six in number, were exploded north of the landing. They were in about six feet of water and charged with powder, from ten to forty pounds. These were fired by several ladies present. There was another row of startling water jets, which would have sent a small flee to "Davy Jones' locker" in a few seconds.
A steam launch next appeared, with two seventy-five pounders rigged on spars at the bow. These were rapidly fired When the splash and splinters had cleared away, the Nina came past the stand with a 100 -pound service torpedo rigged to a spar, which was exploded as she passed the stand. The torpedo used in this way is intended as a substitute for the ram which is attracting so much attention in modern naval war fare. In a few seconds, however, she returned to the charge towing in her wake a "Harvey," which she quickly dragged against a floating raft and sent everything literally sky high. Now followed in rapid succession three fifteen pounders, which were fired by the contact of a small steam launch with buoys containing circuit losers of a peculiar construction.
In connection with these experiments the circuit indicator designed by Lieutenant Converse was used, which gives to the officer in charge absolute information as to the condition of his cables and torpedoes at all times. If a wire becomes defective or broken, it is signaled instantly by the ringing of a bell, which sound is kept up until the defect is repaired It also enables him to fire the torpedo at will when the enemy's vessel does not come in contact with the circuit closer, and yet is near enough, in his judgment, to send. her to the bottom. At the same time all the torpedoes can be
rendered safe to a friendly vessel, their approach being merely signaled by the ringing of a bell, this being, in fact, the most complete apparatus yet designed. When one torpedo is fired, however, all others are therely disconnected from the battery for half a minute, thus rendering it impossible for one torpedo to be fired by the action of another.
The next experiment was the simultaneous firing of seven ty-nine dozen igniters. These were followed again by two extemporized torpedoes, the one in an old tin oil can, the other in a molasses jug, which rattled and thundered so tha the whole of Newport must have been affected. These were constructed, at the request of the Secretary, by Messrs. Hig
ginson and Davenport from the materials at hand. After the ginson and Davenport from the materials at hand. After the
experiments on the east side of the island, Professor Hill experiments on the east side of the island, Professor Hill
created a commotion by exploding a hundred pounds of nitro glycerin, placed to the west of the island, five feet from the surface of the water. The shock was quick and severe, and thousands of fish came instantly to the surface, apparently stunned, while many others were treated to a brief aerial voyage.
At the spot called Junction No. 12 by the experimenters, was effected the explosion of twenty-five pounds of dynamite under a raft which was floating on the surface of the water This was the most splendid piece of work yet accomplished The water was agitated a quarter of a mile distant from the raft, and the volume of water thrown in the air was laden with the splinters, which fell again into the water like match wood. The grandest spectacle of all was the last. The old coast survey schooner Bowditch lay quietly at anchor, 1,300 fect distant, under bare poles. Near her were a hundred little sailboats, which the steam launch was endeavoring to drive off; beneath her, however, was a terrific mine, consist
ing of three 100 -pound gunpowder torpedoes and 250 pounds f dynamite in two others.
Mrs. Field, wife of Judge Field, of the Supreme Court, cosed the circuit, and in an instant a vast column of wate ascended about 300 hundred feet, followed by a roar and a concussion, and the timbers of the stately looking old craft were flying through the air. In the place where she had rested so placidly but a few seconds before a whirlpoul was now seen spreading out its waves and receiving the falling débris as it descended, splash, splash, into the harbor; it was a complete annihilation. Not enough to make a doorpost scarcely, was left whole. The hulk disappeared like a dream, for the instant the explosion took place she was crushed and carried up in the form of chips in the vast volume of water hrown by the force of the mine beneath.

## Ballooning at Night.

M. Wilfrid de Fonvielle made a successful night ascent n August 1, for the purpose of observing meteorites. From 10 P. M. to 4 A. M., forty-two meteorites were observed be tween Rheims and Fontainebleau. Some of these emanated
from Cassiopeia, others from Perseus, and as many as nine from Cassiopeia, others from Perseus, and as many as nine heavens which was concealed by the balloon. None of thes were very noteworthy, and it is probable that none would ave been observed at the surface of the earth. Eight per ons were in the car.

## Currespundence.

## What is the Electric Force?

## To the Editor of the ふcientific 1 merican:

At the close of a life of patent research and experiment it was the conclusion of Faraday that the electric force could ot be defined; and it is almost universally conceded today that the nature and functional character of electricity must or ever remain one of the things unknowable. It is the urpose of the present article, in simple terms, to point ou the partial fallacies of this proposition; and in order to ar rive at a correct understanding of the subject, it is necessary that we frequently step aside from our subject to consider he bearings of other forces in respect of the electric force. We may or may not accept at the outset a fact, susceptible of easy demonstration, that there is but one law regulating the transmission or continuation of force. It is of no sor of consequence what kind of force we may have in hand there is one law inherent in all forces, and that law, in brief, is that no force can be transmitted except by molecular action. By molecular action I mean this: the first molecule or atomic particle of matter to which a force is imparted impatomic particle of matter to which a force is imparted im
parts force to the next, and the next to the next, and parts that force to the next, and the next to the next, and
so on indefinitely, in the same manner, generally speaking, so on indefinitely, in the same manner, generale over a row of bricks standing on end merely by toppling over the first brick. The correctness of this ssumption will be seen further along.
The electric force is characterized as a subtle fluid flowing hrough or overa conductor. However subtle this "fluid" may be, it must therefore be a substance; and the fluid hy pothesis assumes that it is a substance. The electric fluid is, therefore, something which, placed upon the terminal of a telegraph wire in New York, for instance, travels with in conceivable rapidity over or through that wire to the othe terminal in Chicago. Let us note the facts which absolutel disprove this assumption.
We must first take into consideratlon the battery, or gen rator of electricity; and in so doing we are brought face to ace with the question whether, when the electric circuit i established, any substance passes over or through the wire In order that it may not be asserted that the fluid whic leaves one pole of the battery returns to the other pole, there y maintaining the equilibrium, we apply the battery to an nduction coil, and for hours we discharge into the earth,from he secondary wire, a stream of brilliant sparks, the elec ricity generated by the battery. This will be understood as shown in Fig. 1, in which B is the battery, the electricity generated by which flows in the iocal primary coil, A; and C s the secondary coil, insulated from the coil, A, whose cuit is to the earth by way of the separated points,D.


We find an immense volume of electricity collecting at the points, $D$, and we know that the discharges cannot return to the battery. Therefore, if the electric force be a fluid or sub stance proceeding from the battery, the battery will in certain p
The battery is composed of certain metals, and chenical in solution. By the action of the battery the nature of the metals and chemicals is changed, in precisely the same genral manner that fire converts fuel into dust and gases, or water into steam. Now we have used our battery, we wil say, for weeks, until the chemicals wholly, and the metals partially, have been converted; but although the electricit find, if the battery be properly guarded from evaporation and its fumes collected, that not one atom of weight or substance
has been lost. Therefore we can assert positively that the
lectricity generated by our battery, which has been con antly discharging in vivid sparks, not into the local circuit f the battery, but into the secondary earth circuit, is not fuid or substance; that nothing leaves the battery and passe hrough the wire; that nothing passes through the wire, in he sense of substance; for this we do know, that, howeve subtle a " fluid" electricity may be argued to be,if it reall. e a fluid or substance flowing from the battery, there mus nevitably be a lossin the weight of the substances compris ng the battery, which we know there is not. There can be othing more positive than these facts; and in view of them cannot be argued that electricity is a substance, or a fluid or a subtle fluid.*
Having gained this much, it will presently be seen that w ave gained a great deal. What, then, is electricity?
First, it is clearly a force. Secondly, it is transmissible
First, it is clearly a force. Secondissible, it is like all other
Being a force and being transmisin Being a force and being transmissible, it is like all other
orces (all of which are transmissible) $i_{1}$ its transmissibility. forces (all of which are transmissible) in. its transmissibility. of the molecular or atomic structure of substances. It is no more a subtle fluid, nor is its transmission any more singular han the force of traction is a subtle fluid or its transmission ingular. And it is proposed to adduce the most striking acts to prove that the electric force differs from othe orces only in the character of the molecular action in which the forces exist, without entering into a discussion of the ultimates of matter and force, for we can never have know ledge of these ultimates. We know there are matter and force; but when we arrive at a studious questioning, we find t impossible to distinguish between matter and force, to de cide whether matter is an attribute of force, or force an at ribute of matter; and finally we might carry the thing so tribute of matter; and finally we might carry the thing
far as to wonder whether force is not everything and every far as to wonder
thing is nothing.
It may be confidently asserted that in the transmission of any force whatever, from the transmission of force through a simple lever to the transmission of electricity and light here is but one law, which is perhaps best exemplified in the toppling over of a row of bricks, as herein lefore men tioned. In this example, each brick crudely stands in the position of a molecule of matter, and acts upon the nex brick in precisely the same manner (that is, as to imparting f force) that one molecule of matter acts upon another. If you blow a quantity of air into one end of a long tube, the same quantity of air will emerge from the other end; but ou know that it is not the same air that is blown into the ube. The first impelled quantity of air yields its impulse the next, and the next to the next, and so on indefinitely So if you take, with proper shape, a tube of water a mil ong, for instance, and pour a certain quantity of water int one end, the same quantity will be displaced at the othe nd ; but it would not be said that the water poured into th ube had traveled the length of the tube and emerged at th other end, although the effect is the same as though the quantity of water poured in had so traveled. It is the same with a belt or a lever; if you impart to one end a certain force, each atom or molecule of the belt or lever imparts that force to the next until finally the force is manifested at he distant end. And if the medium of transmission could be perfectly rigid or unyielding, the force applied at one end ould be manifested almost instantaneously at the distan nd ; yet no one is astonished in witnessing the three genera perations of an ordinary lever, namely

1. The application of force at one end
2. The transmission of that force to the other end by the molecular action of the matter composing the lever
3. The manifestation, at the distant end, of the force pplied.
The first and third operations, are visible; the second is invisible, but apparently instantaneous. I say apparently intantancous, for I have made several experiments with a view to determining the speed of transmission of this force and have ascertained that a reasonable period of time is re uired for the transmission of force through a rigid bar of ron as short as fifty feet in length. My first experiment ed me to approximate the speed of this transmission to the speed of transmission of the electric force, but I have found hat it varies with temperature and kind of metal. The ba f iron which I used, and which was fifty feet long. gave th best results. It was placed horizontally upon eight pulleys with platinum contact points at each end, connected with an automatic telegraph recording instrument and batteries a follows:


Here are shown the bar A, fifty feet in length, running on pulleys, and the electrical connections, X being a projecting piece fixed to the bar, whose duty is to close the circuit o battery, B B, by forcing together the contact points, I I The circuit of battery, B, is completed by the bar bringing ggether the contact points, $d d$, one of which is fixed to the bar. C Care the recording points, bearing upon the chemi cally prepared paper, E, which is carried over the metallic drum, D. It will be seen that a blow struck upon the end of
able of real dand pable of ready definition, Instead of seeking for a solution, and suspending judgent until a solution is found, $r$
uid $s$, or synonymous somethings
the bar at A, to move it in the direction of the arrow, will close both circuits by bringing together the contact points, $d d$ and II, and that a discoloration of the chemical paper under the resording points, C C, will take place at the instant of such contact. Therefore, if the force applied at A be instantaneously transmitted through the bar, the points of chemical discoloration will be side by side on the paper E , moving in the direction of the arrow; whereas they really tand with relation to each other as shown at $i i$, the first mark made being that caused by the closing of the circuit at I I, where the blow is struck, and the second being that caused by the closing of the circuit at $d d$, which closing of circuit will not take place until the force applied at A shall have been transmitted to the other end of the bar by the action of the atomic particles of the bar.
In my experiment, the length of chemical paper carried beneath the recording points was 90 inches per second, any greater speed occasioning a break, and the dots caused by the contacts were $\frac{1}{4} \overline{\overline{0}}$ of an inch apart; that is $\frac{1}{40}$ of an inch from the line they would have observed had the contacts been simultaneous. Therefore the time required for the transmission of the force applied from one end of the bar to the other was the $\frac{1}{3600}$ part of a second, or at the rate of 2,045 miles per minute. These results, however, were probably far irom accurate. The speed of transmission may not only be much greater than attained in my experiments, but the process of determining it by chemical decomposition is faulty in many particulars. I do not claim that it does more than show a remarkable speed of transmission of ordinary force, and that not only this transmission could not have taken place without the molecular action of the metal, but that the molecular action of the metal alone accounts for the difference in time between the imparting of the force at one end of the bar and its manifestation at the other end. And I doubt whether any one, witnessing this phenomenon would attempt to account for this transmission of force by urging the passing through the bar of a subtle fluid, generated by the bone, flesh, and blood of the person applying the force: yet we have in electricity the selfsame principle in the molecular action in which the electric force exists and by which it is transmitted.

The sun emits light. Now we know that this light has sufficient force, falling upon a surface properly placed, to impart motion to that surface. Therefore a ray of light must either consist of a solid projected from the sun, traveling through space and falling upon that surface, or it must be a certain condition of the molecular or atomic structure pervading everything, which condition is propagated, with inconceivable rapidity, from one atom to another, until, finally, the atomic light condition of the sun, though in less intensity, is reproduced at the earth. Now it is not only beyond all reason and hopelessly absurd to suppose that an atom of matter is projected from a burning body through a resisting medium at the rate of 192,000 miles a second, as, for instance, a ray from a feeble candle frame traveling through atmosphere and glass; but such a supposition is con troverted by all the phenomena of forces. All forces-light heat, sound, expansion, gravity, electricity-are transmitted in a similar manner to the transmission of force through a tube of water or air, as related; and as this is the fact, so al forces must reside in a certain condicion of the atcmic or molecular structure of matter. Primarily, there must be a normal condition of the molecules of matter as to shap and state of motion or quiescence. What that normal condition is, whether in shape the atomic particles ar round, square,or otherwise, whether theirmotion is vibrator or circular, whether a certain motion attracts and nother repels, we can of course never accurately determine, al though we may theoretically approximate some of the condi tions, as, for instance, the couditions necessary to the expan sion of a metal by heat.
Washington, D. C.
W. E. Sawyer.

## Salycllic Acid for the Preservation of Infusions, etc

"The wonderful reports of the conservative properties of salycilic acid led me some time ago to commence a series of experiments to determine the proportions of acid necessary to add to infusions, etc., in order to keep them a reasonable length of time without change. The results I have obtained are not quite as satisfactory as I had anticipated, but proba bly they will not on that account be less interesting to phar macists in general.
Before experimenting with the infusions, I sought a suitable solvent for the acid, and several weeks ago found that solution of borax was its best solvent; but this does not take up a sufficient quantity to allow of its being added to medicinal preparations for the purpose of preservation. Boiling water dissolves the acid in proportions sufficiently large for the purpose, and does not deposit it again on cooling; there fore I made the infusions, etc., upon which I experimented, proportion of the salycilic acid. The following are the re proportion of the salycilic
Infusion of cascarilla, without acid, kept two days; with acid (five grains to pint), kept five days. Another infusion made of double strength, with water containing ten grains o acid to the pint, has now kept over a fortnight and is per fectly fresh.
Infusion of quassia.-A quart of concentrated infusion (one to seven) was prepared, having forty grains of the acid dissolved in it: this has kept now over a month, and is as nice as when first made. One part of it was diluted with seven of water and kept for comparison with a simple infu sion; the latter was unfit for use on the fourth day, wheree the former kept for six days.

Infusion of orange, made with water containing five grain of the acid to the pint, kept perfectly bright and fresh fo eleven days, but then gradually became turbid
Infusion of calumba went bad in three days, and a sample with three grains of acid to the pint only kept four days. A stronger infusion, with ten grains to the pint, was put into an uncovered beaker, and was clear and good at the end of the week; but spots of mold then began to form upon its surface though it still remained bright.
Infusion of senna with eight grains of acid to the pint kept seven days, being four days longer than one without kept

Infusion of malt (two ounces to pint).-A simple infusion was quite sour in three days; but with eight grains of the acid to the pint, a portion of the same infusion retained its odor upwards of fourteen days, and even now, at the expiraion of twenty-one days, the odor might be distinguished.
Tragacanth mucilage.-The addition of acid, in the proportion of eight grains to the twenty ounces, causes this to keep for a length of time, a sample prepared nearly a month ago being quite fresh, while a mucilage without this addition had acquired a repulsive odor in about eleven days.
Mucilage of acacia also appears to keep well with this addition.
Lemon juice will retain its odor for weeks, and will not turn moldy, even if kept in an uncovered vessel, if five grains of salycilic acid are added to each pint.
Having read that this acid would keep leeches healthy and prevent the water in which they were kept becoming foul, I added ten ounces of acid solution (eight grains to pint) to half a gallon of water into which fifty leeches were put. Previous to this addition, we had found two or three dead leeches every week when the water was changed; but since, we have not lost a single leect, and the water keeps fresh for weeks. I forgot to note that, by adding ten grains of acid to each pint of sirups of red and white poppies, violets, etc., fermentation is effectually prevented. The addition of a little yeast to sevtral of the samples produced no effect."J. C. Thresh, in Pharmaceutical Jourrual.

## AN EXPERIMENTAL AURORA.

M. Lynström, of the University of Helsingfors, has sent o the Geographical Exhibition, Paris, an interesting instrument invented by him to demonstrate that aurore are pro-
duced by electrical currents passing through the atmosphere in the polar regions. Our illustration will give an idea of the apparatus.


A is an electrical machine, the negative pole being con ected with a copper sphere and the positive with the earth $\mathrm{S}^{\prime}$ are of ebonite, as well as $\mathrm{R} \mathrm{R} d d$, so that B is quite iso lated as the earth in the spacs. B is surrounded by the at mosphere. $a^{\prime} a^{\prime} a^{\prime} a^{\prime} a^{\prime} a^{\prime}$ are a series of Geissler tubes with copper ends above and below. All the upper ends are con nected with a wire which goes to the earth, consequently a
current runs io the direction of the arrows through the air, and the Geissler tubes become luminous when the electrica machine is set in operation. These Geissler tubes represen the upper part of the atmospbere, which becomes luminous when the aurora borealis is observed in the northern $\mathrm{h} \bullet \mathrm{mi}$ sphere. The phenomeaa produced by the Lynström appara dish observers, earth and penetrating into the upper regions produce aurore in both hemispheres. The experiment, says Nature, differs from the apparatus of M De la. Rive, who placed his current in vacuo, and did not show the property of ordinary atmo spheric air of allowing to pass unobserved, at the pressure
of $6 \frac{1}{2}$ inches, a stream of electricity which illuminates of 2 feet $6 \frac{1}{2}$ inches, a stream of electricity which illuminates
a rarified atmosphere. The experiment was most attractive, a rarified atmosphere. The experiment was most
and hundreds of persons witnessed it every day.

A board of engineers is now ia session in this city, examin ing Captain Eads' plan for the improvement of the mouth of the Miscissippi river. The recnmmendations thus far carry
 be left for the current between the two artificial walls.

## SCIENTIFIC AND PRACTICAL INFORMATION

the barnacles on the great eastern.
Mr. Henry Lee describes in Land and Water a recent exmination of the bottom of the Great Eastern, made by him in search of new barnacles and other marine animals. His labors were unrewarded with much of novelty; but among other interesting iacts remarked, he notes that the portion of he hull usually submerged was clad with an enormous mulitude of mussels, extending over a surface of 52,000 square feet of iron plates, and in some parts six inches thick. The verage weight of the mussels was from 12 to 13 pounds per square foot, so that the vessel was cumbered with fully 300 tuns of living marine animals, enough to load, with full cargoes, two ordinary collier brigs.

NOTHER NEW ANTISEPTIC
Among the benzol group, all of which are derived from coal tar, are (besides the phenol or carbolic acid $\left(\mathrm{C}_{6} \mathrm{H}_{6} \mathrm{O}\right)$ and its many compounds) the cresol ( $\mathrm{C}_{7} \mathrm{H}_{8} \mathrm{O}$ ), the phlorol $\mathrm{C}_{9} \mathrm{H}_{10} \mathrm{O}_{3}$ ), and the phynol. The latter, of which the composition is $\mathrm{C}_{10} \mathrm{H}_{14} \mathrm{O}$, is also found in the volatile oil of thyme. together with thymene, $\mathrm{C}_{10} \mathrm{H}_{10}$, and cymene, $\mathrm{C}_{10} \mathrm{H}_{14}$; but the cheapest source of its production is coal tar. Several compounds of the phynol were studied by chemis s long ago; but it was reserved for Lewin, of Berlin, to discove that it is a powerful antiseptic. When pure, it consists of transparent crystals of a very agreeable and strongly aromatic odor: while it is so powerful that a single grain in thirteen ounces of hot water is a sufficiently strong mixture for all purposes. Comparative experiments have shown that it possesses a much greater power to arrest fermentation and putrefaction than either carbolic or salicylic acid. Added to a solution of sugar with yeast, it arrested fermentation added to milk, it arrested coagulation till 20 days later than is usual, and after 40 days the was nogetation visible Albumen of eggs did not show putrefaction at the end of 11 weeks, and the peculiar aromatic smell was still prevalent at that time. Even in bony substances, otherwise so ready to start decomposition and putrefaction, it was able to arres all putrefactive change for not less than 35 days.
It appears thus that the benzol series contains the best disinfectants, and that carbolic acid, which has hitherto en joyed the highest reputation, is by no means the best in the series; and that it will be superseded by the fagrant thymol, until perhaps some better antiseptic is discovered.

A new oleaginous seed.
The commission of the permanent Exposition of the French Colonies bas lately called the attention of Marstilles soap makers to a new source of oil, found in the seed of the carapa, which is a tree abounding in immense forests in French Guiana. Twice a year the tree produces an abundant harves of seeds, which at certain times cover the earth to a depth of four or five inches. These, immediately subjected to pres sure, give 35 per cent of their weight in an excellent soapmaking or illuminating oil.
national tree protection
By a United States statute of March 3, 1875, a penalty of $\$ 200$ or six months' imprisonment is attached to permitting cattle to run on national lands, and to break down trees and hedges. The unlawful cutting or wanton destruction or injury of " any timber tree or any shade or ornamental tree, or any other kind of tree" on the lands of the United States is punishable by $\$ 500$ fine or a year's imprisonment.

## A Shower of Hay

Dr. Hawtrey Benson, of Dublin, writing in the Dublin Daily Express under date July 27, describes a remarkabl shower of small pieces of hay which be witnessed at Monks town that morning. It appeared in the form of "a number of dark flocculent bodies floating slowly down through the air from a great hight, appearing as if falling from a very heavy dark cloud, which hung over the house." The pieces of hay picked up were wet, "as if a very heavy dew had been deposited on it. The average weight of the larger flocks was probably not more than one or two ounces, and, from that, all sizes were perceptible down to a simple blade The air was very calm, with a gentle under current from S.E.; the clouds were moving in an upper current from S.S W." The air was tolerably warm and dry, and the pheno menon is thus accounted for by Dr. J. W. Moore: " The co incidence of a hot sun and two air currents probably caused the development of a whirl wind some distance to the south of Monkstown. By it the hay was raised into the air, to fall, as already described, over Monkstown and the adjoining districts.'
A similar shower of hay fell near Wrexham, England, July 25.

Collodion.
Few bodies are more easily electrified than collodion. With the least friction by the hand, the membrane adheres to the fingers. If a collodion sheet be fixed, like a flag, to a glass tube, and waved in dry and hot air, it is electrified. Other uses of collodion sheets, here mentioned, are in experiments on polarization of light, on colors of thin films, on diathermancy, on vibrations in acoustics. M. Gripon pre. pares these sheets by dissolving 15 to $1 \cdot 7$ grains gun cotton in a mixture of 50 grains alcohol and 50 grains elher. The collodion is poured on a glass plate after the latter has been breathed upon so as to receive a coating of moisture. When -after some hours-the collodion is dry, the plate is put in water; and a sheet of paper having been applied snd attached to the collodion by the odges, the film is drawn off with the paper

## IMPROVED VISE

 and strong construction, and possessing double jaws, which may be adjusted so as to hold an object at any desired angle with great firmess. This arrangenient offers considerable wivvantages to the orerar since hecan thus place his work advantages to the operator, since hecan hus place his work in whatever position is best suited to his convenience. Aperspective view of the invention is given in Fig. 1, and secperspective view of the invent.
tional views in Figs. 2 and 3.
tional views in Figs. 2 and 3 .
The fixed jaw, A, is grooved at B, Fig. to receive an annular projecting portion of the standard, C, and also has a shank which enters into a socket in said standard. To hold the jaw in its place, a score is cut around the shank, and a similar score is made above in the socket. Into the aperture thus formed a hardened steel pin, D , is placed. This pin prevents the jaw, A, from being drawn out, while it does not interfere with the rotating of said jaw in the direction of the arrow, and a indicated by the dotted lines in Fig , Fir 3 shows the rear face of the in A. And Fig. 3 shows the rear exhibits in the groove, B, a number of holes. On the standard is a spring bolt, shown at E,
Fig. 1 , which, when it is desired to adjust Fig. 1, which, when it is desired to adjust
the jaws at an angle, is drawn back, and, the jaws at an angle, is drawn back, and,
when the jaw is set, is slipped into one of the when the jaw is set, is slipped into one of the
apertures, holding it firmly. The movable jaw, F, has a hollow shank which enters the jaw, A , and the standard. Into the end of said shank is placed the flanged nut, $G$, into which passes the vise screw. The latter is held in place in the movable jaw by a pin, H , arranged in similar manner, to the pin, D, al ready described. It will be seen, from the shape of the upper front is thrown over the lower part of the front piece, shand is held with the latter. The griping of with jaw, D, forming a head covering which is claimed to be perfect A, and is held with the latter. The gripping of
effected by turning the handle in the usual maneffected by turning the handle in the usual man-
ner, the screw acting in the nut and drawing ner, the screw acting in the nut and drawing
the parts together very tightly. All parts of the the parts together very tightly. All parts of the
vise are made to gage, so that, when any portion vise are made to gage, so that, when any portion
becomes broken, it can be replaced by sending becomes broken, it can be replaced by sendin
number and size of jaw to the manufacturer. number and size of jaw to the manufacturer.
The faces of one pair of jaws are roughened, and those of the otherpair left smooth, to suit different kinds of work. The general construction is such as to prevent any dirt entering the working parts. The pins, $H$ and $D$, present a novel and ingenious mode of securing the jaws; and although of hardened steel, they sustain but very little of the thrust, and hence are not likely to wear out. They are easily removed, admitting of the implement being taken apart for oiling, etc. A screw thread cut on one end, engaging in a similarthread made in the jaw fo pin, $H$, and in the standard for pin, $D$, holds each pin firmly in place
Patented January 26, 1875. For further information ad-
dress the manufacturer, Elmore Penfield, Middletown, Conn.

## FOX'S REVERSIBLE CAP.

Mr. Morris Fox, of New York city, has recently invented Fig. 1

a new form of cap for the use of car drivers and others ex posed in winter, by their occupations, to the inclemency of

Fig. 2

the weather. It has a double back section, marked B, in tion, E, Fig. 1, over the front of the head. 'J he front piece D, is also made double. By detaching loops by which the the sections are fastened when the cap is worn as shown in Fig. 1, the folded rear part, B. may be reversed and extend ed down to the neck, as shown in Fig. 2; the supplementary crown section, E , is then swung over the front, below the chin, to cover the ears and front part of the neck, and the
poses to make one side of each section of fur, as in Fig. 1 and the reverse side of rubber cloth or other waterproof ma terial.

## A) MERCURIAL SAFETY VALVE.

A new safety valve, the patented invention of Mr. E. W Colls, is in operation at Erith, near London, and is said to answer exceedingly well. The action of the valve is such that, the moment it begins to move in consequence of an ex cess of pressure, it opens fully, so as to allow a free escape of steam until the pressure becomes sufficiently reduced in the boiler, when the valve closes as quickly as it opened This action is brought about in the following manner: A lever, A, consists of a metal tube, having at each end a closed metal box. This tube passes through eyes in the pillars, B B B. One of these pillars, jointed at X, forms the fulcrum upon which the lever works; another presses upon the valve itself, and the third is unattached at its lower extremity, where it has a stud which works up and down in the curved slot, Y. This slot acts as a guide preventing the valve from being forced out of its seat. The screws, C C C, passing through the pillars at the top, press upon and hold the lever, A. To the end of the lever, $A$, behind the fulcrum, is se

cured a cast iron box, $D$, the inside of the bottom of which is a prolongation of the lower level of the tube. At the opposite end of the lever is another box of cast iron, much deeper, the bottom being of thick cast iron to give weight. The space intervening between the floor of this box and the lower level of the tube is filled with mercury, M. The pressure upon the valve is regulated by setting this weighted end of the lever at a proportionate distance from the fulcrum. For this purpose, the lever is duly adjusted, and then secured in its place by the screws, C. When once the lever is adjusted by the engineer or other responsible person, it may be secured from being altered by the man in charge of the boiler by sliding over
the head of the screws, C, a tubular cap, E, having a slo formed along it at the bottom for the stems of the screws to pass through. The cap is closed at one end, and at the other is provided with a cover which is applied to it when the cap has been slipped over the heads of the screws. The cap is then secured by a padlock, and all access to the screws is hus prevented
When the maxim um pressure of steam at which the valve set is attained, the valve proceeds to lift slightly, as if constructed in the ordinary way; but the moment this takes place the lever is thrown out of its horizontal position, and the mer cury from the weight box begins to flow through the tube into the box behind the fulcrum. The weight of the mercury is thereby displaced from the end of the lever, and acts as a lifting force by being transferred to the rear of the fulcrum. Thus the valve is no longer loaded to the same extent as before, and opens freely for the escape of steam. When the boiler has been relieved of pressure to the extent of two or three pounds, the lever weight is sufficiently heavy to close the valve, and the mercu ry returns to its original position, thereby preventing the valve from opening again until the maximum pressure is once more attained. As used at the Erith oil works, the steam blows off at a pressure of 35 lbs , and closes when it falls to $32 \frac{1}{2}$ lbs. The valve is easily set to a pressure ranging from 10 lbs. to 100 lbs., on the square inch.
apanese Variegated Foil
Professor Lielegg, of Japan, writes to Europe to describe process used by leaf used for decorative purposes. Thirty or forty thin plates, of gold, silver, copper, and various alloys, are laid one over the other in a given order, and soldered together at the edges so that the whole forms a stout plate of metal Punches of various shapes, conical, pyramidal with triangular, square, or pentagonal sides re now used to make a pattern of perforated figures, which exhibit on their inner sides con centric circles, triangles, and other forms cor esponding to the punches used. The plate so prepared is hammered and rolled until it has become quite thin, the holes disappear, and the figures have spread out, preserving, however heir parallelism. A number of broken, straight and curved lines are thus produced, their effect being further enriched by the use of acids to engify the colors. Thin plates prepared it his way have an extromes prepared in admitting relief, with stamped or engraved de
signs; and, capable of receiving the most varied colors and forms, will have many uses in decorative art.

## ROBERTS' COMBINED LAMP AND OIL CAN

A simple little invention is illustrated in the annexed en graving, which, we think, will prove of considerable conve nience to engineers. Any one who has ever attempted to il out-of-the-way machinery in the dark, and especially in the confined limits of a steamboat's hold, will understand that keeping one's self clear of the moving parts, while both hands are occupied, the one with a lamp, the other with an oil can, is certainly not an easy, and is in some respects a perilous, operation. The present device, which combines lamp and oil can in one, allows one hand to be free, so that he user can steady and support himself, and in addition a urther advantage is offered in having a light so placed as to illuminate the darkest recesses of the machine, which it oth erwise might be difficult to light up sufficiently to enable oil cups to be readily found.
As shown in the engraving, a cylindrical vessel is provided

with a flanged stand, and is divided within by a partition, A. The large space nearest the handle serves to hold lubricating oil,and the spout therefor passes through the partition and the small space, which contains lamp oil, and extendsin a nozzle outside the can in the usual manner. The lamp oil space is filled through the aperture, at $B$, in the cover of which a lamp burner is arranged carrying the usual wick. The flow of lubricating oil is regulated by a spring lever, C , by which small air hole is closed or opened at will.
Patented through the Scientific American Patent Agency

June 22, 1875. For further particulars regarding sale of rights, etc., address the inventor, Mr. William Roberts, Quincy, Adams county, Ill.

## THE CENTENNIAL BUILDINGS.

We have already published complete views of three of the buildings now being erected for the purposes of the Centennial Exposition to be held in Philadelphia next year; and we now add a representation of the large structure to be devoted to the agricultural show. It will stand north of the Horticultural Building, and on the eastern side of Belmont avenue, Fairmount Park. It will illustrate a novel combi. nation of materials, and is capable of erection in a few months. Its materials are wood and glass. It consists of a long nave crossed by three transepts, both nave and transept being composed of Howe truss arches of a gothic form. The nave is 820 feet in length by 125 feet in width, with a hight of 75 feet from the floor to the point of the arch. The central of 75 feet from the floor to the point of the arch. The central
transept is of the same hight, and has a breadth of 100 feet, transept is of the same hight, and has a breadth of 10 feet,
the two end transepts being 70 feet high and 80 feet wide. the two end transepts being 70 feet high and 80 feet wide. The four courts inclosed between the nave and transepts,
and also the four spaces at the corners of the building, hav. ing the nave and end transepts for two of their sides, will be roofed to form valuable spaces for exhibits. Thus the ground plan of the building will be a parallelogram of 540
traffic on the ocean, traffic which a distinguished member of the association had said, at one of its meetings, forty years ago, was impossible Similar advancement has been recorded in was impossible. Similar advancement has been recorded in the department of telegraphy; and what a a spleads proved! The railways in the British islands not the railroads proved! The railways in the British islands
now produce, or rather save to thenation, a much larger sum now produce, or rather save to thenation, a much larger sum
annually than the gross amount of all the dividends payable to the proprietors, without at all taking into account the benefit arising from the saving in time. The benefits under that head defy calculation, and cannot with any accuracy be put into money: but it would not be at all overestimating this question to say that in time and money the nation gains at least what is equivalent to 10 per cent on all the capital expended on railways. It follows that, whenever a railway can be made at a cust to yield the ordinary interest of money, it is in the national interest that it should be made.
comparative safety of railways.
Speaking of accidents on railways, Sir John said that they were fewer now than they had been; indeed, that there is only one passenger injured in every $4,000,000$ miles traveled, or that, on an average, a person may travel 100,000 miles each year for forty years, and the chances be slightly in his favor of his not receiving the slightest injury.

TEXTILE industries.
More ingenuity and creative mechanical genius is perhap

## ed.

TELEGRAPHY.
There is no more remarkable instance, of the rapid utiliza tion of what was in the first instance regarded by most men as a mere scientific idea, than the adoption and extension of the electric telegraph.
The first useful telegraph was constructed upon the Black wall Railway in 1838, Messrs. Wheatstone's and Cooke's in struments being employed. From that time to this the pro gress of the electric telegraph has been so rapid that, at the present time, including land lines and submarine cables, there are in use in different parts of the world not less than 400,000 miles of telegraph.
Among the numerous inventions of late years, the automa tic telegraph of Mr. Alexander Bain, of Dr. Werner Siemens, and of Sir Charles Wheatstone are especially worthy of no tice. Mr. Bain's machine is chiefly used in the United States, that of Dr. Werner Siemens in Germany. In Great Britain the machine invented by Sir Charles Wheatstone, to whom telegraphy owes so much, is chiefly employed. By his machine, after the message has been punched out in a paper ribbon by one machine, on a system analogous to the dot and dash of Morse, the sequence of the currents requi
site to transmit the message along the wire is automatically

by 820 feet, covering a space of above ten acres. In its immediate vicinity will be the stock yards for the exhibition of horses, cattle, sheep, swine, poultry, etc.
Several foreign countries will erect buildings, more or less important in size and appearance, in the park. These will add importantly to the appearance of the whole, and many of them will be attractive specimens of modern architecture. Altogether, the Commission must be congratulated on their success in obtaining the necessary buildings for the Exposi tion.

## Progress of Engineering.

At the meeting of the British Association for the Advance ment of Science, which took place at Bristol on the 25th ult Sir John Hawkshaw delivered the address, devoting him self especially to the history and progress of engineering "Inventions," he said, "were lost and found again. The art of casting bronze over iron was known to the Assyrians, though it has only lately been introduced into modern metallurgy; and patents were granted in 1609 for processes connected with the manufacture of glass which had been practised centuries before. An inventor in the reign of Tiberius devised a method of producing flexible glass, but the manufactory of the artist was totally destroyed in order to prevent the manufacture of copper, silver and gold from becoming depreciated.
ancient engineering.
A high tribute to the wonderful engineering capacities of the Romans was paid by Sir John. Wars, with all their attendant evils, often indirectly benefited mankind, as when under the Romans or Napoleon, great systems of roads and bridges were instituted for military purposes. Roads followed the tracks of Rome's legions into the most distant provinces of the empire. Three hundred and seventy-two great roads are enumerated, together more than 48,000 miles in length, according to the itinerary of Antoninus. The water supply of Rome during the first century of our own era would suffice for a population of $7,000,000$, supplied at the rate at which the present population of London is supplied. A rapid glance was taken at the progress of mechanical skill in the manu-
facture of textile fabrics and the immense growth of steam
isplayed in machines used for the manufacture of textile fabrics than by those used in any other industry. It was not until late in historical times that the manufacture of such abrics became established on a large scale in Europe. Al hough in China man was clothed in silk long ago, and al hough Confucius, in a work written 2,300 years ago, orders roduction and manufacture of silk it wes worth nearl its weight in gold in Europe in the time of Aurelian, whose empress had to forego the luxury of a silk gown on account f its cost.
Until 1738, in which year the improvements in spinning machinery were begun, each thread of worsted or cotton wool had been spun between the fingers in this and all other countries. Wyatt, in 1738, invented spinning by rollers in stead of fingers, and his invention was further improved by Arkwright. In 1770 Hargreaves patented the spinning jenny and Crompton the mule in 1775, a machine which combined he advantages of the frames of both Hargreaves and Ark wright. In less than a century after the first invention by Wyatt, double mules were working in Manchester, with over 2,000 spindles. Improvements in machines for weaving were begun at an earlier date. In 1579 a ribbon loom is said to have been invented at Dantzic, by which from four to six pieces could be woven at one time, but the machine was de stroyed and the inventor lost his life. In 1800 Jacquard' most ingenious invention was brought into use, which, by imple mechanical operation, determines the movements of the threads which form the pattern in weaving. But the greatest discovery in the art of weaving was wrought by Cartwright's discovery (in 1784) of the power loom, which led eventually to the substitution of steam for manual labor and enabled a boy with a steam loom to do fifteen times the work of a man with a hand loom.
For complex ingenuity few machines will compare with hose used in the manufacture of lace and bobbin net Hammond, in 1768, attempted to adapt the stocking frame to his manufacture, which had hitherto been conducted by hand. It remained forJohn Heathcoat to complete the adap tation in 1809, and to revolutionize this branch of industry, tation in 1809, and to revolutionize this branch of industry,
reducing the cost of its produce to one fortieth of what th
determined in a second machine by the perforated ribbon The second operation is analogous to that by which, in Jacquard's loom, the motions of the threads requisite to produce the pattern are determined by perforated cards. By Wheat stone's machine, errors inseparable from manual labor are avoided; and what is of even more importance in a commercial point of view, the time during which the wire is occupied in the transmission of a message is considerably diminished.
By the application of these automatic systems to telegraphy, the speed of transmission has been wonderfully accelerated, being equal to 200 words a minute, that is, fastor than a shorthand writer can transcribe; and, in fact, words can now be passed along the wires of land lines with a velocity greater than can be dealt with by the human agency at ei iher end.
Owing partly to the retarded effects of induction and other causes, the speed of transmission by long submarine cables is much smaller. With the cable of 1858 only $2 \frac{1}{2}$ words per minute were got through. The average with the Atlantic cable, Dr. C. W. Siemens informs me, is now 17 words, but 24 words per minute can be read."

## Steam at 500 ibs. Pressure.

For several years the successful experiments of Mr. Loftus Perkins, in England, in the use of steam at enormous pressures, rising as high as 500 lbs . per square inch, have been known, but the explanations for the delay in the manufacture have not until now been made public. It appears, from the law proceedings in a suit lately brought by Mr. Perkins against the Yorkshire Engine Company, that Mr. Perkins assigned the exclusive license under his patents to the Company, they in turn agreeing to proceed with the building of the new engines and boilers forthwith. But this the Company failed to do, and so the invention became as it were locked up, and Mr. Perkins was compelled to appeal to the courts for relief. The case recently came on before Jus tice Fields, Nisi Prius Court, Leeds, when the following interesting explanation was elicited:
In opening the case, Mr. Wills said that his client, Mr Loftus Perkins, was a civil engineer, who resided in London.
He was the inventor and constructor of various devices for
the improvement of boilers and engines, which were the subject of several patents; and the defendants were the Yorkshire Engine Company, Limited, which company traded
principally in the manufacture of locomotive engines, and
carried on their business in the neighborhood of sheffield. carried on their business in the neighborhood of sheffield. between the plaintiff and the defendants on the 31st of March, 1872 . The great object, or rather the principle, which lay at
the root of the various improvements invented by Mr. Perthins were, in the first place, the use of extremely high preskins were, in the first place, the use of extremely high pres.
sure steam; and in the second place, the use of fresh soft
water distilled over and over again with the minimum of loss, water distilled over and over again with the minimum of loss,
so that, practically, there was but litre replenishing of the original supply necessary. The investigation of the profitable application to mechanical purposes of extremely higb
prtssure steam was a matter which had been hereditary in prtssure steam was a matter which had been hereditary in
the family of Mr. Perkins, for his grandfather was the inthe family of Mr. Perkins, for his grandfather was the in-
ventor of what was scarcely more than a toy-an extremely ventor ou what, was scarcely well known thirrty or forty years
ingenious toy which
ago, and which he (Mr. Wills) recollected seeing in his boyhood, and which some of the jury might have seen, exhibited in the Polytechnic, in London-Perkins' steam gun-in which by high pressure of steam, the result which was ordinarily
got from the explosion of compounds was secured. Mr. got from the explosion of compounds was secured. Mr.
Perkins had followed in the footsteps of his grandfather and father, and he became convinced many years ago that great would be great economy of fuel, by the use of high pressure steam-steam with many times the amount of pressure that
was ordinarily used in high pressure engines. The first thing which became necessary was to construct a totally new kind of boiler, because it was obvious that boilers of the ordinary construction never could stand such pressure as are
wished to put upon them, namely, from 200 to 300 , and even up to 500 lbs. per square inch. Accordingly, Mr. Perkins conceived the totion of making these boilers tubular, and making them tubular in exactly the inverse e ense in which we generally understand a tubular boiler. In an ordinary
tubular boiler the tubes which carried the heated air passed tubular boiler the tubes which carried the heated air passed
through the boiler and were surrounded by the water which through the boiler and were surrounded by the water which
was to be turned into steam. By Mr Perkins' process this
was reversed. The heated air was carried outside the tubes. was reversed. The heated air was carried outside the tubes,
and the water to be turned into steam was placed
within the tubes. Mr. Perkins constructed tubes with a within the tubes. Mr. Perkins constructed tubes with a
diameter of three inches, and with tubes of that diameter the necessary strength was practically attainable. The tubes were tested by hydraulic power up to 3,000 lbs. per square
inch, and no tube was used which did not undergo that pres sure. Mr Perkins thus over came one difficulty, and he was thus able to get the means of obtaining safely, within the walls of iron, the water which was necessary to produce this very high pressure. That idea once grasped, a great practical
difficulty occurred, namely, that of fastening tubes of this sort into platess which must hold them, and maintain the necessary connection between these tubes in such a manner
as to be as strong as the tubes themselves. The first patent which formed the subject of a.greement in this case was taken out on the 27 th of April. 1868, and was for improved means of fastening these tubes-connecting them together and fastening them in the plates, which would also hold them.
Mr. Wills went on to explain the method by which the tubes Mr. Wills went on to explain the method by which the tubes
were fixed to the plates, and then said the next difficulty were fixed to the plates, and then said the next difficulty was a very formidable one. Steam at that pressure bad a
temperature of aomething like 450 or 500 degrees Fah., within a few degrees of the temperature at which meta
became red hot, and a cylinder into which the steam was to be introduced must be worked without any vegetable matter about it, or it would have been impossible to work it. This
difficulty was overcome by the construction of a double cylin. der, of the form of which the jury could have an idea if they of it. The upper cylinder renresented by the on the to pot, had no communication with the external air. The upper cylinder needed no stuffing box. The bottom of it was
always filled up by the piston. The steam at 500 lbs. pressure, or the water that was to be let into the upper ccllinder
there, did its duty at that high pressure, never finding its there, did its duty at that high pressure, never finding its way at all into the lower cylinder. As soon as it did its work
the steam was let out by a system of mechanical valves in to a larger cylinder, and arrived there at greatly diminiehed pressurs, which it was safe to use with the ordinary mechani cal appliances for stuffing boxes. The upper cylinder was
the only part in which the high pressure steam was introduced

His Lordship-What did it do, there?
Mr. Wills-It pushed the piston down, but never did the up stroke. After the steam had done its work at a pressure
off say, from 50 liss. o 701 bs per square inch in the larger cy-
linder linder, it went, by virtue of an arrangement which wasnot new
which Mr. Perkins laid no claim to but which was calleo the compound engine system. to another cy inder larger still, where the presture was from 20 lbs. to 25 lbs. per square inch. After doing the work there, the steam was taken a way in the
ordinary course of things into the condenser ordinary course of things into the condenser. The condenser,
again, was a peculiarity of Mr. Perkins
invention, By this system the condensing of the steam was effected in tubes just as in the boiler, the result being that it absolutely prevented
all chance of the admixture of water, and also prevented the escape of steam, so that it could be used over and over again
with an amount of waste which was incredibly small. means of this system marine engines which had to use salt amply sufficient to supply the wasto in long voyages. There was also an enormous economy in the consumpticn of fuel, Mr. Perkins being able to construct the largest en the pows hour. That was one source of economy. The consequence
of using the same water over and over agan in in this way of using the same water over and over again in this way was that they could start with distilled water-the purest water
that could be got-and grit or impurities, which became elethat could be got-and grit or impurities, which became ele In the case of marine boile's and engines this was a very important result. It rendered it absolutely unnecessary to
depend upon salt water for the supply of the boiler, salt water being a source of enormous loss, because, from the moment it got into the circulating cistern to the moment it left it, it was a source of attack upon the integrity of the
metal. $W$ herever it got, it corroded and ate away the boiler. deposit of saline matter, which became incrusted at the botiom of the boiler, and did great mischief by forming an
impervious non-conducting coating inside the boiler. The impervious non-conducting coating inside the boiler. The
incrustation became as thick as the boiler plate itself, and made the appliration of the fire heat to be effected under of that was that the life of an ordinary seagoing steam boiler in large steamers, was from five to seven years, but there might be exceeptional cases in which it lasted, ten years.
Boilers made by Mr. Perkins had been submitted to the most
rigid test by officers of the Admiralty, and it was satisfactorily proved that they had been thirteen years in use without
pron repair or alteration of any kind. Mr. Perkins having in
vented and perfected this arrangement, and having had it satisfactorily used in 1868, he took out the first patent. Mr. Perkins was not a man of boundless means. He was a gentleman who, in company with his father, was carrying on
profitable business in supplying apparatus for heating pri profitable business in supplying apparatus for heating prit
vate houses and churches, in which this new tubular princivate houses and churches, in which this new tubular princi
ple had been brought to bear. He had constructed five or pix of these engines for himself, one of which was placed in
put a steam tug, and had been working ever since. But it was
a sossibe for him to construct these engines at a price impossible for him to construct these engines at a price
which would make them a commercial success, and he looked about him for a person who was possessed of the necessary capital. He was introduced to persons connected with the ed for his purposes if they had faithfully carried out their promise. They had large premises, and turned out a locomotive a wer k , which meant a turnover of $\$ 750,000$ a year at least.
They had a capital of $\$ 1,000,000$, and had power to increase that capital to $\$ 2,500,000$, therefore it was no imprudent step if he was deluded into the belief that the company would make the invention a success. Accordingly, on the 3 sst on
March, 1872 , after six months' preliminary investigation, March, 1872 , after six months' preliminary investigation,
during which these gentlemen had full opportunity of satisfying themselves of everything connected with the practical character of the invention, a deed was entered into. and it
was upon that that Mr. Perkins' complaints were founded. was upon that that Mr. Perkin's' compliaints were founded.
Under that deed Mr. Perkins agreed to give these gentlemen Under that deed Mr. Perkins agreed to give these gentlemen
an exclusive license to work his patent, and shut himself an exclusive thessibility of working with other people. They covenanted that he should have ber cent royaly upon
all aiticles manufactured and sold by them under the patent. They covenanted to proceed with the manufacture of ongines and to set up such extra machinery as might be necessary
for the purpose of executing orders. The very first thing for the purpose of executing orders. The very first thing
that was necessary was to construct sample engines. They agreed that before September, 1872, they would construct two traction engines-one single and the other double. They
also agreed, before the 1st January, 1873, to construct a marine engine, of 250 horse power nominal, suitable for a marine engine, of first of these engines, a single traction
steamer. The engine, was constructed many months after the reasonable
period allowed for its construction, being finished in Decemperiod allowed for its construction, being finished in Decema-
ber, 1873. But it would not work. It never has been worked, ber, 1873. But it would not work. It never has been worked,
and it was broken up, and sold for old iron. The comand it was broken up, and sold for old iron. The com-
pany proposed that, instead of constructing a double traction pany propose should construct instead a locomotive with tramcar attached, suitable for trams in England or abroad. Mr Perkins assented, but with a strong remonstrance. The engine had never been completed. It had never been put upon the stocks, not a sixpence had been spent upon it, and no attemp
had been made to carry it out. With regard to the construc had been made to carry ion. Mr. Sacre, the manager of the company, wrote to Mr. Perkins on the 10th of July, 1872 be carried out, in which he stated that he had endeavored in every possible way to arrange for a ship to fit the engines steamer of 2,000 tons burden, and as steamers of that burde carried a large number of passengers, an objection was raised as to rrying engines of such anexperimentalcharacter. The they undertook to supply a steamer as well as the engine. Mr Perkins accept the modification, but complained of the los of time in carrying out the agreement.
of time in carrying out tis Lordhhip (interrupting) asked what was the case for the defence.
Mr. Seymour said their case was that everything that could easonably be expected had been done, and that difficulties
His Lordship said there was a clear breach in point of time. It was a very valuable invention, and this agreement was
made in 1872 ; we were now in 1875, and nothing had been done.
Mr .
Mr. Seymour said his Lordahip had not heard the history of the difficulties they had had to meet; at one time difficul tifs with regard to Board of Trade certificates for ships; at Mr. Perkins had himself shared. The packing under this high pressure was exposed to a great strain, and some new invention must be perfected, and it was not till January, 1875
that that difficulty was finally overcome, by a simple but that that difficulty was finally overcome, by a simple bu
prand discovery on the part of Mr. Perkins and Mr. Sacre grand discovery on the part of Mr. Perkins and Mr. Sacre
They had now an order from the Admiralty for marine ngines, which were being made, and Mr. Perkins wrote a letter speasing of the Admiralty order as putting this
machinery on its trial and the result would be to satisty the Government as well as the public of the great value of the

His Lordship asked if they could not meet together and arrange the materer amicably
Mr. Wills said that if the defendants would relieve the plaintiff of the exclusive license they would have a license
on most favorable terms. But the plaintiff would do nothing on most favorable terms. But the plaintiff would do nothing
unless he got rid of that exclusive license. He was still in the hands of the Yorkshire Engine Company.
After some further conversation,
His Lordship suggested that counsel should speak to him privately, saying 14 years was the life of an inventor, and
hree and a half had gone already. hree and a half had gone zlleady.
Some further conversation tool.
Some further conversation took place, and afterwards his
ordship and the counsel reiired. Subsequently it appeared hat the Company agreed to a new arrangement, satisfactor to the court and ihe plaintiff

## The New Jetties at the Mouth of the Mississippi

The Board of Engineers, appointed under the act of Con gress to promote the improvement of the mouth of the M1sscity, during which the plans of Captain Eads, of St. Louis, were carefully discussed and in the main adopted. The plan the courses of the moving water, the jetties being simply gkes or levees under water, which are intended to anks to the river, to prevent its expanding and diffusing itself as it enters the sea. It is a notable fact, he says, that
where the banks of a river extend boldy out into the sea, oo bar is formed at the entrance. It is where the banks are absent, as is the case in delta-forming rivers, that the bar
is an invariable feature. The bar results from the diffusion of the stream, as it spreads out, fan-like, in entering the sea. The diffusion of the river being the cause, the remedy
lies in contracting the stream or in preventing the diffusion. A glance at the map of the Southwest Pass reveals the narrow and uniform width of the pass until it is within about $7 \frac{1}{3}$ miles of the bar, which is three miles beyond the Land's End. In this $7 \frac{1}{3}$ miles, the river is building up and extending its own banks into the sea at the rate of eight inches per day. Its jetties are completed by its own forces, and Captain Eads thinks they will probably never change their location, although every time the stream overflows there fresh deposits will raise them still higher. He points, therefore, to the fact that the river itself is continually empioying the jetty system, and that Nature makes parallel not converging, jetties. At $7 \frac{1}{\mathrm{~b}}$ miles above the bar of the Southwest Pass, the natural jetties are finished, and nar rowed to their normal width of 1,250 feet, and there the Pass is 60 feet deep in consequence. Captain Eads thinks that the bar was once unquestionably where this depth of 60 feet now exists. From this point the river gradually widens out to the sea, and the current gradually diminishes
 zero some twenty miles beyond in the Gulf. Since man has known the Mississippi, this distance between the bar and the miles Fol the Pass above has been the same, for miles. For 11 miles above, the Pass presents the same nar rowness and depth. The bar, says Captain Eads, has mar-
shalled the way through ages past to the Gulf, and the natshalled the way through ages past to the Gulf, and the nat-
ural jetties have been built up at exactly the same rate of speed, and have constantly kept the bar $7 \frac{1}{8}$ miles in advance. As the natural jetties advance, the bar is slowly eroded

Now, says Captain Eads, suppose that, by artificial means, these natural jetties could be suddenly extended 77 miles out to the bar. The volume of water would be almost if not exactly the same, and so would be the current. Instead of passing over the bar as it now does at three feet per sec rate of over four feet per second. The question is, could the bar re-form again afterward, nearer than $7 \frac{1}{3}$ miles from the end of these artificial jetties? Suppose there were no litoral current or Gulf Stream to carry away the sediment, the bar would certainly form again, but at the rate it has been going for the last 40 years it would take the river 65,000 days or 178 years to extend its jetties from the place where they are finished out to the present crest of the bar.
If man, therefore, should do in three or four years what will equire the river 178 years to do, it will be after the lapse of centuries when the bar can reappear, because it must be located at least seven miles beyond the artificial jetties. applies with equal force to the South Pass, where he is building the jetties.
Captain Eads further stated that the permanence of these jetties will depend mainly on the skill and experience of the ngineers. The river itself is daily showing that it is able construct jetties of sedimentary matters which it trans ports, which are imperishable and constantly increasing in trength. On its banks are found millions of young willows and poplars, which, properly formed into fascines and secure-
ly interwoven in large masses, and sunk with stone in the ine of the proposed jetties, and securely held in position by huge blocks of concrete, will soon become filled with sedimentary deposit, and form artificial banks, indestructible as those Nature is daily building at the passes.
The following is a table of the increase of depth in 18 rivers in Europe where jetties have been effective


## A Model Scientist

The late W. F. Henwood, F.R.S., the distinguished mining geologist, who died at Penzance recently in his seventy-first
year, was originally a clerk in the employment of Messrs. Fox, of Falmouth, to whose counsel he was considerably in debted in his early scientific work. By very great ind ustry and careful observation he acquired an unsurpassed know ledge of the mineral deposits of Cornwall and Devon; and
 wall. This post being abolished, Mr. Henwood's great experience was utilized in reporting upon and developing a number of mining districts in South America, Canda, etc. nd after the cessation of his travels, he lived at Penzancein comparative retiremant. His great works are the fifth and ighth volumes of the "Transactions of the Royal Geologi al Society of Cornwall," devoted respectively to the metal liferous deposits of Corn wall and Devon, and to those of the
foreign countries he had visited. But his scientific writings freign countries he had visited. But his scientific wricing
besides these were very numerous; a list of them occupie seven columns in the Bibliotheca Cornubiensis.
As a scientific man Mr. Henwood was characterized by in defatigable labor, great caution, love of accuracy, and mode-
mentions a fact of any kind which had not come under his own experience, without giving the authority for it. Thus many of his writings are marvels of copious reference. He per sisted in doing everything with this excraordinary amount of labor and care up to the last, notwithstanding that he suf fered for many years from a very painful heart disease. Hi scientific work ceased only with his death. So long as he could sustain even an hour's intellectual effort during the day, that was devoted to the arrangement of his stores of
facts and observations. Scarcely one of his cherished objects facts and observations. Scarcely one
in this respect remains unfulfilled.
In personal character Mr. Henwood won the high regard o all who knew him intimately. His acquaintance with men and manners was so great and varied, his memory so reten tive, and his conversational style so simple and lucid, that to talk with him was one of the most delightful and instruc tive of intellectual recreations. His estimate of his own labors and merits was unaffectedly modest, although he would resist, if possible, any unfair representation of his work.
In the spring of the present year the Murchison Medal of the Geological Society was awarded to Mr. Henwood.-Na ture.

## Edible Birds' Nest

Edible birds' nests are found for the most part in th Southern Archipelago. The chief region of supply is that comprising Java, Borneo, Celebes, and the Sulu Islands. The bird which produces the nests is a little swallow, hirun do csculenta. This salangan swallow, as it is called, is slightly bigger than a blue tit; it has a brown back; but the under surface of its body, as also the extremities of the feathers in its forked tail, are white. It flies with won derful speed and precision; and on the Java coast, where the surge breaks wildly against the precipitous and caverned walls of rock, the little birds may be seen in swarms darting hither and thither through the spray. They probably feed on fragments of molluses and other small animals which abound on those coasts. As you watch the surface of the water rising and falling, you notice how the holes in the rock are now concealed, now open again; and the little creatures, watching their opportunity, dart in and out with lightning speed. Their nests are fixed to the arched roof of tiese caverns.
What sort of a thing, then, is the edible bird's nest that ministers to the taste of the luxurious Chinese? It is that portion of the fabric which serves as a sort of bracket on which the nest itself (made of grass, seaweed, fibers, small leaves, etc.) is built. There are two forms of this support, one flat like an oyster shell, the other deep and spoon-shaped. It is a transparent mass, somewhat like isinglass, mother-of-pearl, or white horn, and is of animal origin. It was formerly supposed that this gelatin-like mass might be prepared in the bird's crop, from seaweed and other marine plants. This, however, is a mistake. If one opens the animal's
stomach about the time of building, it is found to contain insects, but no vegetable matter; moreover, in all species of the family of swifts, the crop is wanting. Dr. Bernstein has found that at that season the salivary glands under the tongue are enormously developed. On opening the bill, they are seen as two large swellings, one on either side, and these chiefly supply the material in question. They secrete a viscid mucous substance, like a concentrated solution of gum arabic, which can be drawn out of the mouth in long same (even microscopically) as the bracket material.
When one of the little birds wishes to begin building, it flies repeatedly against the selected spot, pressing each time a little saliva aginst the rock with the tip of its tongue. This it will do from ten to twenty times, moving a way not
more than a few yards in the intervals. It then alights, and more than a few yards in the intervals. It then alights, and the rock, continuing to add saliva; and by the motions of its body from side to side, the yet soft saliva is forced out over the harder parts, producing those peculiar undulatory bands which give the nest a stratified appearance. It is thought not unlikely that part of the secretion used by the bird comes from the largely developed glands in its stomach; also, that gelatinous matters picked up in the surge are mployed in the construction of its nest. The salangan a month; and after the young brood is flown, the nest soon decays and falls to pieces.
We have now to consider the adventurous work of gatherng the nests. The plucker, with nothing on but a cloth round his loins, and with a knife and a netted bag at his side, takes his place on a stage (of two crossbars) fastened to the end of a rope, and is let down against the face of the precipitous rock. With the left hand he grasps the rope; in the right, he has a rod, with which he holds himself as far as possible from the rock. Thus he descends, of ten several hundred feet, amid the roar of the breakers and the swarminc of innumerable birds. When he has come opposite a salangan hole, he makes a signal, and the lowering is stopped. He now sets himself swinging-and here follows he most dangerous part of the operation-gradually increasing his width of swing, till he thinks he will be able to leap off into the hole, and find foothold on a part of the rock
which he has previously noted. Should the venture fail, which he has previously noted. Should the venture fail,
death is certain. The man has generally a thin cord fastened round his body, and connected with the rope, so as to enable him to pull the stage to himself again. Sometimes, though rarely, this breaks, and then there is nothing for it but to make a bold spring out to wards the dangling stage. But so
fearless and practised are the men that they generally ccomplish this fearful leap successfully, even when laden with their booty. When the plucker has got safely into the
ole, he cuts off the nests with his knife, and puts them in his bag; for those high up, he usss the rod with the knife fixed to the end of it. The operation demands great address the slippery rock, perhaps, hardly affords standing ground, ad the man will cling with hand and feet to the little crack or projections; while the alarmed birds flit to and fro in the
gloom, and the tumultuous water beneath flashes with gloom, and the tumultuous water beneath flashes with phosphorescence. The plucker, however knows his work and when he is sufficiently laden, he draws the stage toward himself, mounts it, and is pulled up by his companions Thereupon, another repeats the operation.
As the method just described is both a dangerous and slow one, the natives adopt, when possible, another, which consists in fixing a rope ladder from the top of the rock down to the cavern, and also a sort of hanging bridge of rope within the cavern, either running round the wall or passin across. The internal surface of the cavern is often greatly pitted by the action of the weather, presenting a spongy ppearance, so that it is not difficult to find points for attach ment of the ropes. All the young birds and eggs found are cruelly thrown into the sea. The best harvest is in the months of July and August; the next best. in November and December; the worst, in April and May. The collected nests are cleaned and assorted; they are first packed in bags of bamboo fiber or palm bast, and the merchants again pack hem for the $m$ rrket (after a second assortment) in cases con aining a half picul, or seventy pounds.
China is the only considerable recipient of these cases; the few cases which are brought as a curiosity to Europe and America are hardly worth mention. The greatest trade in birds' nests is done with Canton, the eatire import there being reckoned at $168,000 \mathrm{lbs}$. We may reckon on fifty nests to the pound, so that altogether $8,400,000$ nests, or, from three pluckings, the products of $2,800,000$ pair of birds, ar annually introduced into China. There are, principally, two inds of nests distioguished in Canton-the mandarin nests, and the ordinary ; of the former or perfectly white kind ach pound costs in China twenty to thirty dollars, a quit xorbitant price, compared with that which the salangan pluckers themselves receive for the dangerous work, and which is, at the most, only ten to twelve per cent of the
market value. The second quality of nests are sold at half that price. The nests are dissolved in water or broth, and so taken as soup. It is higbly spiced with minor substances. This forms an entrée which is rarely wanting on the tables'o the wealthy Chineso, and never from that of the imperial court of Peking. The Chinese set a high value upon it considering it one of the best stimulants; but for this opinion there seems to be little or no ground. The mos路 Bunn. He finds that the material does not consist of specially nourishing or stimulating snbstances, but is quite similar in constitution to any animal saliva. Thus the Chinese pay dearly for
Journal.

## The Water Shell.

A correspondent writing from Okehampton, England, where some artillery experiments have recently been made reat that the trials have been successful in proving the adopted as of the new water shell, which in strument of warfare surnass in destructive power the nowned Shrapnel shell; and in one experiment when a bat tery of the Royal Horse Artillery was in action, as many as fifty-one hits were recorded with the new shell, against twenty-eight made by the Shrapnel, fitted with time fuses The wooden dummies, which represented the enemy drawn up in loose order, one pace apart, in the manner of an advancing army, were struck again and again by the minute fragments of the water shells, which, according to our corthan those made by the Shrapnel or common shell
The nature of the water shell may be explained in a few words. It is not a projectile of special construction, but imply a common shell or cast iron cylinder filled with water, which is fitted a small cylinder containing a quarter or cally soal han ounce of gun cotton; it is then her betwe the grains of fulminate of mercur is place ter is fitted, the shell is ready firing.
The charge of gunpowder used in the same sized shell is isteen ounces, the explosion of which breaks the shell up into 3 or 4 pieces, whereas the one charged with half an The reason is cotton flies into a hundred or more fragments. The reason is this: The gunpowder explodes comparatively slowly, and breaks up the shell at its weak points, while the gun cotton detonates with a sudden and terrible force, which, being communicated to a non-compressible body (water), bursts the shell instantly into minute fragments, the energy being exerted equally on all sides. So rapid and terrible is the force generated by the gun cotton that the iron shell is sometimes pulverized, the fr
The idea of this terrible shell is due to Professor Abel, he scientific referee of the English war department, who is also the patentee of a process to manufacture gun cotton, by which process, it appears from our correspondent's letter, the gun cotton is rendered the safest as well as one of the most powerful of all known explosives; being kept always in a wet state, preventing accident without diminishing its efficiency. The English, German, and French governments have adopted this new form of gun cotton for torpedoes and hells, as well as for military engineering and submarine mining.

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## Appreciation.

The following are samples of letters frequently received at this office. It would occupy too much space to publish a small fraction of them, but we occasionally, as an acknowledgment to the writers of all such letters that we are not unmindful of their good words, make public one or two of hese unsolicited expressions of appreciation. They are mementoes treasured by the recipients, and act as a lubricant to machinery, sunoothing the way, and making light the work incident to active professional pursuits:
Messis. Munn \& Co.-
GENTLEMEN: Letters patent have been received for our manner in which you have conducted our business, in securing our letters patent. And in the future we will remember you to others who may need assistance in securing patents.
Very truly yours,
Honton \& HAYEs.
McKinney, Texas, August $27,1875$.

## RESULT OF AN ADVERTI EMENT

On the day that the above was received at this office, the following letter, from Senator Randolph, of New Jersey came to hand:
. D. MunN, EsQ
It is due to you to say that, of over 300 enquiries about the Ditcher since June, 75 per cent refer to the advertisement of it in the Scientific American. We have adverised largely in other directions with little success. The sin fions from every State and Territory of the United States, and rom Canada, England, France, Belgium, Australia, Brazil, and Buenos Ayres. These are hard, dull times; and I canot present you with a Ditcher, but can make you feel that, despite the times, people read and heed your good paper.
Yours truly,
Theo. F. IRANDOHIH.

## New York, September 3, 1875

Opening of the American Institute Fair
The annual exhibition of the American Institute of this city is now open, and presents a most interesting and attractive display of industrial productions. We shall take occasion to report whatever is new and of interest in the exhibition when order reigns within the building.

The Chinese alloy called pakfong is made by fusing togeth er 10 parts copper shavings and 4 parts arsenic, arranged in alternate layers in a covered crucible, with a layer of com mon salt on the mixture.

## DECISIONS OF THE COURTS.

United States Circuit Court.---Northern District Now York.
the goulds manufacturing company ys, join p. cowing et al.
In equity.-Before Mr. Justice Hu nt.-July, 1874.





## Supreme Court of the District of Columbia

 of the District[In General Term.]
tam f. niedringhaus.-
tutes a design patert.
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## NEW BOOKS AND PUBLICATIONS.

The Shoe and Leather Reporter, devoted to the Trade in Lea ther, Boots and Shoes, Findings, Hides, Skins, Wool, Furs, Tan-
ning Materials, etc. Edited and Published by Isaac H. Bailey. ning Materials, etc. Edited and
New York city: 17
This paper, which is devoted to the shoe and leather interests of not only this city but of the whole country, has clanged proprietorship. Isaac H.
Bailey, Esq., a gentleman well known to the leather trade in this city. has become its owner. Mr. Yailey was for many years a merchant, and has an
extensive acquaintance among our business men, both in the "Swamp'" and extensive acquaintance among our business men, both in the " Swamp' and
out of it ; and if there is any writer that can make the subjects of leather out of it; and if there is any writer that can make the subjects of leather
and boots and shoes interesting to the public, that man is the present editor and proprietor of the Shoe and Leather Reporter. Published weekly. Price, ncluding, postage, $\$ 3.50$ a year.
The Mechanic's Friend, a Collection of Receipts and Practical
Suggestions. By William E. A. Axon, M. R. S.L. With 300 Suggestions. By William E. A. Axon, M. R. S. L. With 300
Illustrations. 12mo, cloth. Price $\$ 1.50$. Copies sent free by mail on receipt of price. New York: D. Van Nostrand, 23 Murray and 27 Warren streets.
This work consists of extracts from the pages of The English Mechanic, he nature and scope of which periodical are well known to our readers.
The ideas and suggestions are practical and, in many cases, original; and rtisans of every class will find much that is useful in its pages.
national Hymn and Tune book, for Congregations, Schools, and the Home. Price 40 cents. Boston, Mass.: Ditson \& Co. The music in this work is that with which every young person should be-
come familiar, since it includes the tunes, old and new, that will be used during the next life-time in public assemblies. The arrangement into four
simple parts has an educational value, and either one, two, three, or four parts may be practised and sung. There are more than 200 tunes, with 34

## Inventions Patented in England by Americans.

Compiled from the Commissioners of Patents' Journal.
From July 7 to August 23, 1875, inclusive
breech-Loading Fire arm.-N. King, Hartford, Conn
Chain Cable.-C. A. Chamberlin, Camden, N. J.
Compressing Fluids.-T. S. Disston, Philadelphia, Pa.
Dental Plates.-V. Smith, Schenectady. N. Y.
Discharging Grain, etc.-C. W. Mills, Montclair, N. J.
Electro-Magnet.-W. L. Powleson, San Fran
Fililing Mill.-W. B. Lodge, Danbury, Conn.
Locy.-J. Fish, New York city.
making Button Holes.-A. H. Cramp (of New York city), London, Eng. Motor.-J. G. Lane, Millhrook, N. F.
Over-Sewing Machine.-J. L. Boone et al., San Francisco, Cal. Printing Press Feed.-F. Deming, Waterbury, Conn.
Revolving Pistol.-E. Remington \& Sons, Ilion, N. Y. Spinning Rivg, etc.-H. A. Chapin, Springfield, Mass. Steam Engine.-G. b. Dixwell, Mass.
Umbrella Frame.-J. Horton et al., N ew York city.
Wamping Up Lifts, Etc.-V. W. Mason, Providence R.

## gecent sancricay and foreign equtents.

## Improved Dust Brush

Henry B. Conant, Geneva Lake, Wis.-The brush portion of the duster, which may be made of feathers, hair, silk, or any suitable material, is attached to springs in bunches, and the springs are con-
nected together so as to form a mutual support for each other, and keep the brush in place

## Improved Claw Bar

Andrew Shaw, Petroleum, W. Va.-This is a bar for drawin spikes from railroad ties, and for drawing spikes or nails in othe places, so made as to allow the clutch jaw to be raised and the levso as obtained, diminished after
saw the spike clear out

Improved Car Brake
Alfred T. Riley, Halleck, Mo.-A lateral band spring of suitable car frame, and connected by a rod to the brake-operating leve that is connected to the front drawhead, and to the brake wheel on the tender or locomotive. The drawhead or spring controls jointly the operations of the brakes of all the wheels. When the car is in state of rest, so that no strain is exerted on the spring and fron drawhead, the brakes are all, by the action of the spring on the
lever and brake rods, tightly applied to the wheels; but when the cars are coupled and drawn forward, the front drawhead slide forward and releases the brakes by the strain on the spring.

## Improved Ironing Board

Orlando S. Pride, Yonkers, N. Y., assignor to himself and John E Woddruff, same place.-In using the device, the board is passed into the shirt, and the neck band is turned down into a notch
Portion of a frame is then placed in the said notch to confine the said neek band, and the rear part of the board is raised, and its rea edge is placed against the inner edge of a rear cross bar. The shir
bosom is then drawn straight and smooth, and the frame and the rear part of the board are pressed down. In this way the shirt bo som will be held straight, smooth, and firmly, so that it can be

## Improved Graini Separator.

William E. Torley, Mllwaukee, Wis.-The cockle and small whea
pass off from a fine screen to the indented concave sides of a drum for the cockle to fall into the indentations, which will not hold the wheat, because of the elongated form of the grains, so that the wheat win pass off the when the sides turn theat will naturally slide off the plates is At the point where the wheat will naturally slide off the plates is
cbute, to receive and conduct it into the hopper. A brush in front of the drum brushes back any of the cockle on the front edge of the indented sides liable to slide off with the wheat and throw it back into the pockets.
improved Corn Sheller.
Solomon Williams, Tehuacana, Tex.-This is an attachment fo
corn shellers, consisting of a block having a conical cavity wit ribs or teeth on the inside, and arranged upon the extended end of a cylnnder journal. Its object is to remove the small kernels from

Improved Horseshoe.
Arthur C. Snowden, South Norwalk, Conn.-This horse overshoe toe, so that the shoe will open and close. The interior plates cover the under part of the foot, but not the frog, for which they ar shaped to leave space, and are lapped or shut past each other Hook flanges on each plate fasten the overshoe to the shoe on the horse. The hinged parts are spread by means of a screw, so that the hooks on the plates will tightly embrace and hold the overshoe t the shoe on the horse

Improved Welding compound
John Scott, Jr., and Amos S. Scott, Coatesville, Pa.-This is an improved welding compound, to be used in ihe manufactu
and steel, and it consists of a mixture of kaolin and sand.

Improved Hat and Coat Hook.
Charles Schoenbein, Brooklyn, N. Y.-This invention consist of a which the upper one is weighted at the rar pivoted thereto, of lower lever and open the front ends, which close like jaws on the coat or other article suspended from the lower lever. When the coat is removed, the jaws open instantly by
weighted lever, and are ready for repeated use.

Improved Sharpcning Machine.
Andrus S. Weaver, Joy, N. Y.-A reaper knife is fastened to the adjustable table by a cam lever. The table is adjusted by the two eccentric levers and by a spring. The grinding stone is moved back
and forth on the knife by a bar and rack and pinion to grind the teeth to the proper level after the knife table has been properly adjusted. A crane is hinged to the plate on which the bar rests, so as to readily move forward and back. The forearm is hinged to the top of the crane. The grinding stone, as well as the reaper кnife may be adjusted to almost any position. Wheel.
Improved Wind wher
Horace J. Brimhall, Jr., of Millington, Ill., assignor to himself and Samuel E. Foster, same place.-This invention consists of fans shaped like the arc of a circle, and pivoted at the middle of the top
and bottom to horizontal arms projecting from the shaft, so that they may swing into radial, or nearly radial, positions to take the wind, and into a circle to close, so that the wheel will not be turned by the wind. The buckets are connected to a slider on the shaft which is moved by a lever to open and close them forstarting and opping the machine.
Improved Safety Center Pinion for Watches.
Charles R. Bacon and Leuthold C. Brown, San Francisco, Cal. assignors to Cornell Watch Company, same place.-This consists of
a center wheel with detachable pinion, having projecting teeth that inclose a spring secured by a spring at one end to a perforation of the and center wheel to revolve in the usual manner, while it turn freely without the center wheel in opposite direction

Improved Ice Breaker.
Joseph T. Martin, Newark, N. J.-This ice breaker consists of a shaft carrying radial arms. Said arms are rigidly secured to said shaft, and are provided at their outer ends with ax or wedge shaped heads. The whole is mounted in a suitable frame, adapted to be
secured to a vessel, and operated so as to cut a passage before the secured to a vesse
vessel through ice

Improved Hose Nozzle
Charles Oyston, Little Falls, N. Y.-This is a hose nozzle for extinguishing fires, so constructed as to divide up the stream of water lar openings, is connected with three arms, the outer ends of which are connected with the flaring middle part of the shell of the nozzle. A series of concentric ring wedges also are connected together
by three arms, and in the outer surface of the outer ring is cut a by three arms, and in the outer surface of the outer ring is cut a
screw thread to screw into the shell. The ring wedges and arms are cast in one piece, and the said ring wedges are so arranged that their edges may be directly opposite the annular openings in the
plate, so as to divide up the ring sheets of water.

## Improved Glazier's Diamond

Philip Sinsz, Baltimore, Md.-The object of this invention is to he right inclination of a glazier's diamond to produce the best cuting effect. It consists in a broad-faced instrument, having at one end a diamond and at the other a guide roller, which latter forms with the diamond the supports of the instrument upon the glass, and keeps the sharp angle of the diamond in proper position for nt sized notches, which are cut into the face of the metal for the purpose of breaking off the cut portion of the glass.

Improved Steam Boiler.
John E. Jerrold, Meadville, Pa.-The ends of the boiler tubes are Hared or spread outward into grooves, and the inwardly projecting edge of the metal around the opening (in the tube sheet) is bent or
turned down over the end of said tube, thereby clamping or confinturned down over the end of said tube, thereby clamping or confining it in place a
jury from heat.

## Improved Boot and Shoe Calk

Rufus D. Guilford, St. Charles, Mich.-This calk is formed from a ectangular piece of sheet steel, struck up in suitable dies, whereby

Improved Indicator for Steam Engines.
Joseph W. Thompson, Salem, Ohio.-The indicator is designed to egister the relative amounts of steam pressure exerted on the pis-
on at each portion of its stroke. It is in part an improvement upon the automatic recording indicator for which letters patent of the United States were granted to C. B. Richards, March 24, 1863. The object of the invention is chiefly to reduce the number and weight of the parts composing the recording mechanism proper, nd thus correspondingly reduce their momentum when in action, ressures existing in the engine cylinder during a given stroke or trokes of the piston.

## Improved Injector.

Samuel Fowden, Philade!phia, Pa.-The steam is admitted through 2n annular opening formed by a water tube and a mixing tube, hough wier is admitted through a central tuine, the appaatus for lifting the water consists of valves with hollow stem, team pipe, and jet

## Improved Middings Purifier

Richard W. Gunter, Carrollton, Mo.-The invention comprises a eries of flat inclined laterally and longitudinally shaking sieves, pace under each, to carry off the light matters. Valves are pro ided to regulate the blasts, and a conveyer is placed under the bot tom sieve. There are inclined close bottoms to the sieves, descendng toward the fans to carry the middlings back. These have open ing at certain intervals for discharging to the fans below. In fron re wind breakers to pr ack up the botcom
Joseved Sugar Cooling and Draining Apparatus Joseph H. Hynson, Alexandria, La.-This consists of an oblong enter, where a longitudinal slot connects with a slotted revolving raining tube, fitting tightly to the under side of the central bot om part of the vessel. When, after the striking is finished, the ugar in the cooler has sufficiently granulated, the process of drain ge is commenced by turning the crank until the slotted part of the tube opens gradually toward the bottom slot of the cooler. the sugar is still warm, the molasses drains rapidy through the na but if the sugar has cooled and become firmer, the opening between tube and bottom slot may be opened wider for the readier draining of the molasses which has collected by granulation at the central bottom part of the cooler. The molasses may in this manner be
drained off more or less rapidly, according to the degree of heat in drained off
the sugar.

Improved Car Starter
Anthony A. Jones, Utica, N. Y.-A ratchet wheel is fixed on the ront axle of the car, and a long pawl lever is arranged to operate
i. When it is desired to start the car, the front (free) end of the ever is depressed by the driver applying his weight thereto (through the medium of a rod projecting up through the platform) whic causes the ratchet wheel to revolve the front axle and thereby the car wheels.

Improved Cotton Sweep.
Manfred Call, Richmond, Va.-The invention consists in a cotton weep with sharp cutting wings on both sides of a nose or point,
clined with their lower edges in advance, and attached by bolts to the standard as well as the nose flange.

Improved Vehicle Spring.
Henry Jeffrey, Seymour, Ind.-V-shaped bearing springs are in prings. Both the flat tension and V-shaped bearing springs ar made of semi-elliptic shape, and joined at the outer ends by bein bent around the bolts of the clips, to which they are connected. he clips are set into casings of the carriage body and frame. The tained by crosspins connected by outer links passing sideways.

## Improved Shingle Machine

John J. Kendall, Greensborough, N. C.-The reciprocating driv gainst each side of which a bolt is to be held on the table by a ttendant. Spring clamps behind the cutters receive the blanks cut off from the bolts between them and the side of the head, to hold them ready for the feeders, which consist of the swinging dogs
placed on vertical oscillating shafts. The feeders catch in the sides olaced on vertical oscillating shafts. The feeders catch in the side of the blanks by thin notched and pointed ends, and push the ass oft from the riving heads they drop in front of their ends, to e pushed by them through the shaving cutters. These cutters ar open when the blanks are pushed in by the feeders; one closes on the blank just before it begins to be pushed along, and continues to ove it toward the other cutter. An eccentric opens the cutter gain just before the feeder works, ready for receiving anothe lank; and immediately after the feeder works, the riving hea The throw of the eccentric may be changed to open and close the shaving cutters more or less, according to the required thickness of the shingles.

Improved Shot Charger for Shot Pouches.
John S. Long, Elkville, Ill.-This is a steel cutting valve with a enlarged on one side of the valve, so as to give clearance to the shot as they are divided without pinching on the blade. Also series of slors in the upper portion of the barrel, for gaging differen charges, are arranged radially to the pivot hole of the lever, $t$ hich the valve is connected

## Improved Butt Hinge.

A. H. Isham, A von, N. Y.-This invention consists in providing sindle with a doubly inclined lug so that the spindle will rising be drawn down by the action of the wing.

Wusiness and zersonal The Charve for Ineertion under this head is $\$ 1 a$ Line.
Hoalley Portable Engines. R. H. Allen \& Con
 Something New-Door and Bell Plates-Letters
Engraved on Glass. For Beauty and Durability it cannot Engraved on Glass. For Beauty and Durability it canno Pettis, Providence, R.
Cook's Pat. Rein Button-See advertisement on
page 205. John R. Jones. 50 N . 5 th St. Philadelphia, Pa. Valuable Water Power and Flour Mills for Sale.
Address, for particulars, M. Clark, Davis Bridge, Aiken

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ens or hundreds, while the cost is not increased.--Exch
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taining detail drawings of all parts and full particclars, now ready, and will be mailed gratis. W. D. Russell,
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not less than 2,500 lbs. Address B. F. Morret, Pots-
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Vols. Address E. B. Lewis, Clifton, Greene Co., Ohio. How to lay y out the Teeth of Gear Wheels-Price
50 cts. Address E. Lyman , C.E.,., New Haven. Conn.



 Back-geared Drill, 8200.22 in. 5 ft. Hor. Boring Mill,
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chine, 875.
sher.
All of best makers and

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mal Creation. Agents wanted. No trouble to sell. For Traps, \&e.,.a. a
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walk, Ct. N. Y. City salesroom, 17 Broadway.
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the Union Stone Co., Boston, Mass., for circular.


Barry Capping Machine for Canning
nents. T. R. Bailey \& Vall, Lockport, N. Y. The "Scientiffc American" Office, New York, is lttle buttons on the desks of the managers signals are sent to persons in the various departments of the eetablish-
nent. Cheap and effective. splendid for shops, offlees,
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adress Star Tool Co... Providence, R. I. Sinining Rings of a Superior Quality-Whiting-
ville Spinning IIng co., witingrlle, Mass. For best Presses, Dies, and Fruit Can Tools, Bliss
© Willams cor. or Plymouth and Jay, Brokklyn, N. $\mathbf{Y}$. For Solid Wrought-iron Beams, ett., see adver-
Hisement. Addres Union Iron Mull, M1ttsburgh, Pa. for usement. Ad
lithograph, \&c.

##  <br> . K. will find directions for polishing meer-

 schaum on p. 155, vol. 31.-A. J. B. will find directions for cleansing greasy waste on p. 202, vol. 31.- R. J. will find directions for gilding picture frames on p. 90, vol. 30.-F. J. will find directions frames on p. 90, vol. 30.-J. J. wing a level op p. 218, vol 31.-J. N. will find a recipe for sulpho-cyanide of potassium on
p. 219, vol. 31. p. 219, vol. 31.
(1) G. F. asks : How is telegraph wire galvanized? A. Galvanized wire is simply a wire cov-
ered with a coating of zinc. The wire is first immersed in acid, and then run through a vat of melted zinc.
(2) W. H. G. asks: How many cells of the Callaud battery will it take to run a small foot
lathe on light work, with an engine to match? A. It depends upon how much power you require. You can get $\frac{1}{20}$ of a horse power by using 100 cells of
very large size.
(3) A. J. asks: Can I get porous cups made at a pottery? A. Yes. 2. Would a gallon battery consisting of a jar with copper cylinder, inside of
which is a porous cup with zinc, the inside jar bewhich is a porous cup with zinc, the inside jar be-
ing filled with sulphuric acid and water, and the ing filled with sulphuric acid and water, and the
porous cup being filled with salt water, do for battery.
(4) H. P. R. asks : Does the conductibility of a lightning rod depend upon the surface of the rod or the cross section, that is, will a rod $1 / 2$ inch in diameter, round, be as good a cunductor as the same
amount of metal, flat and with a large surface? A. amount of metal, flat and with a large surface? A.
It depends upon the quantity of metal, irrespec-
(5) M. L. B. says: I propose to construct a
burglar alarm to be attached to doors and windows burglar alarm (to be attached to doors and windows
of my house) as follows: I use line wire No. of my house) as follows: I use line wire No. 20, of
copper, put up on brick work with shingle nails, the wires being 4 inches apart; longest circuit is 120 feet; bell magnet has No. 23 wire, to be operated by one cell of Léclanché battery. The wire is to be putup before the plastering, and is, of course, covered by the plasterer. The wire is common
copper wire not insulated, but all joints are to be soldered. Will it work? A. Use copper wire insoldered. Will it work? A. Use co
sulated with gutta percha or kerite.
(6) E. E. R asks : Has any person discovered
the properties of lightning? A. Franklin discovered the identity of lightning and electricity. Its properties are the production of heat, magnetism,
chemical decomposition, shocks, light, and polari(7) D. B. B. asks : 1. Where can I get a hard ubber plate for a Holtz electrical machine? A. At the rubber factories. 2. Would the ordinary Yes. 3. Is the effectiveness of a machine
by a higher polish of the rubber? Yes.
(8) V. F. P. M. C. asks: How large a flue ought we to hàve in a stack 75 feet high, other things being in proportion and the surroundings
favorable, for a boiler 5 feet $\times 13$ feet, with seven-ty-one $31 / 2$ inch flues, in order to get the greatest benefit of fuel used? A. Make the area of the fluc
about the same as the collective cross area of the tubes.
(9) L.H. M. asks: What fluid would be the best to use for changing the weight from one end time, by letting it pass slowly through a smal opening, the same as in an hour glass? A. Dry
sand, such as is sold by stationers, will answer. Perhaps mercury would be better. We could not ell without knowing more particular
(10) J. C. says: My steam gage points to 5 possibly it has water pressure on it. You should have it tested, however, as soon as possible. (11) J. R. N. asks: If there is an iron vessel to the square inch, and of sufficient capacity to
hold 1 gallon of cold water, can there be any more water forced into the vessel? A. Yes, since wate is slightly compressible.
(12) J. T. R. asks: 1. How can I inflate a cot cohol, set fire to it, and hold it under the balloon It is well to put the sponge in a barrel or deep vessel. 2. Please give a recipe for varnishing cotton balloons. A. See p. 136, vol. 28.
(13) W. B. asks: Has the screw ever been applied to car brakes instead of the chain, as a
means whereby to work them? A. Yes. Does any substance projected into space return with the same velocity as that with which it as
a. No, if your question refers to initia cended? A. No, if
and final velocities.
(14) M. M. says: 1 . Some of our engineers use
old india rubber hose to make joints on the hand hole plates of their boilers; they claim that
makes a tighter joint than hemp and white lead, but I think the gum corrodes the iron around the
joint. Am I correct? A. No. The practice is joint. Am I correct? A. No. The practice is
very common, and generally approved. 2. Please give a rule for putting gage cocks in locomotiv oilers. A. Place one 3 or 4 inches above crown
sheet, and the others the same distance apart ove
$\qquad$
(15) C. T. O. says: I have been making some tests of a plain slide valve engine. I have taken the following data every half hour : Revolutions, and the temperature of outside of engine and in boiler room, injected water, and steam. I put a plug in the steam dome and in the water pipe, and
filled it with mercury ; but I do not get within $20^{\circ}$ flled it with mercury; but I do not get within 20 you tell me the reason? A. It would seem that either your pressure gage or thermometer is incorrect; but you do not send enough data to enable us to form a very definite opinion. We would be glad to receive from you an account of the
trial, giving data and results, with description of manner of conducting the experim
not be afraid of making it too full.
(16) N. C. F. Sr., says: I wish to build of the Cunarders about 3 feet long after the model arge an engine would be required to move it rap idly? A. Make everything about on the scale of the original. We imagine that in Boston you can pick up more in a ship yard, in a short time, tha
(17) A M. Z asks. Will a flat bottomed boa 15 feet long, 28 inches wide, and 12 inches deep, sail as fast and stand as much as a round bottome ooat of the same dimensions? A. With
(18) A. D H says: 1
(18) A. D. H. says: 1. I am building a boat ter. I wish to put in an engine $4 \times 4$ inches, and a boiler 2 feet in diameter by 4 feet high, having 28 two inch tubes. Will boiler and cylinder be in proportion, and will they be large enough for the boat? A. The machinery will answer very well.

2. Whatsize of screw should I use, and what pitch? 2. What size of screw should I use, and what pitch?
A. Use a propeller 2 feet in diameter, and of 3 eet pitch
(19) C. R. says: Suppose we are standing on the upper side of the globe; when it has with our heads downward, why are we not conscious of it? A. We are, to a considerable extent,
if we take account of such incidents as sunrise and if we take account of such incidents as sunrise and
(20) J. M. L. asks: 1. Is any advantage likely to be derived from attempting to bleach or clarify crude mineral oils, by bringing them in contact with bleaching gases, such as sulphurous
acid or chlorine, or even only by hot air or steam, by some process similar to that used in Louisiana for bleaching sugar cane juice? A. No. Agitate or some time; wash with water, and repeat the acid treatment a second time if necessary. 2. Could not chlorine be made at such a low price as to al-
low of using it instead of sulphurous acid in bleaching sugars? A. Cblorine gas may be obtained ing sugars? A. Cblorine gas may be obtained
cheaply and in large quantities from chloride of lime (bleaching powder) by treating it with a little oil of vitriol.
(21) H. asks: What kind of acid is used to frost glass? A. Hydrofluoric acid is used for this
purpose, and is obtained in the gaseous form by purpose, and is obtained in the gaseous form by
subjecting powdered fluorspar to the action of strong oil of vitriol in a leaden tray. This should
be placed in a warm wace, and the glass to be be placed in a warm place, and the glass to be
frosted placed over it as a cover. The sand blast has lately been substituted for this tedious and expensive process, with very satisfactory results. (22) J. F. G. asks: 1. What material is best to coat paper with to render it waterproof? A. Dissolve 8 ozs. of alum and $33 / 4$ ozs. of white soap
in 4 pints of water ; in another vessel dissolve 2 ozs. in 4 pints of water : in another vessel dissolve 2 ozs.
of gum arabic and 4 ozs. of glue in 4 pints of water. of gum arabic and 4 ozs. of glue in 4 pints of water.
Mix the two solutions and make the mixture hot Immerse the paper in the mixture, and hang it up to dry, or pass it between steam-heated cylinder enamel, such as pots and kettles are lined with? cat
(23) R. L. asks: Can you explain the fact that flies, restivg on the wall, or any perpendicuheads downwards? If dead, they will be found heads downwards? If dead, they will be found
with the heads upwards. A. Our observations do not sustain yours. We find that, of flies resting upon the wall, etc., some have their heads pointing upwards and some downwards.
(24) C. M. says: 1. I am told by good au-
thority that muriate of soda will prevent coal oil trom exploding. Will it do it? A. No, if we understand your question. 2. What is the reason that, the moment you place a chimney over a
smoking lamp it ceases to smoke, the lamp wick moking lamp it ceases to smoke, the lamp wing at same hight in both cases? A. The shape of the chimney causes a greater supply of air to the flame, and consequently of oxygen; an
(25) C. B. H. asks: 1. How can I get rid of peach borer in peach trees? A. The following
plan, proposed by Harris, has been found very uccessful: Remove the earth around the base of which may be found in it and under the bark, cover the wounded parts with common clay composition, and surround the trunk with a strip of sheath ing paper eight or nine inches wide, which should extend two inches below the level of the soil and
be secured with strings of matting above. Fresh be secured with strings of matting above. Fresh
mortar should then be placed around the root, so mortar should then be placed around the root, so or unexhausted loam. This operation should be performed in the spring, or during the month of

June. In the winter the strings may be removed, and in the following spring the trees should again search before, and the protecting application hould be renewed. 2. Will boiling water around
(26) H. R. asks: 1 . Is an engine $2 \times 4$ inches arge enough to run a boat 20 feet long? A. The engine is too small to give much speed. 2. Please give me the proportions of a boiler suitable for
this engine to work at 200 Ibs. pressure. A. Make an upright boiler with about 50 square feet of heating surface. 3 . Please tell me the proper diameter and pitch of screw. A. Use a propeller 20 inches in diameter, and of 28 or 30 inches pitch.
4. How fast will she run? A. Ascertain this by (27) R L.
(27) R. L. S. asks: Will cold-blooded ani mals, such as fish, alligators, and snakes, live for
years, grow, and fatten, without food? A. No. 1. Are any of those stones known as Indian arro points found in Europe, or anywhere else than America? A. In Europe. Consult Harper's Magazine of June and July, 1875, on an article entitled "The Stone Age in Europe." 2. Were they in use by the Indians in Amer
or since? A. Before
(28) C. A. Before
(28) C. J. G. asks : 1. Will phosphorus shine in the dark when put into a hermetically closed
bottle? A. Yes, if the bottle contain air. 2. Will bottle? A. Yes, if the bottle contain air. 2. Will
it consume itself therein? A. If not ignited by friction or otherwise, it will not. 3. Must it be put in water, even when hermetically closed? A.
(29) E. F. asks: 1. How would you advise me to use cotton seed as a food for cattle? A.
You should remove as much of the oil as possible first. 2. In what condition should it be given, raw or cooked? A. Either way will answer; but with
regard to the latter method, we find no account of it having been prepared. 3. Should it be given alone, or mixed with other food? A. The latter is perhaps the better method. 4. Will it give an oily taste to the meat? A. No. 5. Will cotton seed (30) J. T. asks: 1. What is the exact quantity of the ordinary commercial sulphuric acid required to decompose a given amount of protosul-
phide of iron? A. Ten pounds of FeS will require $11: 24$ lus. of $\mathrm{H}_{2} \mathrm{~S}_{\mathrm{O}_{4}} .2$. What is the amount of sulphuretted hydrogen and sulphate of iron thereby
formed? A. This reaction will give you 38 lbs. of formed?
$\mathrm{H}_{2} \mathrm{~S}$ and $17 \cdot 4 \mathrm{lbs}$. of $\mathrm{Fe} \mathrm{S} \mathrm{O}_{4}$.
(31) P. and B. say: We occupy a business room which is roofed with tin from each end to
center, with gutter in the middle, through which center, with gutter in the middle, through which
the water from five other rooms passes. This gutthe water from five other rooms passes. This gut-
tecasions us a great deal of trouble by leakage. The contraction opens the seams in the tin, especialy during cold weather. If we put in a of one continuous sheet of tin the whole leogth,
will the contraction be sufficient to break it? A. You do not say how long the gutter is; but in any case y ou will not be able to tind a sheet of tin long elourh to make the whole gutter in one piece. If
you take galvanized sheet iron, and make in it you tike galvanized sheet iron, and make in it
some slight corrugations crossing it at right angles to its length, there would be no danger of its breaking from contraction; and the corrugations
would make no material impediment to the flow would make no material impediment to the flow (32) C. T. H. asks: Will worn-out printer's
type make good Babbitt metal? A. No type make good Babbitt metal? A. No.
(33) R. G. says: 1 . We have a stream of
water here (the Wabash river) which is estimated water here (the Wabash river) which is estimated to furnish 10,560 cubic feet of water per minute,
having 10 feet fall. I estimate the power at 160帾 who ought to know put it at less than 100 .
mate? A. About 200 horse power could be obtained from the water if all the power were uti-
lized. 2. What percentage of the water could be lized. 2. What percentage of the water could be
raised 80 feet by using the remainder as power? raised 80 feet by using the remainder as power?
A. With good apparatus, you might expect to obA. With good apparatus, you mizbt expect to ob-
tain an efliciency of from 60 to 70 per cent of the power of the water, from which it will be easy to hight.
(34) H. A. asks: At how many revolutions per minute must I run an engine, cylinder $4 \times 4$ pressure at 80 lbs ., and a boiler large enough to generate all the steam required? A. From 400 to (35) P. H. W. says: A steamer is $42 \frac{1}{2}$ feet long by 7 feet 5 inches beam, aud 2 feet 10 inches
deep below guard. The engine is $51 /$ inches in diameter by 7 inches stroke. The screw is of 38 inches feet pitch. The engine makes 200 revolutions per minute, with 80 lbs. pressure. We make about 10 miles per hour. We have run 22 miles (conveying 18 passengers) in $21 / 4$ hours, steam pressure averag-
ing 87 lbs. With a view of increasing speed, I put on a steel plated screw of similar dimensions to wide at point screw had two blades. With this screw the engine made 225 revolutions per minute; but it re-
quired 45 minutes to make 7 miles, which with the quired 45 minutes to make 7 miles, which with the power will I require? A. More than double the
(36) F L B
(36). F. L. B. asks: Can you make clear the workings of what is known as planchette? A. It
never works, if no one touches it, as far as we have heard. "A word to the wise is sumcient." (37) J. McC. says : Let a body of air be com cools. Then, if allowed to expand, it will be minus a force equal to the heat it has lost. If, now, the same air be immediately recompressed into the same space, it will not, according to my idea, lose any more heat, and therefore give back as much
power as it receives, except what is lost in friction. AmI right? A. This is what will take place

If the air, on being compressed, is allowed to cool,
its pressure will be decreased. Then, if it expands, and does work, its temperature will fall: and if it is recompressed, without loss from radiation, its temperature and pressure will again be increased. if there is expressed in the simple statement that. tion, the air that is compressed is capable of ex erting as much power, in expanding, as was em ployed to compress it.
(38) A. A. P. says: Suppose I take a cylin$r$ less: Can I increase a gallon of water, more using all the water at once, without introducing the water gradually into the cylinder? A. Yes.
(39) S. B. asks: How long can a man live n a submerged boat, the air capacity of which is 200 gallons? A. With proper arrangements, the vessel would contain a supply of air sufficient for
(40) G. W. S. says : I tried to extract potash from corn cobs by burning the cobs to ashes, and
leaching them with water. I then boiled the leaching them with water. I then boiled the
leachings to dryness, and the potash which was the result would attract moisture from the atmosphere and turn to a strong lye. How can I prevent this? A. The product you obtained was, undoubtedly, pearlash, an impure carbonate of potash. This hould be calcined in a suitable furnace and packe (41) C. M. R. asks: How can I coat som mall castings, made of Babbitt metal or pewter A. Make your castings of Babbitt metal; and they will wear
(42) G. A. M. L. asks: What is the compo sition and process of manufacture of common White shirt buttons? A. Some varieties of these
buttons are made as follows: Finely powdere steati $\cdot e$ is saturated with soluble glass, dred, an repulverized, and the powder thus obtained is pressed into molds by suitable machinery. Thes solution of soluble glass, and subjected a second time to the firing process. When cool, they ar polished by being placed in a rotating cask with water, dried, and again polished by rotation in a similar cask with soupstone powder
(43) J. A. H. asks: Where is the Pennsy anian soapstone dug or quarried? A. At Texas ottigham, Unionville; in South Mountain, te miles from
(44) A. L. S. asks: How can I perfume soft wood in pieces three inches long? A. The of hydraulic pressure with any of the essential ils, etc., but we know of no substance the perfume of which might be considered as permanent
or inexhaustible.
(45) A. C. W. asks: What preparation will ethe gutta percha stick to wood? A. Melt to or
(46) E. H. asks: 1. What influence has veg etable charcoal on the system? The dose is a tea poonful in water. A. Its antiseptic properties Is there any cure for catarrh of the throat and nose? A. The following has been highly re commended: Carbolic acid 10 drops, tincture of odine and chloroform, each 7.5 drops. A few rops of the mixture should be heated over spirit lamp in a small test tube, the mouth of zation is effected. The operation should be re peated in about two minutes, when, after the patient sneezes a number of times, the troublesome ymptoms rapidly disappear.
How can I make paraffin varnish ? A. Paraffin路 bon, etc., and may be recovered trat
(47) W. H. W. asks: How is compressed four moistened with beer, and other fermented matter, the superfluous moisture having been re moved by pressure. As a general rule, however,
the recipes for the so-called yeast cakes, tetc, are not made public.
(48) E. D. R. says: J. D. can clarify his cider by adding to each barrel of it 1 pint boiling coagulate the milk, the coagulum, in precipitating, carries down with it all impurities held in suspension in the cider ; this process has the etfect of de colorizing the cider in some degree.
(49) S. S. S. says: I have been experiment ng for 10 years on gums, trying to bleach them have succeeded with shellac, sandarac, copal, etc. ark gum arabic. which gum arabic in solution may be bleache without injuring the adhesiveness of the mucil a stratum of animal charcoal: and then concen trate by evaporation over a water bath. This, we think, will render your mucilage perfectly clear. (50) H. C. asks: How long does it take the noon to make a revolution around the earth? A. nean or average period of 27 d ., $5 \mathrm{~h} ., 43 \mathrm{~m} ., 11 \cdot 5 \mathrm{~s}$, returning, in that time, to a position among the

## communications received.

 The Editor of the Scientific American ac-knowledges, with much pleasure, the receipt of nowledges, with much pleasure, the receipt of original paper
ing subjects:
On the Qualities of Sounds. By W. J. S. On Industrial Expedients. By

On Aerial Navigation. By E.M.B. On a Solar Chronometer. By H. C. P. On Advice to Engineers. By C.C.J. On Repairing Bells. By J. E. E., and by J. H. B. Also inquiries and answers from the following. J. G.-B. A. P.-J. M. P.-J. J. M.-R. J. F.-H. B.
J. J.-N. R.-W. B. W.-E. T. H.-T. E. C.-J. T. N

HINTS TO CORRESPONDENTS. Correspondents whose inquiries fail to appear may conclude that, for good reasons, the Edito declines them. The address of the writer should always be given. Enquiries relating to patents, or to the patenta published here. All such questions, when not be only are given, are thrown into the waste basket as it would fill half of our paper to print them all, but we generally take pleasure in answering briefly by mail, if the writer's address is given.
Hundreds of inquiries analo Hundreds of inquiries analogous to the following are sent: "Who sells the best photographic chem
icals? Who makes the best brick-pressing ma chine? Who sells piano wire, in lengths of a mile
chick-pressing ma and upwards? Whose is the best printing press for illustrated book work?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart.for that purpose, subject to the charge mentioned at the head of that column be expeditiously obtained.
[OFFICIAL.]
INDEX OF INVENTIONS
Letiers Fatent of the United States
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$\frac{\text { Those marked ( } \mathrm{r} \text { ) are relssued patents. } 1}{\text { larm register. fire, Pierce \& Griswold........... }}$

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uyger, earth, C. A. Brockett...
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Pump, chain. C. Fishbuugh (r)...
Pump, force and suction, B. Bran
Pump valve, lift, F. A. Ruhl....
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Ruler, H. J. Richarason
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Stamp
Stereoscope, L. D. Sibley.....
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Tellurian, J. Troll.
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Toy money box, A. Feigg.................
Trap, self- setting animal, Gibbs and Bro
Trunk, A. . . Romadka........
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Tyre-bending machine, T. M. Stansbury et a
Umbrella, G. W. Francis.
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Valre seats, etc., dressing, N.
Valve slide, J. Wermillo
Valve, slide, J. W. Vermillion..................
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Vavives, device for operating throct
Vehicle, side spar, E. Chamberlin..
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