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DREDGING FOUNDATIONS FOR STONE BULKHEADS.

building planting space and filling in bays, south of high bridge.


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shade trees for the harlem speedway.
It will be seen from our concluding article on the Harlem Speedway that the second section is marked by the same general excellence which was noted in ou description of the first half of the work. On that par of it which lies north of Washington Bridge, there are no linitations such as necessitated a reduction in the width of the roadway on the first section, and the board was able to give the Speedway its maximum width and lay out the planting spaces continuousl on each side of it for nearly the whole of the distance It is here that the landscape features of the driv would have had an opportunity to show to the best advantage, and when the trees had grown to their ful size they would have formed an avenue which for stately dignity, reach of perspective, and beauty of surroundings, would have had no equal in the country. We say would have had-for it is certain that under the provisions which have been made for it growth, the avenue will never exist. The trenches ar already lined with the fatal masonry and concrete -a menace to the early growth of the trees, and, unles it is removed, a certain cause of their ultimate des truction.
We are informed that the planting spaces were put in on the recommendation of a prominent landscape architect, now deceased ; but it is not definitely stated and we cannot believe, that he advocated walling up the roots of the trees with masonry. The bare sug gestion of the thing is so radically opposed to the firs principles of tree culture, that the public will be slow to believe that this device was suggested by a land scape architect, and a prominent member of his pro fession at that. But, admitting that the board wa under the impression that this construction was con templated by the architect, common sense, surely should have called forth a protest against such a pal pable absurdity, and sooner or later called a halt in the construction of some miles of walling, which, now that it has gone in, will have to come out again.
The longer one contemplates this device, the more amazing it appears. If ingenuity itself had set out to discover a sure tree-killer, it might have devised a mor speedy, but it could never have found a more certain device than this. The outlying roots of a tree, which always delight to push their way among the crevices of such broken and rocky material as surrounds the present trenches, will here run up against a solid wall. Even if charity allows one to suppose that the minds of the responsible parties were clouded with absolute ignorance of tree growth, one would have thought that mere considerations of stability would have shown that a gale of wind blowing across the trenches would in all probability upset every tre that they contained. The roots being unable to take hold of the roadbed, the trees would have no more sta bility than was due to the weight of the narrow strip of mould, which, with its mass of embedded roots, would simply turn over in the trenches under the pressure of high wind.
Unless the future appearance of the Speedway is to be ruined, there is but one course to pursue, and tha is to stop all further construction of the trenches and remove every yard of wall that has been put in. It is ertain that, if it is not removed now, it will have to be a later date, and at a considerably greater expens onstruction, faulty sufficient to say that the presen needs of the next few years. A work of this kind is not built for a decade, but for all time. If the Speed way is to be beautified with trees, let the work be don in a manner that will be permanent-a credit to the skill, and not a monument in stone to the folly, of the present administration. We are willing to believe that the responsible parties have been actuated by the best of motives, and that they are desirous of making this public work a lasting credit to the city. It is in thi belief that we have brought the matter publicly be fore their notice, with the hope that immediate steps will be taken to correct a serious error-an error whos evil effects will otherwise be as lasting as the work itself
Structures of this kind are not built for a day, decade, or a generation. In all the details of thei planning and execution it should be borne in mind that they are intended for the use of the public in the years to come. In considering what to do in the present emergency this fact must not be forgotten. It would betoken a narrow spirit, a selfish point of view, to determine to let the planting trenches remain as they are, on the ground that their destructive action wil not be felt in the immediate future. If the trees ar put in at all, they should be planted with a reasonabl conviction that their life will be measured by centuries Now that this matter has been brought to the atten tion of the Board, it behooves it to investigate the mat ter thoroughly and ascertain who is responsible for this wretched work, which has cost the city so many thousands of dollars and which has provided what is ikely to prove, not a feature of beauty in time to come but an ever increasing source of regret and mortifica tion at the shortsightedness or lack of judgment of the projectors of the work

THE RECLAMATION OF THE NEW JERSEY MEADOWS Travelers who come to New York over the railroads hat have their terminal stations in Jersey City will re member the long stretch of marshy land which i crossed just before reaching the outskirts of the latte city. It forms a prosaic and monotonous finish to the picturesque ride through New Jersey, and is apt to give first and last impression of metropolitan surrounding which is in flat contradiction to the reputation for pic uresque beauty to which the environs of New York ar justly entitled.
The objections to the meadows on the ground of thei intrinsic ugliness, however, is the least serious that can be raised, for their existence has always been a menace o the health of the surrounding districts, and in th ummer months they form a prolific breeding ground or the hordes of mosquitoes that render life burden some in the many picturesque and otherwise desirable suburbs of Jersey City.
At various times schemes have been proposed for re claiming this waste land, and the alternative methods of filling or diking and pumping have been made the ubject of investigation and report to the governin boards of the neighboring districts. The latest and most comprehensive scheme is that proposed by the Geological Survey of New Jersey. State Geologis Smock recently visited Holland and investigated th vast drainage systems in that country, and the whole matter is made the subject of an exhaustive report by Engineer C. C. Vermuele, from which we learn that un derlying the 27,000 acres of marsh is a mass of alluvium mixed with peat, wood, and other vegetable matter, more or less decayed. The depth of this accumulation ranges generally from seven to fifteen feet. The na ural level of the surface is three or four inches above mean high tide, but the whole is frequently overflowed, and such extreme tides as that of the second week of last November cover it to an average depth of eighteen inches. Lately an unhealthy and undesirable popula ion is beginning to be crowded upon them. Twelv nes of railroad cross the marshes, six of them trunk ines, and the impression made is unprepossessing.
It is stated that of the two systems of reclamation filling and diking, the latter is the better and, indeed, the only one feasible in this case. It is stated that, even f these marshes are filled up for city purposes, pumping will still have to be resorted to, as there will not be ufficient fall to sewer and drain the district by gravity Filling to the extent of six feet will cost an average of $\$ 2,500$ per acre. The area can be embanked and pump ing works installed for about $\$ 1,000,000$, or less than $\$ 40$ per acre.
As the taxable value of the neighboring districts is about $\$ 3,000,000,000$, the cost of this improvement could readily be borne, even if it presented no return other than improved sanitary conditions and a mitigation of the mosquito pest. To make the improvement of the reatest sanitary benefit, the whole area should, as apidly as possible, be brought under cultivation
It is recommended that at first only the embank ments and main ditches and pumping plants should be constructed, the whole area being laid out in twenty acre farms and sold as promptly as possible, on the express condition that they should be immediately and thoroughly ditched and brought under cultivation. It is urged that the prompt improvement of each plot should be considered more important than the purchase price. As soon as sanitary conditions have been brought about, the improvement of water front and business and manufacturing sites could be carried out as fast as they could be sold, the proceeds paying for the imvement
The interest charges and operating expenses are esti mated at $\$ 6$ to $\$ 7$ per acre, and it is predicted that in ew years this charge could be entirely covered by as essments on the property itself, any deficiencies in he interim being met by the surrounding districts tha are benefited by the undertaking
If the estimates of the report are not too sanguine the whole scheme should meet with hearty approval The substitution of over forty square miles of good land for a dismal and malodorous swamp in the midst of a district whose taxable value is $\$ 3,000,000,000$ is a proposi tion that should commend itself strongly to the authori ties and property owners who are immediately affected and indirectly to the State at large.

## THE GREEN CROSS.

In addition to the Red Cross Society and the White Cross, which gives aid to sick or convalescent soldiers, there has just been established at Vienna a new order which will be known as that of the "Green Cross" says the Medical Record. Its object and aim is to give succor to Alp climbers and excursionists in mountain regions. It originated in the Austrian Alpine Club The intention is to establish huts upon high mountain and to keep supplies and relief stores or boxes con taining articles apt to be required in emergencies a conveniently located points. Besides this, guides are to be instructed in first aid to the injured and trained in the application of splints and antiseptic dressings. We wish the society with its new-colored cross all suc cess in its humane undertaking.

## the nicaragua canal.

At a time when the promoters of the Nicaragua Canal bill are urging the government to assume the financial responsibility of the undertaking by guaranteeing the principal and interest of the bonds of a private company to the amount of $\$ 100,000,000$, there are one or two cardinal facts which need to be kept prominently in the public eye, particularly as there seems to be a disposition on the part of the promoters of the bill to keep these facts conveniently out of the discussion.
We have always been favorable to the Nicaraguan Canal as such, and there is no public journal that would be more gratified than our own if it could be proved that the canal can be built for a sum of money upon which the prospective traffic would pay a reasonable rate of interest. But, as the matter now stands, this is a vital question upon which everybody is in the dark; and nobody more so than the engineers themselves.
It is now about four years ago that a previous effort was made to secure a government guarantee of the bonds. Some doubts were expressed at the time as to the estimated cost of construction; and the absence of
any accurate information on this head led to the rejection of the bill and the appointment of a board of experts to make an independent examination for the government. Three engineers of high standing, respectively in the army, the navy, and in civil practice, made an examination on the ground of the proposed route of the canal. They made as complete an investigation as the funds at their disposal would permit, and their report stated that the estimates of the canal company's engineers would have to be raised from $\$ 69,893,660$ to $\$ 133,472,893$, or practically doubled.
It was evident that the government experts consid ered the estimates of the canal company's engineers to have been based upon a too rapid and superficial survey of the route and that the data was too incomplete to give them any reliable value. As an instance of the discrepancy between the figures of the two estimates, it may be mentioned that the maximum flood discharge of the river near the Ochoa dam was estimated at 42, 000 cubic feet per second by the company's engineers and at 150,000 cubic feet by the government experts. The great Ochoa dam, in some respects an unprece dented undertaking, was estimated by the company to cost $\$ 977,000$ and by the board of engineers to cost $\$ 4,000,000$ ! These are only two instances out of a lengthy report which proved that, as the affairs of the canal then stood, any legislation by the government would have been simply a leap in the dark. The of 4350,000 be appropriated for an exhaustive exami nation, which should extend over eighteen months, or nation, which should extend over eighteen months, or
long enough to enable a reliable estimate of the rainlong enough to ena
Now it is obvious that the next natural thing to do would have been to have the sum voted and the expert commission sent out. The high character of the engineers was a guarantee of the sincerity of the report, and it stood there, as it stands to-day, an insuperable barrier to any flotation of bonds for construction of the work. If the aims of the canal company were to build a great engineering work that should he a benefit to commerce and a profitable investment for capital, they should at once have pressed for
the execution of such a survey as the expert board the execution of such a survey as the expert board
recommended. There was nothing to lose and everything to gain by a bona fide investigation of what the canal company presented as a bona fide scheme. Pro vision for the survey could readily have been secured,
and by this time reliable data would have been and by this time reliable data would have been available.
Instead of following this very obvious course, the canal company has done everything in its power to throw discredit upon the report of the professional men who were sent out to safeguard the interests of the nation, and the promoters of the bill have ignored the report altogether. They are now seeking to push through the bill in its original form, with its enormous guarantee of $\$ 100,000,000$ of bonds for the construct
of a work which nobody knows very much about. of a work which nobody knows very much about.
Why this haste? If the canal scheme is a good one it will bear investigation, and if the nation is to be virtually committed to its construction, it surely has a as the experts haveshown, has no means of knowing at present: and the action of the promoters of the bill in trying to shut out investigation is likely to prove the most effective agent in bringing about its defeat. There is no doubt but what the course pursued by the company and its representatives is discrediting the whole scheme
in the eyes of the nation. Charges are being freely in the eyes of the nation. Charges are being freely made that a complete examination is what the parties avoid. If this conviction should once become general, the scheme will receive a setback from which it may take many years to recover.
We are fully alive to the sentimental reasons for the construction of the canal with American capital, and for its being subject to American control. But no amount of sentiment can alter the fact that there is aright way
and a wrong way to bring this about. If the canal is practical, by all means let it be built; but let it be done
according to everyday business principles, and not in direct violation of them. It is not too late for the friends of the canal to secure an appropriation for that careful survey and estimate which is the necessary precursor of all great engineering works. When the survey has been made and the report presented, the nation will be able support or control

## A RAPID TRANSIT TUNNEL BETWEEN NEW YORE

A deep tunnel scheme for rapid transit between New York and Brooklyn is recommended by a commission which was appointed by the mayor of the latter city to arrange a plan for improving rapid transit facilitie on certain of its streets. The plan proposed contem plates an electric line (partly in tunnel and partly on an elevated structure) from Cortlandt Street and Church Street, New York, to Ralph Avenue, Brooklyn
It is proposed to have a low level station at Cort andt Street, New York, about 70 feet below ground, connecting with the streets and the elevated roads in that city by means of elevators, the tunnels being car ried thence to a station at Maiden Lane and Pear Street, with connections with the Secoud and Third Avenue railways; thence under the East River and under Pineapple Street and Fulton Street to a station near the City Hall, Brooklyn; from thence under Fulton Street and Flatbush Avenue to the Flatbush Avenue station, where it would be about 18 feet below grade The tunnel will be carried under the Brooklyn streets within the curb lines to a station at the City Hall where it will be 115 feet below the street grade, and will rise by an easy grade from that point, so that the bottom of the tunnel shall come above the main relie sewer at Flatbush Avenue and Hanson Place before passing into the depressed station.
Continuing from Flatbush Avenue station, along Atlantic Avenue, the tracks are depressed to Bedford Avenue, a distance of 6,700 feet, the depression being covered by means of girders and masonry arching, restoring the surface of the street for public use for its full width. From the east side of Bedford Avenue the railway tracks will rise rapidly in an open cut to the grade of the street, and, continuing to rise, will pass onto an elevated railway structure, which, at Nostrand Avenue, will attain such height that full head room will be provided for all street traffic without interfer ence.
The physical characteristics of the ground between Bedford and Nostrand Avenues are such that the rising grade of the railway and the falling grade of the street combine to favor this transition from a depressed to an elevated structure, so that no obstruction is caused to any existing cross street, and full advantage is taken o the length of this block between Bedford and Nostran Avenues (which is the longest on Atlantic Avenue) At Nostrand Avenue an elevated station is proposed, and the elevated structure continues thence a distanc of 8,010 feet to Ralph Avenue.
The project is a modified form of the plans prepared ome four years ago by the Long Island Railway Company, who thereby sought to secure a New York ter minal for their system. We understand that the com pany is disposed to work in harmony with the commision, and such a connection will be in line with their efforts to secure entry into New York by other tunne schemes, and notably by the proposed Blackwell' Island bridge.
The construction and operation of deep tunnel elec tric roads such as this has long ago passed the experi mental stage. They can be built at a reasonable cost, and their construction does not involve any problems of engineering that are not well within the control o modern skill and resources. The success of the existing tunnels of this kind in London has shown that here is no popular objection to subterranean travel If the proposed New York and Brooklyn tunnel is built, its extension to the Jersey side to connect with th Pennsylvania system would merely be a question time.
sCHEMES FOR CHECKING RETURNED NEWSPAPERS.
The Tribune has examined carefully the differen devices which have been submitted, at least one hundred in number, for indicating whether a news paper has been sold and read. They all show great ngenuity, and many of the Tribune's friends hav pent much time and thought over the subject. To all of them this office extends its most sincere thanks. Owing to the peculiar construction of a modern web
printing press, the majority of the plans submitted printing press, the majority of the plans submitted are inapplicable without actually building a new press unize the invention; and the enormous expense pnstruction of a new press they could be then. In the thought best, however
Speaking broadly, the devices suggested fall into fou groups
First-Twenty or more correspondents have pro-
paper at the edges with a wire staple, rivet or other netal attachment. Some of these schemes are practi cable, although special machinery would have to be built to make use of the idea. They would al require the tearing out of a part of the paper during the reading
Second-Others have suggested the pasting of a gummed label or seal over the leaves of the paper This again is practicable to a certain extent, particularly in presses which run at a slow speed. In a rapid pres it is doubtful whether the idea could be utilized. And as for pa-ting together the whole edges of two adjoining leaves, one might as well let the paper remain uncu altogether; that would be the most perfect of sealing and canceling devices; but enormous sums have been expended by all the great dailies simply and solely to be able to send their papers to their readers with the edges cut. No backward step can be taken in that egard.
Third-The punching of a hole in the margin of the paper has been proposed by so large a number of men and women that one marvels at the fact. All sorts of holes are suggested, the majority of them in artistic forms. The idea of the proponents is that two thing will happen. First, if a paper is read, as it is, by al nembers of a family, it will be so crumpled that i any one attempts to fold it in its original form the edges of the punched-out hole will not there after correspond, which will indicate the facts of the case. Second, that the paper which is punched out and left hanging, like a tongue, will be torn off in reading, and the absence of the tongues of paper will tell the story. There is something in this idea, but its value can only be revealed by actual experiment So far, the experiments of the Tribune have been inconclusive
Fourth-Many have proposed the pasting togethe of the leaves of the paper in two or three places. In reading, the paper must be torn apart where pasted because no one could read the interior pages unles he did so. This is a practical device, and the one easiest of application. It has the disadvantage of earing the margin of the papers, the disfigurement being greater or less, according to the haste with which the finger is thrust in and the leaves torn apart.
Two or three men have suggested one other idea namely, the use of invisible ink, but there are variou reasons why such a method would not be in the leas onclusive. Some of the plans proposed are patentable and if the one best way could be found and could be patented, the inventor would be able to derive an excel lent revenue from it.-Tribune.

## OUR NEW TORPEDO bOATS.

Torpedo boat No. 6, which has just been completed by the Herreshoffs, was sent on a preliminary trial run by her builders on January 20 , when she made a speed of 26.85 knots. The result was very gratifying to the firm, considering the circumstances of the trial; for the run was made with an untrained crew in the engin oom and under reduced boiler pressure. The con tract calls for a speed of $271 / 2$ knots under 220 pounds of team, and as the little craft was carrying only 180 pounds to the square inch, it was confidently believed that under the favorable conditions of a trial trip 28 knots an hour will be realized. The water was airly smooth, the breeze blowing across the course which was a part of that which has been laid out for the official trial
The expectations based upon this performance were realized in another builders' trial, on February 5, during which, in a series of eight runs over the measured mile course in Narragansett Bay, she averaged 28.76 knots an hour. Her highest speed was $30 \cdot 1$ knots, and every mile was run off at a higher speed than the contract calls for, viz., $271 / 2$ knots. The steam pressure ranged from 205 to 225 pounds to the square inch, the latte being the maximum allowed.
the modern verinin of supply and demand.
Prof. Thurston, in the pages of Science, discredit the generally received idea that increased demand im plies increased prices, and that an increased supply causes lower prices. This is not the case. It may be the case momentarily, but, in the long run, "increased demand and an enlarged market, by permitting more economical operation of the system of production decrease prices." He instances the copper production of the Lake Superior mine. In operation for years, it has been in competition with such mines as the Calunet and Hecla, and has yielded almost uniform profits all the time. The cost of production has been reduced o one-half what it was a generation ago, and the value of labor has been correspondingly reduced per ton of product, and the market price of labor has gone up. In the open market, the price of a commodity is prac tically the cost of production plus a fair business profit. If this result is not obtained, a business languishes or expires. If profits are abnormally large, calital is attracted and competition set up, and the availability of capital now brings about the modern fact that

## A HANDY NOTE BOOR HOLDER

The cut shows a simple little note book holder invented by W. T. Ives, of No. 41 'Tompkins Place vented by W. T. Ives, of No. 41 'Tompkins Place,
Brooklyn, N. Y., and designed primarily for stenographers in copying their notes. It will also hold letters and many kinds of books very nicely. In the illustration Fig. 1 represents it with a note book in place for copying, Fig. 2 representing the deve


## IVES' NOTE BOOK HOLDER

folded. It is practically made of a single piece o wire coiled to form a spring connection between the front and rearstandards. The frontstandard wires are turned up at the base to keep the leaves of the note look from flying up, while the wires of the rear standard are connected at the base by a single coil, to form a clip which holds all or a part of the leaves firmly A keeper, which slides easily on the rear standard when the tension of the springs is released, regulates the inclination of the book. When not in use, the device folds into a small space, and can be conveniently carried in the pocket. It weighs but two ounces, which is a great improvement over the heavy, bulky holders on the market to-day.

## A HORSELESS FIRE ENGINE

There is now being constructed for use by the Boston Fire Department a horseless steam engine, of great size and power, having a contract capacity of 1,350 gallons of water per minute, but the builders, in view of recent tests, are confident that this engine will throw 1,850 gallons of water per minute. For some time past the fire commissioners of nearly all the great cities have had under consideration the question of adopting a specially powerful steam fire engine for use in portions of the city in which the great office buildings are located A fire in one of the upper stories of the tall office build ings renders the ordinary methods of fire fighting futile
From experience gained in recent fires, it became evident that one of two things must be done, if the constant menace of a disastrous fire were to be avoided. Either a limit must be placed on the height of build ings, or more powerful engines, capable of throwing higher streams of water, must be obtained for use in the districts containing the lofty structures. The heaviest fire engine for horses weighs 10,000 pounds and requires three horses to get it about the city It has a guaranteed capacity of 1,100 gallons per minute. A heavier engine would be almost unmanageable, if horses were used as a means of moving it about from place to place, and in the narrow streets of Boston and lower New York it is even difficult for an engine with three horses to make rapid progress and the liability of some of the horses becoming injured is also very great.
In view of these facts, it was decided by the Boston Fire Department that a "douille extra first size self-propeller" size self-propeller, as it is called, should be ordered, having steam for a motiv power. There have been many attempts in the past to build and put into prac tical service steam propelled fire en gines. Among the first was Among the structed in 1840 by
mechanism of a fire engine is required to operate the self-propellers. The road driving power is applied from one end of the main crank shaft to an equalizing compound, and two endless chains running ove sprocket wheels on each of the main rear wheels per mit these rear wheels to be driven at varying speeds when turning corners. The driving power is made reversible, so that the engine may be driven for ward or back at the will of the operator. When it is not necessary to use the power of the engine for driv ng purposes, the driving mechanism can be discon nected by the removal of a key, so that the pump may be worked with the engine standing still. An extra water tank is carried at the rear of these engines to supply the boiler until connections can be made with a hydrant. The self-propeller can travel on a fair level road at a maximum rate of twelve miles an hour It can climb any ordinary grade; in fact, any one that a team of horses can climb with a heavy load

AN IMPROVED FRICTION CLUTCH SYSTEM.
The illustration represents a strong and simple clutch made in sizes to positively transpositively transof horse power up of horse power up It two thousand. adopted, and its high efficiency is approved, by large numbers
 propelling engine, where the engine ower is transmitted to the driv-
ing wheel through the main crank shaft, which is not the case when this power is transmitted to the pumps, the crosshead and onnecting rod plan has many advantages, and is therefore adopted for self-propelling engines. A selfpropelling engine of the type we ilustrate, made for the city of Hartord, Conn., at its


WORRALL'S FRICTION COUPLINGS PULLEYS AND GEARING.
first trial threw through fifty feet of leading hose, $31 / 2$ of representative users for main lines of shafting,


A HORSELESS FIRE ENGINE. inches in diameter, horizontal streams as follows :
 countershafts, pulleys, dynamos, generators, motors, fire pumps, and all classes of machinery. Perhaps its strongest recommendation is its capacity for long, continuous hard service, without repairs. It is manufac tured by the American Twist Drill Company, of La conia, N. H., and has self-adjusting and centering friction disks, and the friction may be applied to pulleys on main shafts, dispensing with loose pulleys on machinery and countershafts, stopping all pulleys countershafts and belts when dynamos or other ma ! chines are not in use. It is operated with the engine running at full speed, and will gradually start or stop any connected shafting and machinery without sudden strain upon belts or gears. Holes are drilled through all parts of the friction, that it may be quickly bolted together and converted into a solid coup ling in event of any accident to the clutch mechanism. The friction surface are flat, and when clamped together form a vacuum, having the pressure of the atmosphere in addition to that of the levers to force them together, each part of the friction being keyed solid to the shaft upon which it runs. Simple methods of adjustment are provided, and all parts of the clutch and shafts are automatically centered when in use, there being no friction upon the shipper or shaft bearings. When the shipper sleeve is thrown out to stop the clutch, the balance weights, shown in the engraving, overcome the centrifugal force ex-
erted on the levers at high speeds. Any size iron or wood friction pulleys may be used for light power and moderate speed, by simply placing the pulley on one of the coupling hubs, or the friction disk may be applied direct to pulley hubs, but this plan should never be used for high speeds or heavy powers. The clutch applied to a quill upon which a pulley can be mounted, or as a cut-off coupling, will do heavy work, and may be run up to speeds of five thousand revolutions a minute.

British Strikes and Lockouts in 1895.
The annual report of Mr. J. Burnett, of the Labor The annual report of Mr. J. Burnett, of the Labor
Department of the British Board of Trade, on strikes Department of the British Boa
and lockouts, "shows that and lockouts, "shows that there were 876 disputes resulting in stoppage of work during 1895, and these involved 263,758 workpeople, as against 1,061 disputes and 324 ,245 workpeople in 1894. As regards results, 303 , or $34 \cdot 6$ per cent, of the disputes ended in favor of the workpeople, as against 35 per cent in 1894 ; but in these successful disputes 24 per cent of the persons affected during the year were involved, against $22 \cdot 1$ in the preceding year. 'The aggregate number of days lost in 1895 was $5,542,652$, compared with $9,322,096$ in 1894 and $31,205,062$ in 1893. The average duration per head of disputes in 1895 was $21 \cdot 6$ days,
as against 29.5 in the preceding year. The value of the aggregate number of work ing days lost, worked out as wages, would amount to about $£ 1,120,000$, compared with $£ 2,000,000$ in 1894 . The percentage of persons concerned in the dispute of 1895 which were settled by conciliation or negoti ation was $74 \cdot 8$, as against 56.7 in 1894."

## The Effect of Shading the Soil.

According to Lancaster (Ciel et Terre, March, 1896, xvii, p. 22), some experiments have been made by $A$. Buehler, which may be summarized as follows, says the Monthly Weather Review : Four broad plats of ground were selected, situated near each other ; one was left freely exposed to the sun and wind, while the three others were shaded by horizontal wooden trellises placed around each plat and about 40 centimeters above the ground. The sunlight was cut off from the ground by the shadow of the trellis to a different extent for each plat, viz., onequarter for plat No. 2, one-half for No. 3, and three-quarters for No. 4. In each plat, at 5 centimeters below the soil. a thermometer was buried; there was also placed in each plat an evaporometer and a vase of sheet iron filled with clay in which 1,000 grammes of water had been poured. Observations were taken every three hours; with the following results: The shaded soil experienced less cooling by radiation at night time and less warming by sunshine in the day time. The plat, No. 4, three-fourths of whose area was shaded, showed a temperature 10 per cent lower than the unshaded plat, No. 1; the lowering of temperature was most decided at noon and 3 P . M. As to the nocturnal cooling, the differences between the various plats were only $2^{\circ} C$. at the maximum, which explains why plants under a trellis are less exposed to frost than plants that are not thus protected. During rainy weather the differences in temperature were very small, rarely more than $1^{\circ}$ C.; the shaded plats had a temperature a little higher than the unshaded, but during dry weather the shaded plats were warmed up more slowly. The relative evaporation from the plats was as follows: No. 1, unprotected, 100 per cent; No. 2 , one-quarter covered, 88 per cent No. 3, one-half covered, 71 per cent: No. 4, threequarters covered, 62 per cent. Evaporation was most rapid from noon to 3 P . M. The observations all relate to a soil that is not covered with vegetation. If the soil had been cultivated, the temperature and the evaporation would have been diminished still more.

In France, wagon tires vary from three to ten inches in width, usually from four to six, depending upon the weight of the load. Were such tires compulsory in America, the present good roads movement would re ceive a tremendous impetus.


PORTABLE ELECTRIC DRILLING MACHINE AT WORE ON STEM OF LARGE STEAMSHIP.
special work occurred when the cast steel blades of a propeller were covered with Muntz metal sheets. Hundreds of holes had to be bored in the cast steel for re ceiving tap screws for holding the lining, and few of these holes were in the same direction. By the use of a drill running 180 revolutions, driven by a one horse power motor, all the holes necessary for lining one blade of a propeller eighteen feet in diameter were bored by one man and a boy in two days.
It is in the shipyard, however, that these drills have proved extraordinarily useful. In addition to the work of boring holes, they are used for countersinking, cut ting out side-lights, scuttles, hawsepipe holes, boring out stern post bushes by means of boring bars, and for replacing plates out of the outside bottom of grounded ships.

The machine has also been successfully adapted for ex panding boiler tubes in wate tube boilers, anā Messrs Yarrow \& Company, of Lon don, have several of them at work. It is stated that on actual trial where sevent tubes a day could be expanded by steam power at these work thirty tubes per hour wer expanded by the use of the portable expander

## A ward of Royal Society Medals.

At the anniversary meeting of the Royal Society, the
for over three years, and has given great satisfaction president, Sir Joseph Lister, announced, says th It will be seen from the illustrations that the motor with its gearing, is pivotally suspended in a yoke which is carried on a suitable hand truck or carriage At the arsenal of the Austrian Lloyds Company, where 2,000 hands are employed, it is rarely that any holes ar drilled with the obsolete ratchet. A network of elec ric wires extends over the yard, and each shop is provided with a number of special drilling machines, with the necessary electrical connections. When any holes have to be drilled in a piece of work, the portable dril is wheeled to the spot, and the wires attached. In thi way the time iormerly occupied in carrying the work o the drilling machine is saved.
As instances of the economy of these machines, we are informed by Mr. Kodolitsch that where ten flexible shaf drills were formerly used in the boiler shop, four elec Electrical World, the award of the second Royal medal to Prof. Boys for his researches on measuring minute orces, by his invention of the mode of drawing quartz fibers, and by his discovery of their remarkable pro perty of perfect elasticity. Prof. Boys used a combina tion of thermo-junction with a suspended coil in galvanometer of the usual D'Arsonval type, a combina tion first devised by D'Arsonval himself, and by this means Prof. Boys developed the idea in the micro-radimeter, an instrument, according to Sir Joseph Lister rivaling the bolometer in the measurement of smal amounts of radiation. In the case of the Rumford medal the council made a new departure by awarding the medal in duplicate. As stated by President Lister many physicists have studied the luminous and othe effects which take place in a vacuum tube, but the extension of the field of inquiry to the external space around it is novel and most important. This extension has been due to two menProf. Lenard and Prof. Roentgen. Although differences of opinion exist as to the exact meaning and cause of the phenomena discovered by Lenard and Roentgen, few will dispute the theoretical interest which these discoveries embody.
The Davy medal was awarded to Prof. Henri Moissan for having accomplished the isolation of fluorine in a state of purity, and for his researches at extremely high temperatures by the aid of the electric furnace. President Lister stated that it is impossible to set bounds to the new field of research which has thus been opened out, and the electric furnace has now become the most powerful synthetical and analytical engine in the laboratory of the chemist.

Eyesight of Iron Workers.
In the mining and foundry district of Bochum, Prussia, Dr. Nieden reports having treated during the years 1885-94, 5,443 patients engaged in such occupations, of whom more than 68 per cent were cases of injury to the eye in their callingiron and foundry workers showing a large predominance in this respect over miners. Of 3,723 iron tric boring machines now do the same amount of work, $\mid$ and foundry workers treated for eye injuries, 2,805 with less hands than were formerly necessary. In the were for the left eye and only 1,639 for the right, fitting shop they have saved much time and money in he handling of heavy work. An instance of this oc curred when a marine condenser weighing twenty-four tons was planed on one side, the necessary holes being simultaneously bored on the other side with portabl drills. The seats for the air pumps were finished at the same time with a boring bar driven by one of the elec tric boring machines. This heavy piece was put on the planing machine as a rough casting and completel finished ready for erection before it was removed. An other instance of the handiness of these machines for
or a relative proportion of 56 to 44 ; and as a similar proportion held good in each separate year, the conclusion arrived at is that in such work the danger to the left eye is really greater than that to the right. Even more marked, in fact, was the proportion in respect to the severe cases, the left eye being quite lost in seventeen cases, the right eye in seven. It is urged, therefore, that in iron workers the loss of the right eye should be calculated as the more serious, inasmuch as the individual then runs a greater risk of injuring the remaining eye than when he has lost the left.

Deep Waterways Commission Report.
The Deep Waterways Commission, which was appointed by the act of 1895 to make a preliminary investigation of the possibility of opening a deep water way from the great lakes to the sea, has made a detailed report which has been forwarded to Congress by the President. In a letter accompanying the report he recommends to Congress that proper provision be made for carrsing on the work of preliminary examination and that the commission be continued for the pur pose of securing all necessary information
After recounting in detail the work of the commission the report gives its conclusions seriatim as follows :
" 1 . That it is entirely feasible to construct such canals and develop such channels as will be adequate to any cale of navigation that may be desired between the several great lakes and the seaboard, and to conduct through the same domestic and foreign commerce, and that, in our opinion, it will be wise to provide for securing a channel of a navigable depth of not less than 20 feet.
2. That, starting from the heads of Lakes Michigan and Superior, the most eligible route is through the several great lakes and their intermediate channels and the proposed Niagara Ship Canal (Tonawanda to Olcott) to Lake Ontario, and that the Canadian seaboard may be reached from Lake Ontario by way of the St. Lawrence River, and the American seaboard may be reached from Lake Ontario by the way of the St. Lawrence and Lake Champlain and the Hudson River, or by way of the Oswego-Oneida-Mohawk Valley and the Hudson River
" 3 . That the alternative routes from Lake Ontario to the Hudson River require complete surveys and a full development of economic considerations to determine their relative availability.
4. That a moderate control of the level of Lake Erie and of the Niagara River above Tonawanda may be justified in connection with the Niagara Ship Canal; the determination in this matter to rest on a full examination of the physical conditions.
" 5 . That the policy should contemplate the ultimate development of the largest useful capacity, and that all works should be planned on this basis, and that the actual execution should conform thereto, except in so far as the works may, without prejudice, be progressively developed with the actual demands of commerce
" 6. That it is practicable to develop the work in separate sections and the several sections in part by degrees, each step having its economic justification, so that benefits shall follow closely on expenditure, without awaiting the completion of the system as a whole.
"7. That the completion of the entire system as quickly as proper projects can be matured and economically executed is fully justified.
"8. That the Niagara Ship Canal should first be undertaken and incidentally the broadening and further deepening of the intermediate channels of the lakes, the same being in the logical order of develop ment, and also requiring the least time for considera tion."
The commission had neither the time nor opportu nity to make a close estimate of the cost of the work. Its recommendations are summed up as follows :
'1. That complete surveys and examinations be made and all needful data to mature projects be procured for: Controlling the level of Lake Erie and pro jecting the Niagara Ship Canal ; developing the Oswego Oneida-Mohawk route; developing the St. Lawrence Champlain route; improving the tidal Hudson River and improving intermediate channels of the lakes.
" 2 . That the collecting and reducing of existing in formation, supplemented by reconnaissances and special investigations, be continued until the general questions have been fully covered
3. That a systematic measurement of the outflow of the several lakes and a final determination of their levels shall be undertaken.
"4. The complete surveys and investigations, with measurements of the outflow of the several lakes and full investigation of collateral questions, will cost not less than $\$ 600,000$ and require some years of time.

It is probable that the measurement of the outflow of the lakes and the final levels can be as well done through some other agency, and this item may be taken at $\$ 250,000$, to be expended through a series of years, and this should be at once undertaken, on account of the prevailing low water of the lakesystem, which can not be expected to continue.
"The specific surveys and investigations are in themselves estimated at $\$ 350,000$, and will take two or three years, and of this not less than $\$ 150,000$ should be appropriated the first year, along with such additional sum as may be required for measuring the outflow of the lakes, of which $\$ 100,000$ should be made available during the first year."
The Canadian government, which is also deeply interested in the question of opening a deep waterway to the sea, had appointed a commission to look into the question; and a joint session of the two commissions and masters who were gathered at the annual meeting
of the Lake Carriers' Association gave much valuable information.

Recent Patent and Trade Mark Decisions.
Tarrant \& Company v. Johan Hoff (U. S. C. C. A., 20 Cir.), 76 Fed., 959.
Infringement of the Trade Mark "Hoff's Malt Ex-tract."-In this case Tarrant \& Company obtained the right to manufacture and sell "Johan Hoff's Malt Extract" in the United States under labels and trade marks used in Germany for many years, and which entered into commerce under the name of "Hoff"s Extract." The defendant, Johan Hoff, became the agent in the United States for a malt extract made in Ger many by Leopold Hoff. He used the words "Hoff"s Malt Extract" on his labels and advertisements, affixing, however, a perpendicular side label with the words "Manufactured by Leopold Hoff." It was held that the defendant had no right to use the words "Hoff's Malt Extract" unless it was preceded by the word "Leopold" in a conspicuous place, and that the perpendicular side label was not sufficient to prevent the deception of the public.
False Statement in Labels.-While false representations in a label will prevent a manufacturer using such labels from being enjoined because of the infringement, such, however, is not the case where the statements, while not strictly accurate, are entirely immaterial.
P. H. Murphy Manufacturing Company v. Excelsior

Car Roof Company (U. S. C. C. A., 8th Cir.), 76 Fed., 965.
Metal Car Roof.-The Murphy patent, No. 414,069, for an improvement in car roofs, has been held not to be infringed by the Jennings patent, No. 446,780, on the ground that the " angle strip," which is the chief element of all the combinations in the former, is omitted from the latter.
limitation of Claims.-A patent to one who has made a slight improvement on devices that perform the same function before as after the improvement is protected against those only which use the very improvement he claims, or mere colorable evasions of it.
"Foreign Art."-The art of covering the roof of a car with sheets of metal is so nearly, if not completely, identical with that of covering a house with the same material, that there could be no invention in using one for the other, unless some radical modification was required to adapt it to the new use.

Mechanical Equivalents.-The "angle strips" in the Murphy patent, No. 414,069, is a copy of the metal ribs in the Hawthorne patent, No. 386,316, and the mechanical equivalent of the triangular strips in the Smith patent, No. 143,471, the ribs of wood in Morsell's patent No. 165,113, and the bars of metal in Naylor's patent No. 1,321 .

Omission of an Element of a Combination.--The un questioned rule is that the absence from a device al leged to infringe of a single essential element of a pat entable combination of old elements is fatal to the claim of infringement, and where the patentee intro duces an element into each of his claims and makes it the first element, it cannot be eliminated in construing the claims.
Campbell v. Richardson (U. S. C. C. A., 3d Cir.), 76 Fed., 976.
Garment Hooks.-The De Long patent, No. 462,473 s limited by the words "substantially as described" to the form of hooks shown and described, that is, one in which the free end of the wire is carried to " the rear end of the shank and there formed into an eye," giving to the hook three eyes by which to attach it instead o two, as formerly.
Construction of Claims.-Where a claim contains the words "substantially as described," and such claim in its terms is old, but the part of the device to which such claim relates, as shown and described, is new, the claim should be construed, by reason of the phrase " substantially as described," to cover the invention described unless that would conflict with the terms of the claim. The fact that such construction of the claim makes it coterminous with the other claims in the patent is im claims, and similarity of claims in a patent is not un usual.
Brunswick-Balke-Collender Company v. Phelan Bil
liard Ball Company (U. S. C. C. N. Y.), 76 Fed., 978 Pool Ball Frames.-Patent No. 288,879 for a pool ball frame, with rounded corners made with layers of wood bent in a triangular shape, has been held to be cal skill.
Fcster v. Wertheimer (U. S. C. C. N. Y.), 76 Fed., 979.
Glove Fastener.-The Foster patent, No. 279,980, has been construed and held valid as to the exact combina ion shown.
What Amounts to a Patentable Difference.-In this ase was held that an improvement in the glove elevation of the head and neck of a former device, by means of which the tightening of the glove is made asier, the fitting more perfect, and the fastening mor
size of these parts is so small that the differences seem very little, yet the change in the mode and effect of the operation of the parts is quite considerable.

Infringement.-The defendant's fastener contained the features of the plaintiff's improvement in the same relation to each other, but in somewhat different form, except that the front of the head and the glove material were brought close together by raising the plate below instead of inclining the head above, so that in operation and effect the parts are the same and infringe.
Independent Electric Company v. Jeffrey Electric Manufacturing Company (U. S. C. C. O.), 76 Fed., 981.

Mining Machine.-The Lechner patent, No. 432,754, for a mining machine, which combines a traveling frame, an endless belt cutter, an auxiliary cutter operating in a different plane, and a holding projection adapted to follow such auxiliary cutter into the incision made thereby and to form a holder to operate against the thrust or force of the band cutter, ha been held valid and infringed as to its first claim.
Effect of Impracticability on the Validity of a Patent.-The mere fact that a machine constructed on the lines of a patent was a failure does not affect the validity of it, when it appears that the failure was due to defective construction, not to the peculiar improve ment patented, and that successful machines were afterward made.
Assignment of Future Inventions.-Where a patentee conveys an interest in his patent and any and all improvements which he may thereafter acquire or invent in connection with and in any way appertaining to the mprovement patented, the assignee thereby acquires no interest in a subsequent invention for a distinct ma chine which works on a principle radically different from that of the former patent.
Contract to Assign Future Inventions.-Where an in ventor agreed to convey an interest in several inventions and in any improvements thereon made in the future and in the patents for such improvements, and afterward another agreement was made in writing whereby such assignee was to have an interest in cer tain patents, nothing being said about improvements, and a suit was brought for a specific performance of the latter agreement, it was held that the rights of such party under the two agreements were merged in the de. cree and he had no claim under the contract to any future patents or improvements.
Dedication of Invention to the Public.-Where ap plicant for a patent shows an improvement but does not claim it, and before the patent was issued another application was filed by the same inventor in which he claims such invention, the presumption that what is shown or described in the patent and not claimed therein is dedicated to the public, does not arise.
Owen v. Ladd (U. S. C. C. Conn.), 76 Fed., 992.
Gong Bell.-The Owen reissue patent, No. 10,348, for a gong bell having in combination the novel element f a curved and bent vibrating standard, if valid at all, has been held not to be infringed by a gong in which the standard is neither curved nor bent, and is cast solid with the base.
Delay in Suing for Infringement of Patent.-The delay of over ten years in bringing suit, after charging infringement and it being denied, is such laches as to prevent recovery against one who in the meantim succeeded to the alleged infringing business.

## England, America and the Metric System.

British and American consuls agree in reporting that the foreign trade of their respective countries would be greatly benefited by the adoption of the metric system of weights and measures, says the European edition of the New York Herald. With the exception of Eng and and Russia, all European nations use the system and, in view of the convincing testimony taken by the committee of the House of Commons last year, its adoption by England at an early day seems probable. The United States years ago legalized the use of metric weights and measures, but did nothing to enforce their use. Just now her merchants are working to increas their trade with the countries of Central and South America, and as all these use the metric system, there i growing pressure for its formal adoption by Congress. The House of Commons committee asserted that th use of the metric system would save one year's school ing of all the children in the United Kingdom, and houses engaged in foreign trade testified that its adoption would enable them to get on with fewer clerks. In America the local weights and measures used in the various States are particularly numerous and confusing and the substitution of the uniform French system fo all of these would be of inestimable benefit.

ACCORDING to Engineering, some recent researches by Captain Abney show that the light of the starry sky is to that of the full moon about as $1: 44,000$. The latter is usually considered to be about as $1: 600,000$ to that of the sun at noon, so that we receive over $13,000,00$ million times as much light as from the stars, taking both hemispheres into consideration.

## Sorrespondence.

Half Century Readers of the Sclentific A
To the Editor of the Scientific American :
If the following is of interest to you, you are at liberty to use it as you may wish.
When a young man in my twentieth year I was bookkeeper in one of the largest manufacturing establish ments in our city, and was so interested in your paper that I asked our workmen to subscribe and sent you their names. About that time I was librarian in the Mechanics' Library, thus bringing me in contact with many mechanics. I then began, as a young man, to take your paper and have continued a subscriber ever since, now fifty-one years. Have you an older one ?

Charles W. Jences.
Providence, R. I., February 4, 1897.
To the Editor of the Scientific American :
This is the commencement of my fifty-first year's reading of the Scientific 'American. When I first met him, he was quite a little fellow, but, in wisdom and knowledge, far beyond his years. Now he is the most fully developed giant in the arts and sciences the world has yet produced. What will he be by the end of the next century? Who can answer?
I inclose money order for $\$ 3$, to renew my subscrip tion.
. R. Maben.
Bedford Springs, Va., January 1, 1897.
Another correspondent writes: "II believe I have al or nearly all the numbers since the first issue in 1845 . My brother, who died in 1858 , was a subscriber from the beginning. After his death I continued it, with some intermissions during my absence in California and dur ing the war. I, however, always sent for back numbers and in that way have complete files."
[The letters printed herewith, touching the much mooted question as to the oldest living subscriber, have been received by us in our ordinary mail. We are not able to determine the question of priority, owing to the destruction of our books in the great Park Row fire in 1882. The subject is evidently one of interest to our readers, and it is a curious coincidence that the three letters printed above should have been received by us at almost the same time without sugges tion or solicitation on our part.-ED.]

Agriculture for a Year.
The annual report of Mr. J. Sterling Morton, Sec retary of Agriculture, has beenreceived, says the Ameri can Manufacturer.
It appears that since March 7, 1893, the civil service regulations have been extended until they now include "every important permanent position in the United States Department of Agriculture." "This department," says the secretary, "has for its object the discovery, investigation, development and utilization of the agricultural resources of the United States. Primarily it is a scientific or technical department." The secretary rightly says that the functions of this department have little or no relation to political policies or expedients. Its useful work should go ahead year after year systematically. There are now on the pay rolls of the department 2,217 men and women, a reducrolls of the department 2,217 men and women, a reduc-
tion of the force of 280 since 1893 , in spite of the fact that the work has increased. This reduction was made possible, Secretary Morton says, because of the improvements effected by the law extending the classified civil service.
"The bureaus and divisions in Washington," the report continues, "are, contrary to the popular idea, much the smaller part of the Department of Agriculture. Outside of Washington there are 154 observing stations and 52 signal stations of the Weather Bureau. There are 152 meat inspection stations in the country; 21 different quarantine stations, for import cattle at points on the coast, the Canadian and Mexican boundary; 9 different stations for inspecting import stock and 19 for inspecting stock for Texas fever, making a total of nearly 200 stations in the Bureau of Animal Industry, which should have inspection and supervision occasionally by the highest authority of the department. The agricultural experiment stations, located in different States and Territories, and several experiment stations of the Department of Agriculture, must be inspected by this department. In addition to these the department has many other agencies for studying soils, foods and food dietaries, testing timbers and collecting material, illustrating our natural resources scattered all over the country."
The secretary advises that an additional executive officer shall be employed, who shall have general supervision of all the work of the department. This officer should be, the secretary says, "a broadly educated, scientific man." He also calls attention to the fact that the salaries of the higher officials in the department are at present inadequate, young men being drawn away from the government service constantly to accept higher salaries offered by universities, colleges and scientific schools.
-Agricultural colleges and experiment stations are
teaching the science of agriculture," the report continues, "but they are not generally teaching farm economics and the importance of markets." With this latter end in view, Secretary Morton organized on March 20, 1894, the "Section of Foreign Markets," one of whose admirable publications, relating to Sweden, was noticed in the last number of the Manufacturer This section not only publishes a regular series of bulle tins and circulars, but it furnishes information in re sponse to special inquiries.
The secretary is of the opinion that the distribution of seeds to applicants is a wasteful expenditure on the part of the government, and he is certainly not alone in this view. The report says: "The seeds distributed gratuitously by the government during the fiscal year closing on the 30th of June last weighed a little over 230 tons. The cost of carrying them through the mails was over $\$ 70,000$. They occupied 30 mail cars in transportation. Careful computation shows that the seeds sent out by the Department of Agriculture dur ing the year would have planted 21,038 acres of cabbage, 10,768 acres of lettuce, 10,712 acres of tomatoes, and other garden vegetables in proportionately large areas. Briefly, the seed gratuitously sent about the country would have planted more than 115 square miles of garden. In other words, it would have plant ed a strip of ground one rod in width and 36,817 miles in length. Such a strip would reach one and a half times around the globe, and a passenger train going at the rate of 60 miles an hour would require 51 days 3 hours and 14 minutes to travel from one end of this gratuitously seeded truck patch to the other. Each congressional quota contained seed enough to plant more than $1631 / \frac{1}{2}$ acres."
Mr. Morton concludes his report as follows: "The question for American farmers and all other citizens engaged in gainful occupations to consider is: How can the United States supply the markets of the world with staple food product and necessary articles of manufacture? . . . It is probably quite safe to declare that at least $2,000,000$ of American workmen, on arms and factories, subsist almost wholly upon employment based upon foreign demand for American commodities. And in this contest for feeding and fur nishing mankind-notwithstanding the fierce competi tion which meets us all over the globe-American agri culture, manufacture and commerce are steadily gaining more trade, and thus furnishing an enlarged wage fund on a gold basis out of which many thousands of American laborers and skilled artisans draw their year ly remuneration, and upon which they and their fam lies largely depend for employment and comfort."

## Footwear Nevers.

Dr. Samuel Appleton, in Health Culture, gives four teen of them, which every person will derive comfort in heeding:

1. Never wear a shoe that will not allow the great toe to lie in a straight line.
2. Never wear a shoe with a sole narrower than the outline of the foot traced with a pencil close under the ounding edge.
3. Never wear a shoe that pinches the heel.
4. Never wear a shoe or boot so large in the heel that the foot is not kept in place.
5. Never wear a shoe or boot tight anywhere
6. Never wear a shoe or boot that has depressions in any part of the sole to drop any joint or bearing below the level plane.
7. Never wear a shoe with a sole turning up very much at the toes, as this causes the cords on the upper part of the foot to contract.
8. Never wear a shoe that presses up into the hollow of the foot.
9. Never have the top of the boots tight, as it intereres with the action of the calf muscles, makes one walk badly and spoils the shape of the ankle.
10. Never come from high heels to low heels at one jump.
11. Never wear one pair of shoes all the time, unless obliged to do so. Two pairs of boots worn a day at a time alternately give more service and are much more healthful.
12. Never wear leather sole linings to stand upon. White cotton drilling or linen is muchjbetter and more healthful.
13. Never wear a short stocking, or one which after being washed is not, at least, one-half inch longer than the foot. Bear in mind that stockings shrink. Be sure that they will allow your toes to spread out at the extreme ends, as this keeps the joints in place and makes a strong and attractive foot. As to shape of stockings, the single digital or "one-toe stocking" is the best.
14. Never think that the feet will grow large from wearing proper shoes. Pinching and distorting makes them grow not only large but unsightly. A proper, natural use of all the muscles makes them compact and attractive.

The elevation of Sir Joseph Lister to the peerage has been received with great satisfaction by the scientific world, and is an honor not only to his profession but to the Royal Society as well.

## sclence Notes

Sir Joseph Lister on being raised to the peerage has elected the title of Lord Lister.
Physiological uses of the Roentgen rays have so in Skiagraphy has been begun in London
We learn from Natural Science, of London, that the Roentgen rays have been applied to fossils embedded in chalk, and the photographs obtained have been very successful.
Heinrich Gätke, who, in fleeing from Prussian political persecution in 1848, was wrecked on Heligoland and spent the rest of his life there, marrying a native, painting marine views, and watching the flights of birds over the island, has just died at the age of 83 . His collection of migratory birds is in the South Kenington Museum. He held the place of government secretary until the English gave up Heligoland
The Bressa prize of the Royal Academy of Sciences of Turin will be awarded in 1899. The value of the prize is nearly $\$ 2,000$. It will be given for the most mportant scientific work produced during the year 1895-98. The term will be closed at the end of Decem ber, 1898. The competitors must send their contribu tions in print before the above stated time. The prize may, however, be awarded to a non-competitor if he is considered the most worthy to receive it.
The following are the calculated illuminating values of mantles made from the oxides named per cubic foot of gas: Thoria (commercial) 6.0 ; thoria (pure) 1.0 irconia (commercial) 3.10 ; zirconia (pure) 1.5 ; ceria $0 \cdot 9$ yttria, $5 \%$; lanthania, 6.0 ; erbia (commercial) $1 \cdot 7$ erbia (pure) 0.6 ; alumina, 0.6 ; chromium oxide. $0 \cdot 4$ barium oxide, 3.3 ; strontia, 5.5 ; magnesia, 5.0 . Ceria gives a reddish-yellow light. Erbia, zirconia, and oxide of barium, a yellow light. Alumina, a whitish yellow. Strontia and magnesia, a white light.
Austria proposes to introduce radical innovations into its university systems. Students' fees are to go to the government instead of to individual professors, while professors' salaries throughout the empire are to be equalized. Moreover, well known professors are to be distributed among the provincial universities instead of being retained at centers like Vienna and Prague, in order to check the flow of provincial students to the great cities. The result will be the establishment of a system of higher instruction, somewhat resembling that in American colleges. Objection is made to the scheme on the ground that it interferes with the German theory of Lehr and Lern-freiheit, and that it gives the government too much power over the higher education.
The Department of Agriculture has detailed Prof. H. J. Webber, of Eustis, Fla., to make an investigation of the plant known as the water hyacinth, which has come so near blocking navigation in the St. John's River tributaries. Until last September little attention had been paid to the steady increase in the growth of the water hyacinths on the St. John's River. At that time a member of the Jacksonville Times-Union staff made a trip up the river, and at once began calling attention to the obstruction to navigation of the river by the hyacinths. Since that time the matter has been taken up by the War Department and the Agricultural Department, and it now looks as though something might be done to rid the river of the plants.
Two Danish officers, MM. Oloufsen and Philipsen, have just arrived in St. Petersburg on their return from a journey of exploration to the Pamir country, where they reached places hitherto untrodden by
Europeans. They met tribes who are still fire worEurojeans. They met tribes who are still fire wor-
shipers and totally uncivilized. The men of these shipers and totally uncivilized. The men of these tribes and even their animals are very smanl, the bulls donkeys about the size of a large dog, and the sheep about as large as a small poodle. Money is unknown to them, and their only trade consists in the bartering of furs. Women are bought at the rate of five or six ows or fifteen sheep apiece. These natives are very timid. MM. Philipsen and Oloufsen have secured
numerous scientific collections, which they intend numerous scientific collections, which they intend
presenting to the Natural History Museum in Copenhagen.
According to Dr. W. O. Atwater, of Wesleyan University, in 25 cents' worth of various foods there are the following nutritive values in each: In 10 pounds of cornmeal there are more than 8 pounds of actual nutriwent; in $8 \frac{1}{3}$ pounds of wheat flour there are over $63 / 4$ pounds of nutriment; in 5 pounds of white sugar there are $41 / 2$ pounds of nutriment ; in 5 pounds of beans there are 4 pounds of nutriment; in 20 pounds of potatoes there are 334 pounds of nutriment; in 25 cents' worth of fat salt pork there are $31 / 2$ pounds of nutriment; in the same value of wheat bread there are $21 / 4$ pounds; in the neck of beef $13 / 4$ pounds; in skimmilk cheese $13 / 4$ pounds; 11/ whole milk cheese more than $1 \frac{1}{2}$ pounds; in butter $11 / 2$ pounds; in smoked ham and leg of mutton about the same; in milk over 1 pound; in mackerel about 1 pound; in round of beef $3 / 4$ pound; in salt codfish and beef sirloin about $1 / 2$ pound; in eggs at 25 cents a dozen about 7 ounces; in fresh codfish about 6 ounces, and in oysters at 35 cents a quart about 3 ounces.

THE HARLEM RIVER SPEEDWAY, NEW YORK CITY. (Continued from page 90 .)
In estimating the value to the driving, and in these In estimating the value to the driving, and in these Harlem River Speedway, it must be borne in mind that it forms, as mentioned in a preceding article, the connecting link in a circular driveway, whose other portion is of greater length and, if possible, enriched with features of greater historic and natural beauty. It has been mentioned that the new speedway terminates at Dyckman Street, into which it leads. The latte thoroughfare, which has a clear width of 100 feet, runs northwesterly to an intersection with Kingsbridge Road, which forms the continuation of the famous Boulevard to the south of it. It is here that the new Boulevard Lafayette, which constitutes the western portion of the drive, commences. As finally completed it will have a clear width of 100 feet for the whole of its lengrth from the Kingsbridge Road to One Hundred and Fifty-seventh Street - a distance of three miles. From the Kingsbridge Road the Boulevard rises on a regular grade and winds around the northern spur of Washington Heights, until it reaches Heights, until it reaches
the bluffs of the Hudson at a high elevation above the river. The roadway is largely blasted out from the cliffs and in many places is carried by heavy retaining walls. 'This lofty elevation opens out a charming and ever changing panorama of Hudson River scenery, extending River scenery, extending
from the far distant and from the far distant a:ld
softly outlined hills of New Jersey in the south to the wooded heights that raise their heads above picturesque Tarrytown far to the north. The new Boulevard terminates at Eleventh Avenue and One Hundred and Fifty-seventh Street, from which point the enfrom which point the entrance to the Harlem
Speedway is reached by way of One Hundred and Fifty-fifth Street. By the time he has arrived at the starting point, the horseman will have covered nearly six miles of what may be justly termed one of the most handsome and picturesque driveways in the world.

From the above description it will be seen that this magnificent system of roads makes the complete circuit of the spur of lofty land at the northern end of Manhattan Island which is known as Washington Heights. We have referred to the historical associations which cluster thickly around its colonial mansions and tell their story from many a grass-grown rifle pit and weatherbeaten fort. Here was the favorite site for the summer residences of notable colonial families. Conspicuous among them is the mansion known as Washington's Headquarters, which


THE HARLEM RIVER SPEEDWAY-VIEW LOOKING SOUTH FROM DYCKMAN STREET BEFORE COMMENCEMENT OF WORK.


VIEW OF THE SAME SPOT SHOWING WORK COMPLETED. is built on a lofty emi-
nence overlooking the Harlem River and not far from the southern entrance to the Speedway. Crowning the projecting headland just above the junction of the Speedway with Dyckman Street is Fort George, which figured conspicuously in the operations of the revolutionary war: and across the heights to the west ward, on a spur of land which runs out into the Hudson about midway of the length of Lafayette Boulevard, is Fort Washington, where, owing to the culpable blundering of Washington's subordinate generals, the revolu tionary cause suffered one of the greatest disasters of
the war. Above the avenue are to be found such his toric homes as the Jumel mansion, noted as the resi dence of Aaron Burr ; the Morris mansion; the Monroe mansion, and many another colonial building which bears a name less famous it may be than these, but destined to be forever conspicuous on the pages of our national history.
Our detailed description of the Speedway in the last issue included the first section of the work, and carried us to High Bridge. At this point the surveyors found it necessary to narrow the roadway to a width of $661 / 2$ feet, in order to pass bet ween the piers, and to carry th
portion of the whole Speedway, and it will naturally be a source of regret that the bulkhead could not have been carried 10 feet further into the river. As it is, however, the roadway extends 15 feet beyond the bulkhead lines established by the government, and this was the maximum allowance that could be obtained from the War Department, who are naturally anxious to maintain the full width of a waterway which, now that the Harlem Canal is opened, has a high strategic as well as commercial value, giving access from the Hudson to the East River independently of the route by the Battery.

Immediately north of Washington Bridge is loWashington Bridge is 10
cated the third subway Owing to the fact that the westerly walk is carried to the west of the pier of the bridge, at an elevation of 26 feet above the roadway there is a rise of 33 feet from the floor of the subway to the sidewalk. To obtain as easy a rise as pos sible, the connecting stair way will be built with a broad, easy curve, and for landscape effect the slop ing ground between stair way and sidewalk will be terraced and -laid out in flower beds and shrubbery Judging from the plans of this work, it promises to be a highly ornamenta feature of the driveway.
By reference to the large front page engraving. which is taken from the top of Washington Bridge, an excellent idea will be obtained of this portion of the work. To the left will be seen the westerly walk, which here falls on an even grade to the roadway which is reached near the end of the great side hill cut. The retaining wall is built of broken range ma sonry, as is also the retain ing wall seen to the west of the walk against the bluffs, which has been built to catch the heavy drainage and the loose material which is carried down where the soil is loose and liable to slide. The line of the coping has been broken in order to avoid a too stiff appearance, and trail ing vines are to be planted against this and all retain ing walls, so as to make them harmonize as far as possible with the general appearance of the bluffs.
Eight hundred feet beyond the bridge the roadway widens out to 95 feet. and the planting spaces, which have been omitted between the bridges, again make their appearance, and are continued to the end of the drive. By reference to the illustration, it will be seen that one of the stretches of masonry bulkhead has been built where the roadway has been blasted out of a projecting bluff. The white stone work and the dark strip of asphalt paving indicate the length of this work. The inclined westerly walk is to be similarly asphalted.
It is just at this point that the most costly piece westerly sidewalk round the outside of the adjoining| of excavation on the whole driveway occurs. The center pier, and at a higher elevation than the roadway. Just beyond the bridge is located the second subway for foot passengers, for communication between the east and the west sidewalks without crossing the drive, and at this point walks will be constructed leading to the High Bridge Park. After passing beneath the bridge, the roadway widens to 75 feet and holds this width to within 500 feet of Washington Bridge, where it gradually narrows down to 55 feet, in order to pass to line length of the cut was over 1,000 feet, and the top of the slope is 110 feet above the roadway grade. As over 160,000 cubic yards of material were taken out at a contract price of $\$ 1.20$ per yard, this inconveniently obtrusive point of rock has cost the city $\$ 192,000$ to remove. North of the cut the roadway extends on a straight course to the mouth of Sherman Creek, where it swings to the left with an easy curve and merges into Dyckman Street. This part of the work consists chiefly the eastward of the bridge pier. This is the narrowest of filling, and the bulkheads are built of cribwork.

Two of the accompanying illustrations show the condition of this portion of the driveway before construction They are reproduced from photographs taken from exactly the same point of view, and portray, better than any pen can describe, the transformation that has been effected. In the later cut the point of view is exactly in the center of the westerly sidewalk. The broad strip of garden mould between the sidewalk and the roadway, which shows up in the photograph of a darker shade than the surrounding material, marks the location of the masonry trench for tree planting, the construction of which was explained in the previous article.
The track which is seen to the right of the picture is being used in filling in the bays of the creek which lie between the drive and the shore. This work is part of an important modification of the original plans, which will add greatly to the appearance of the finished Speedway. It was at first intended to allow such portions of the tideland as might be inclosed between the drive and the shore line to remain as they were. This would have left a series of unsightly holes which would have |more than a few days, and the vases in which they are been a blemish upon the work and a continual eyesore. placed should be well washed out with hot water once The present Park Board very wisely determined to fill or twice a week." in all such spaces to the grade level and give them landscape treatment. They will be planted with trees and laid out with winding walks, and will form a park like border to the drive, which will extend over a considerable part of its length.
The total quantities for the second section of the work, as given by Mr. J. A. Lockwood, the engineer in charge, to whose courtesy we are indebted for all particulars, are as follows: The excavation, mostly solid rock, shows a total to date of 281,000 yards. There are 350,000 yards of filling, and this is held in place by no less than $3,750,000$ cubic feet of cribwork. The masonry retaining walls account for 12,000 cubic yards of broken range masonry, and there are 30,000 yards of first-class masonry in the bulkheads and subways.

By the time it is opened to the public the Speedway will have cost about $\$ 2,250,000$, of which $\$ 1,032,000$ have been expended to date. The second section will be completed early this spring, and as about twelve months will be consur will be consumed work on the first section, we may look for the opening of the Speedway early in the spring of next year.

## Flowers in Sick Rooms.

After relating several anecdotes of cases where flowers have proved injurious when kept in the bedroom of invalids, The Hospital says: " It is not necessary to comment at length upon cases like these. They tell their own story, and point their own moral. The


THE HARLEM RIVER SPEEDWAY-LAYING CONCRETE FOUNDATION FOR ASPHALT ON THE EASTERLY SDEWALR.

## HE STABILITY OF THE BATTLESHIP INDIANA.

It will be remembered that the new battleship In diana, on a trip from Hampton Roads to New York harbor last October, rolled so heavily as to break loose all the heavy guns and turrets. The enormous mo entum of the great masses of metal proved too much or the clamps which prevent the turrets from rotation on their turntables, and, tearing loose, the guns began to swing to and fro across the decks with every roll of the ship. In the height of the gale the crew set to work to lash the guns temporarily in place, and the tory of that never-to-be-forgotten night, as told by Capt. Evans, will bear repetition just now, when the Indiana has again had to return to port lately from ear of a similar accident.
"We tied the two forward guns together by binding

battleship indiana-the big guns lashed, after breaking loose during a gale
rule should be that, where flowers are kept in bedrooms, to the bitts, and managed the aft ones the same way they should be changed frequently, and those which It was a very hard job. About two o'clock next yield a heavy odor should not be preserved after the morning the forward ones snapped their hawsers and day is over. In sitting rooms the case is somewhat got loose again. The storm was then very severe, and different; but even in them flowers should not be kept the ship was rolling at an angle of 36 degre To mak matters worse the forward 13 inch gun oot loose, and those enormous guns began thrashing about in full com mand of the deck We finally caught the big guns with a 13 inch hawser and tied them securely to the superstruc ture."
On the morning fter the storm one of the electricians, with the permissio of Capt. Evans, took a photograph of the aft pair of 13 inch guns, from which the accom panying en graving has bee prepared.
It will be seen that the 8 inch hawse was passed around the chase of the gun a few feet from th muzzle, and led around the bitts on the opposite side of the deck, the opera tion being repeated until a sufficient number of turns had been taken to hold it securely. Any one who has handled an 8 inch manila hawser can well believe Capt. Evans when he says: "It wa very dangerous in that storm. I wa fraid of losing two or three dozen men, and if I had ozen men, and if I ha we would have come out."
Upon the return to the navy yard stronger clamps were put in place, such as, it was supposed, would tand any possible demands upon them. It seems, however, that the Indiana has again had to leave Admiral Bunce's squadron and put back, not this time because the turrets actually did break loose, but for fear they would. In a report given out by the Navy Department, it is stated that the return of the hip was due to the "caution" of the officers and nin "a further inspection and possible read lesire for "a further inspection and possible readjust cribed to the fact that she is not fitted with the bilge cribed to the fact that she is not fitted with the bilge
keels which she was designed to have. These were keels which she was designed to have. These were
omitted because the naval docks were not of sufficient omitted because the naval docks were not of sufficient
capacity to accommodate the ship with bilge keels in , lace.
It is gratifying to learn that the rolling of the Indiana and her class is not, in the minds of the naval exp due to their top hamper and the great height ( 26 feet) at which the feet) at which the four 8 inch guns and turrets ar the desirns were published, it was predicted in many quarters that these ships would not show sufficient stability in a beam sea, and the performance of the Oregon in Pacific waters coupled with the troubles of $t h e$ Indiana might seem to verify the prediction. Against this, however, it is quite sufficient to reply $t h a t$ the most stable ships of foreign navies showed quite as great instability before their bilge
keels were fitted. This is notably true in the case of the Resolution, a 14,150 ton ship of the British navy, which, in crossing the Bay of Biscay, rolled 47 degrees, and looked so much like "turning turtle" that she put back to Plymouth. Bilge keels were fitted, and she is now one of the steadiest ships afloat.
The bilge keels are continuous, narrow, plate steel, V-shaped keels, about three feet deep, that extend at the turn of the bilges for the greater part of the length of the ship. Their broad surface, by its resistance, prevents the rolling of the ship, hence their othe name of rolling keels.

Convenient Metric Conversion Table
The following metric conversion table has been compiled by Mr. C. W. Hunt, M. Am. Soc. M.E., president of the C. W. Hunt Company, of New York City, and is most convenient in dealing with metric weights and measures :
Millimeters $\times 0.03937=$ inches
Millimeters $\div 25 \cdot 4=$ inches.
Centimeters $\times 0.3937=$ inches
Centimeters $\div 2 \cdot 54=$ inches
Meters $\times 39 \cdot 37=$ inches. (Act of Congress.)
Meters $\times 3: 281=$ feet.
Meters $\times 1 \cdot 094=$ yards
Kilometers $\times 0.621=$ miles.
Kilometers $\div 1 \cdot 6093=$ miles
Kilometers $\times 3: 80 \cdot 7=$ feet.
Square millimeters $\times 0.0155=$ square inches
Square millimeters $\div 645 \cdot 1=$ square inches.
Square centimeters $\times 0.155=$ square inches.
Square centimeters $\div 6.451=$ square inches.
Square meters $\times 10 \cdot 764=$ square feet.
Square kilometers $\times 247 \cdot 1=$ acres.
Hectares $\times 2 \cdot 471=$ acres
Cubic centimeters $\div 16.383=$ cubic inches
Cubic oentimeters $\div 3 \cdot 69=$ fluid drachms. (U.S. P.)
Cubic centimeters $\div 29 \cdot 57=$ fluid ounce. (U. S. P.) Cubic meters $\times 35 \cdot 315=$ cubic feet.
Cubic meters $\times 1 \cdot 308=$ cubic yards
Cubic meters $\times 264 \cdot 2=$ gallons ( 231 cubic inches). Liters $\times 61 \cdot 022=$ cubic inches. (Act of Congress.)
Liters $\times 33.84=$ fluid ounces. (U. S. P.)
liters $\times 0.2642=$ gallons ( 231 cubic inches).
Liters $\div 3 \cdot 78=$ gallons ( 231 cubic inches).
Liters $\div 28 \cdot 316=$ cubic feet.
Hectoliters $\times 3.531=$ cubic feet.
Hectoliters $\times 2.84=$ bushels ( $2150 \cdot 42$ cubic inches). Hectoliters $\times 0.131=$ cubic yards.
Hectoliters $\div 26 \cdot 42=$ gallons ( 231 cubic inches).
Grammes $\times 15 \cdot 432=$ grains. $\quad$ (Act of Congress.)
Grammes $\times 981=$ dynes.
Grammes (water) $\div 29 \cdot 57=$ fluid ounces.
Grammes $\div 28 \cdot 35=$ ounces avoirdupois.
Grammes per cubic centimeter $\div 27 \cdot 7=$ pounds per cubic inch.
Joule $\times 0.7373=$ foot pounds.
Kilogrammes $\times 2 \cdot 2046=$ pounds
Kilogrammes $\times 35 \cdot 3=$ ounces avoirdupois.
Kilogrammes $\div 1102 \cdot 3=$ tons ( 2,000 pounds).
Kilogrammes per square centimeter $\times 14 \cdot 223=$ pound per square inch.
Kilogrammeters $\times 7.233=$ foot !ounds
Kilogrammes per meter $\times 0 \cdot 6 \cdot \sim=$ pounds per square foot.
Kilogrammes per cubic meter $\times 0.062=$ pounds per cubic foot.
Kilogrammes per cheval vapeur $\times 2 \cdot 235=$ pounds per horse power.
Kilowatts $\times 1.34=$ horse power
Watts $\div 746=$ horse power
Watts $\div 0.7373=$ foot pounds per second.
Calorie $\times 3.968=$ B. T. U
Cheval vapeur $\times 0.9863=$ horse power.
(Centigrade $\times 1 \cdot 8$ ) $+32=$ degrees Fahrenheit
Francs $\times 0 \cdot 193=$ dollars.
Gravity, Paris $=980.94$ centimeters per second.

## Rise and Decline of Strikes.

A record of strikes in the United States for 1881-86, from the United States Bureau of Labor Statistics, has been supplemented by a report bringing the record down to 1894 . The former record showed a great increase of strikes, culminating in 1886 with the riots and Haymarket massacre at Chicago. The following totals for the period covered by both reports are tabulated and commented upon by the Springfield Republican :

| Strikes. | Estabish- <br> ments. | Number thrown <br> out of work. | Per cent <br> which <br> failed. |
| :--- | :---: | :---: | :---: |
| $18,2981 \ldots \ldots \ldots \ldots . .471$ |  |  |  |

the number of establishments involved, decreased in prevalence until 1890, when there was a sudden increase to almost the extent of 1886 over 1885, and another decline followed by the widespread disturbances of 1894 which culminated, as in 1886, in the Chicago railway riots. The two years of 1886 and 1894 stand out above all the others, both in the number of establishments involved and the number of workmen thrown out of employment; but the causes were different. The former year witnessed a revival of business activity from the depression of 1884 and the strikes were gener ally for increase in wages. In 1894, however, we had very hard times and strikes against wage reductions.
"But the most instructive and significant figures o the table are those exhibiting the proportion of establishments involved in which the strikes failed altogether. There is a gain on the whole in the percentage of failures which is too marked to escape notice. During the earlier part of the period represented, about two thirds of the strikes as respects establishments involved wholly or partially succeeded. But more recently the proportion has declined, until in the last four years the failures have exceeded on the average the whole and partial successes. As a weapon against capital, there fore, the strike is losing its force. Labor has been unable to keep pace with capital in forming powerful combinations. United labor, it is demonstrated, cannot equal in power united capital, and labor seems to be realizing the fact. Evidences are not wanting that labor is beginning to lay more stress upon politica action than upon mere unionism."

## To South Polar Lands.

After an interval of fifty years the scientific world has taken up again the matter of Antarctic exploration and it seems likely that during the coming year much important information will be obtained regarding a region of the earth's surface of which we as yet know hardly anything, whose area covers not less than $4,500,000$ square miles-about once and a half that of the United States, and equal to that of the great
Chinese empire. It was with good reason that at the Chinese empire. It was with good reason that at the
last International Geographical Congress, held in last International Geographical Congress, held in
London in the summer of 1895, says the New York Sun, the first general resolution of recommendations embodied the statement that the greatest piece of geographicel work that was left for the future, and one that should be taken up immediately in the pre sent, was the exploration of this terra or aqua incognita Not since the days of Sir James Clark Ross and Capt (afterward Commodore) Wilkes, of the United States navy, or the years 1840-42, has any systematic research been conducted in this great expanse of southern ice and water, the ice barriers of which have for one reason or another been assumed to render access to its deeper parts impossible. Yet, strange though it may appear, all this supposition of inaccessibility was based upon the experiences of gallant seamen whose highest resource was the sailing vessel, and to whom the modern methods of polar research, as theiy have been developed within the last quarter of a century, and particularly in the last decade-the period which compasses the remarkable work of Peary and Nansen-were practically unknown. Whether in the Arctic or in the Antarctic tracts, the work that was accomplished was done with the assistance of a heavy equipment, inefficient clothing, and a source of food supply which knew little or nothing of canned and vegetables which proper association of sweetmeat scurvy from the sailor's Arctic dreams.

At the present time three expeditions are being planned or actually being placed in commission for the important work of discovery in the south polar regions. At the head of one of these will be the Nor wegian, Borchgrevink, who, in association with his commander, Capt. Kristensen, in 1894-95, while on a whale catching cruise, reached Ross's trail latitude $74^{\circ}$ south, and made the first landing on what is com nonly designated the Antarctic continent, if in reality such a continental mass exists. Borchgrevink's fitnes or this command seems eminently established, and the lucid, graphic, and wholly unpretentious account of his late experiences has placed to his credit a confidence similar to that which has been reposed in th till more illustrious sire of Norwegian soil, Fridtjo Nansen. To him scientific men owe the first discovery of vegetable forms as part of the product of the south ern lands. Up to the year 1895, when fragments of what appear to be true lichens were picked up off the bleak and forbidding rocks of Cape Adarl, on Victoria Land, and the offlying Possession Island, it had been assumed that not a trace, type, or form of vegetation of any kind belonged to this inhospitable tract of the south-a tract of land or ice as destitute of terrestria fauna as it was assumed to be of a covering or partially covering vegetation. Strangely contrasting is the di covery made by Capt. Larsen in 1893 on Seymour Island, a patch of Antarctic land lying almost due south of Patagonia, of an abundance of fossilized plant ble organization, but of the noble structure of th South American pine or Araucaria. However meager
or absent may be vegetation of the far south to-day, the evidence is conclusive that at a former period of the earth's history, and one that is quite recent when measured by geological standards-perhaps extending no further back than 150,000 years, or even consider ably less-a goodly vegetation of forest trees, and with it, doubtless, a multitude of herbaceous plant of various kinds, gave life, color, and freshness to the landscape of Antarctica, the landscape which to-day sees hardly more than giant glaciers, walls of ice hundreds of miles in length and as many feet in height, undulating mountain slopes buried beneath perhaps thousands of feet thickness of snow, and a few grandly smoking volcanic cones, like Erebus, sending skyward the products of the internal destruction of the earth.
The second expedition is planned under the direction f Lieut. Gerlache, a young Belgian, and it receives, in addition to the warm support of the town, Antwerp, from which it is expected to take its departure, the official patronage of the Belgian government in the shape of a timely financial backing; presumably, there fore, a possible failure on its part will not be due to the absence of those "sinews of war" which are so eminently necessary for this far-off exploration. It is gratifying to learn that the scientific men of America are fully awake to the importance of the exploration that are planned, and to the discoveries that await the successful investigator of Antarctica. At the last annua meeting of the American Society of Naturalists a committee was appointed to examine into the practicability and the ways and means of furthering an America Antarctic expedition. Profs. Angelo Heilprin and E D. Cope, of Philadelphia, are members of this com mittee, and it is known that they strongly favor the immediate (so far as it may be possible) equipment of such an expedition. It is thought that $\$ 50,000$ will cover an important reconnaissance, if not deep penetration, with one or more steam whalers from the Newfoundland or Norwegian fleet
It seems likely that the points of attack for all expeditions will be the region of Graham Land, south of Patagonia, which lies nearer the base of operation than the Victoria Land of Ross, and offers additiona advantages to exploration which are not found in the track lying south of Australia. It holds out, more over, hopes of important scientific results even with the failure of the objective aim of any expedition-i. e. high penetration southward. It was in this track that Larsen obtained his fossil plant remains, and also a umber of marine fossils, identical with those found by Darwin sixty years earlier in Patagonia, which so trongly point to a former connection with the South American continent. Somewhat eastward of thi egion Weddell, in 1823, penetrated to latitude $74^{\circ} 15^{\circ}$ south, and the same year Capt. Benjamin Morrell ailing from New York, and pretty much in Weddell's track, reached $70^{\circ} 14^{\prime \prime}$, reporting a moderately high temperature and a sea practically devoid of ice. How far beyond these points the assumed "impenetrable" barrier would be met, if met at all, only an effort at penetration can determine, as the inconstancy of the in this region is such as to throw its front edge to positions, depending upon the year, fully a thousand miles apart from each other. At all events, a chanc is here presented.
Of the substance of our knowledge of Antarctica it must be said that most of it is bound up with the esearches of Ross about Victoria Land, and with the less important ones that have been made in the region of Graham Land. Concerning the other land, island, or ice masses that have been designated Clarie Land Sabrina Land, Enderby Land, Alexander Land, etc.in fact, of the whole Wilkes Land-our information is confessedly scant, and surely not sufficient to build up the great Antarctic continent which has been made a restoration by many geographers. Of the meteorology of the region, and of tides, currents, etc., we know equally little, and manifestly still much less of the geology, zoology, and botany. The commonly accepted notion of the extreme severity of the south polar climate is not founded on fact, any more than was the supposition of the shallowness of the Arctic basin, which, among his many other discoveries, Nansen ha now so completely dissipated. In fact, it is all but ertain that the winter rigors are far less pronounced in the region about the South Pole than they are in he region of the far north. and that there is nothin here which approaches the $-94^{\circ} \mathrm{F}$. which is found at two or more tracts along the Lena River in Siberia, or even the almost annual - $75^{\circ}$ of Yakutsk. Again, the summer temperature, while there is seemingly much less of it, partakes in a measure of the balm of Greenland, the thermometer frequently marking as high as $40^{\circ}$ and $45^{\circ} \mathrm{F}$. above in the shade. The great ice nasses are the disturbers of travel in the far south but up to the present time they have not been brought ace to face with vessels carrying steam, or those that are fitted for the exploration. The coming year will hrow new and important light upon this as yet "dark est " tract of the earth's surface.

The cost of Harveyized single forged nickel stee armor plate is about $\$ 170$ per ton.

## THE SWORD WALKER

by william b. caule.
Of all the daring tricks that have been introduced in the circus, none have caused more comment than the one in which a person, generally a lady, walks with bare feet up a ladder of sharp swords, treading directly on the sharp edges without any injury to the feet.
It is amusing to a person who is acquainted with the secret to hear the many explanations of "how it is done" offered by the spectators, yet none of them ever come near guessing the truth. This secret has been so jealously and successfully guarded that very few, even among the best informed experts know how it is performed.

That the explanation is as simple as the trick is surprising, the writer will now show

From the illustration it will be seen how the swords are arranged in a rack with the cutting edges on top. The rack is usually about seven feet high, and eight swords are used. One of the most necessary points in the preparation for the trick is that the rack should stand firm, and the swords fit snug and tight in the slots made to receive them.
Usually the inspectors are invited to examine the rack as well as the swords, and paper is cut with the swords to show that they are really sharp. The secret is not in the swords or rack, but in the preparation of the performer's feet. In a pint of water as much alum is dissolved as the water will readily take up. To the alum water is added as much sulphate of zinc as will lie on a silver dime, and thoroughly dissolved.

A few minutes before doing the act the performer bathes the feet in this solution and allows them to dry without wiping. Just before leaving the dressing room the feet are dipped for a moment in as cold water as can be secured and at once wiped dry without rubbing
By placing the feet squarely on the swords there is no danger, but great care must be used not to allow the foot to slide or slip on the sword, or the result would be a very bad accident.
On leaving the circus in which one has seen the above act, visitors are almost sure to see before the ever present side show a large painting on which is the representation of a Mexican dancing with bare feet in a shallow box filled with broken glass.
If you are of an inquisitive nat
ady walk with bare feet up a lady walk with bare feet up a ladder of sharp swords, you enter the side show to see this new wonder.
On a raised platform is found a box about four feet long, three feet wide, and six inches deep the bottom of which is covered with broken glass. In a few moments a man dressed in th Mexican costume appears on the platform, and proceeds to break a few old bottles and throw the broken glass in the box, then re move his shoes, shows his feet to be free from any covering, steps in the box, and dances among the glass. After he has finished dancing he shows his feet to be uninjured, and retires. The trick is performed in the following nanner :

Secure a number of thick glass bottles, break them in rather small pieces and file or grind al the sharp edges round. This stock of glass you place in the center of a box made according to above measurement. Now soak your feet in strong alum water and wipe dry, and give them a thorough rubbing with pulverized rosin. Dust the in side of your shoes with rosin put them on, and go upon the platform. Take some old lamp chimneys and bottles, break them in bits, and throw this fresh broken glass in the box around the edges and in the corners, not in the center. Remove your shoes, step in the center of box among the prepared glass, and do your dancing. Avoid the sides or corners of box where you have thrown the glass, and you run no risk of cu ting your feet, especially if you use plenty of rosin.

The late Robert H. Lamborn bequeathed $\$ 200,000$ t the Academy of Natural Sciences of Philadelphia.

The Electrical Conductivity of Cement and Concrete.
Electrical engineers, especially those engaged in rail ways and similar works, would do well to study a re cent paper by Dr. Lindeck, in which he describes some experiments which he has been conducting in order to determine the electrical conductivity of cement and concrete of various kinds. He finds that the resistance per cubic foot of pure cement blocks, when dry, is


## SWORD WALKER

after inmersion for about twenty-four hours in water, while it rises to 820 ohms after being exposed to a heat of $212^{\circ}$ Fah. The admixture of sand or gravel with the cement increases its electrical resistance. In cases where blocks were made with one part of cement to seven parts of gravel their resistance when dry mounted to about $18,000 \mathrm{ohms}$, when wet to 72 ohms, and after exposure at $212^{\circ} \mathrm{Fah}$. the resistance rose to about $2,000,000$ ohms. If the highest results obtained for airtight concrete be taken at about 1,670 ohms pe cubic foot, an insulation resistance of about $1 / 2 \mathrm{ohm}$ per mile is obtained. These considerations become impor tant when adopting the German practice of laying the rails of electrical railways in concrete. From experi-


## GLASS DANCER.

 ordinary cement is userl, it is only necessary to lay a bottles that had been filled had lost a part of their thin layer of the asphalt concrete over it. The cost is then not excessive. Asphalt concrete consists of 50 per cent of broken stone, 20 per cent of coarse gravel, free from loam and sand, 12 per cent of asphalt, 8 per cent of coal tar pitch, and 10 per cent of coal tar. The original paper appeared in the Electrotech. Zeits., 1896, p 180, says the English Electrical Review.current range is very trifing, and if filled with wine. An examination showed that the

## The Ascent of Aconcagua.

A special telegram to the Daily Chronicle announces hat Mr. Fitzgerald and Zurbriggen, the Swiss guide began to climb Mount Aconcagua, in the Andes, on Christmas Dicy. At a height of 21,000 feet. Gussfeldt's ard, dated March, 1883, was found in a tin box, say Nature. The explorers had to descend to the valley for three days, but a second attempt was begun on December 30, and an altitude of 22,500 feet was reached on January 2. A third attempt to ge to the top of Aconcagua was com menced a week later. The arête be tween the peaks, at a height of 23,000 feet, was reached on January $14 . \mathrm{Mr}$ Fitzgerald then had to turn back, but Zurbriggen reached the summit, which is over 24,000 feet high. This is the greatest altitude yet attained by mountaineers. The following item of climbing history is abridged from an article in the Chronicle: "The serious business began with De Saussure and has been going on ever since. He was soon followed by Humboldt, who climbed Chimborazo (19,000 feet) in 1802. The next climber to set foot on that mountain was Mr. Whymper, in the year 1880. The Jungfrau was first ascended in 1811, and the Fin steraarhorn in 1812. The other Swis peaks have fallen one after the othe -the Wetterhorn in 1854, Monte Ros in 1855, and the Matterhorn in 1865 Mr. Freshfield scored the first great victory when he climbed Elbruz ( 18.52 feet) in 1868; but long before that Gerard had climbed to 19,410 feet o Porgyul in 1818. The highest climbs of later years have been those of Si Martin Conway, who climbed Pionee Peak, in the Himalayas, in 1892, and of Mr. Mummery and Mr. Hastings, who climbed to 21,000 feet on Nanga-Parbat. Dr. Gregory reached to about 16,000 feet on Mount Kenya, in Central Afric 20,000 feet high), and Hans Meyer reached to 16,830 eet on Kilima-Njaro. In Asia there are four colossa mountains which still defy all efforts. Mount Everes 29,000 feet) still lies far beyond the reach of man Dapsang ( 28,700 ) is almost equally inaccessible. Tacarma ( 25800 ) and Khan-Tengri $(24,000)$ have yet to be caled. Similarly, in Africa the highest mountain is till a irg ; been climbed in New Zealand, Charles Louis $(20,000)$ still remains unascended in New Guinea."

Glass Soluble in Wine.-M. Henri Lavouroix has been making a series of experi ments to find how much effec the quality of glass in a bottle has on wine, and the results have aroused the interest of wine dealers, says Invention He states there is a direct chemical reaction between the glass and the material within the bottle, and he quotes a case in illustration. A wealthy retired merchant bought in France a lot of costly and rare wines in casks, samples of wine from each cask being given to him by the wine merchant. The new owne proceeded to have his wine racked off and bottled Some racked dayslater sone the wine wa served on his table, and he de tected a strange, unpleasant taste which the wine that he had sampled did not have. A fresh bottle was served, and this was found to be similarly af fected. Bottle after bottle was opened, with the same result and the owner brought suit rainst the man who had sold him the wine alleging that it was not like the sauple that ing the action some of the bot tles were brought into court, and it was found that the glass in them had become opaque These bottles were handed to a chemist, together with simila n oxal that had never me, potash and soda, which had passed into solution, forming compounds with the acid ingredients of the wine that rendered it unfit to drink.

A CyCle factory has been established at Copenhagen, Denmark, with an output of over 2,000 wheels per annum.

RECENTLY PATENTED INVENTIONS. Engineering.
Bridge Wall for Boilers.-George W. Hayton, Brooklyn, N. Y. To securely hold and lock in place the bricke employed in making the bridge walls of boilers, preventing their being broken or knocked out
by the firemen in raking the fires, this invention provides for the use of bricks having in their faces projections aud recesses, whereby they are adapted to interlock with each other, while a key brick is made with grooves reg-
istering with corresponding grooves in adjacent bricks, stering with corresponding grooves in adjacent brick, kers being driven into the registering grooves. The set
of bricks forming this improved bridge wall may be readily set up by a fireman or other unskilled person, and in case one set burns out, another may be readily set up by the attendant without the use of mortar.
Steam Boiler Indicator. - John Parker, Bradford, England. This inventionis for a simple and inexpensive device to inlicate excessive rise and fall of the water level. A frame in which is arranged a foat is connected with a tubular extension through the boiler shell, the iloat being at one end of a fulcrumed Within the tubular extension inside the boiler is a valve seat engaged by a valve on the lever, and the undue fall of the water level raises the valve from its seat, permitting the water or steam to flow through the bore of the extension, and through a connected pipe outsiside, to give warning to the attendant. The device may also
be arranged to give warning of an undue rise of water.
Raising Sunken Vessels.-John R. rant, New York City. 'This invention relates to raising sunken vessels by intlated bags in the hold, and provides
improved bags and attached parts whereby the bags improved bags and attached parts whereby the bags
may be inflated as desired without leakage of air or danger of bursting, or the closing of the air inlets by the outer shell of fabric, with two reinforce plates secured to outer shell of fabric, with two reinforce plates secured to
its inner and outer sides and having oriflces matching an orifce in the bag, gaskets being interposed between the plates and the shells. The air distributing pipe is so ar-
ranged that all the bags on a vessel will be uniformly ranged that alt the bags on a vessel will be uniformly
inflated, that the vessel may be properly raised without listing.

## Railway Appliances.

Convertible Chair or Shat. -James M. Osgood, Boston, Mass. A seat or chair for
day use, which may be readily converted into a berth for day use, which may be readily converted into a berth for
night occupation, is provided by this invention. A seat portion, upholstered on both sides, is mounted to rotate
in a seat frame, a back frame recessed at opposite sides being pivotally connected to the seat portion, and an upholstered back section in each of the recesses is pivotally
connected with the upper portion of the back frame, whereby they may be swung into or out of the recesses to
form hacks or a berth. The alternating seats are somewhat differently constructed, according as they are to be convertible into an upper or lower berth, and the improvement also comprises sectional partitions by which two staterooms are practically formed, one for the upper and the other for the lower berth.
Dust Screen for Windows. - Hugh B. Shutt, Shawneetown, Ill. This is a screen especially adapted for use in connection with car windows, be-
ing readily applied atteither side of the window frame ing readily applied atteither side of the window frame
and held in position by the sash, or being applied on the outside of the car on the panels between the windows. It has a box body with hooded top and bottom escape
openings, an npright on the inner front portion of the body having a rib adapted to enter a sash groove, and the ends of the upright being recessed to receive the bottom rail of the sash. The screen is designed to prevent the
entry of dust and cinders at an open window, and also entry of dust and cinders at an open window, and also the window when the car is in motion.

Mining, Etc.
Mining Caisson.-James M. Thorp, College Park, Cal. For mining the bedrock of rivers
this invention provides a caisson that may be readily transferred from place to place, and which enables the miners to work directly on the river beds. The caisson is
supported by floats which form a double hull boat, arsapported by fioats which form a double hull boat, arranged with rails, a framework and clatiorm, whereby
the caison may be moved aboat and considerable space worked without moving the floats. It comprises an outer casing with lower work chamber open at the bottom,
there being a fixed chamber portion and a vertically movthere being a fixed chamber portion and a vertically mov-
able chamber portion. Bucket shafts open at the bottom able chamber portion. Bucket shafts open at the bottom
into the working chamber and at the top in airtight chambers, from which chutes lead outwarily, worklock shaft.

## Mechanical.

Sawing Maceine.-Daniel J. Taft, Leon, Ky. An attachment has been devised by this in-
ventor for automatically feeding and adjusting staves ventor for automatically feeding and adjusting staves
and similar articles to the saws in such a manner that
the desired amount of surplus is cut off from either and similar articles to the saws in such a manner that
the desired amount of surplus is cut off from either or
both ends of the article. Two pivoted guides are mounted both ends of the article. Two pivoted guides are mounted
to swing in unison, and are engaged by the ends of the to swing in unison, and are engaged by the ends of the
article to shift it transversely to bring the ends in proper article to shift it transversely to bring the ends in proper
position for the saws. The guides are readily set to position for the saws. The guines are ready
proper position, and their free ends extend under a press roll which holds the stave in place while passing to the gaws, another roll preventing the cutoff stave from being lifted while passing rearward between the saw blades.
GAGE FOR SEWING BELTS. - Jolin GAGE FOR SEWING BELTS. - John
Gregory, Newark, N. J. To properly locate wire lacing on a belt, a a simple and inexpensive gage has been de-
vised by this inventor, consisting of two hinged sections having front and rear plates connected by bars outwardly arched and diafonally placed, the two sets of bars pro-
ducing the effect of a thread. Gage bars are fitteà to the arched portions of the gage eections, the bars having the top face and the other the under face of the belt. In attaching lacing with this gage the strands alternately vary in length, one strand being short and the other vary in
longer.

## Bicycle Handle Bar and Brake.-

 anue strong, light and readily adjustable handle bar, whose ends may be made to stand in any desired position, and with which is combined a brake device to be operated bythe handle bar. The stem or upright portion is clamped he handle bar. The stem or upright portion is clamped post in the ordinary way, a hollow head receiving the screw-threaded ends of horizontal tubular arms, in which are journaled a horizontal tube whose opposite ends re-
ceive the handles. Within a sleeve on the ends of the handes are flanges with serrations engaged by spring oolts on the hollow arms, the bolts acting as latches in djusting the handles to desired position. In the hollow tion leads from it through the forward post and diagonal nd carring to a brake lever fulcrumed on the lower fork, and carrying a brake shoe adapted to engage the tire.
On disengaging a spring catch on the handle bar, the brake may be applied by simply pressing down on the

Bicycle Brake.-William L. Stewart, Wilmerding, Pa. According to this improvement, the
braking pressure is applied on the bicycle tire through a braking pressure is applied on the bicycle tire through a
brake cylinder covered with canvas or similar material, he brake cylinder rotating more or less on contact with The tire, which it is designed not to injure in any way. are central openings for the paseage of trunnions of an
inclosed bearing block having semicylindrical seats, each bearing on the top of a friction roller engaging the inner periphery of the cylinder below its center, the
outer ends of the trunnions being engaged by a yoke itter ends of the trunnions being engaged by a yoke
from which an operating rod extends upward convenifrom which an operating rod extends upward conveni-
ently near the handle bar. By pressing down on the into engagement with the wheel tire and the braking orce is equal to the pressure between the friction rollers nd the inner surface of the brake cylinder.
Bicycle Gear.-Cbristian A. Meister, Alentown, Pa. The hub of the rear wheel, according o this invention, has at opposite ends a large and a a large and a small sprocket wheel turning loosely on opposite ends of the crank shaft, the latter wheels baving inwardly projecting hubs adapted to be engaged by clutch sleeve. This sleeve has a circumferential groove receiving a loose collar connected with a clutch lever at
whose upper end 18 a handle movable in a clip on the whose upper end 18 a handle movable in a clip on the
frame of the bicycle, the handle being held in engagement with opposite sides of the vertical brace bar. To change from a high to a low gear, or vice versa; it is only necessary to push the handle from engagement
with one side into engagement with the other side of the frame.
PRI
Printing Apparatus. - Joseph B. Mockbridge, New York City, and Julius G. Hocke,
Bayonne, N. J. This invention is for an apparatus more especially for on shipping receipts, etc., at the same time issuing a has two sets of type wheels duplicate characters. wheel, a consecutive numbering wheel and an indicating wheel, the corresponding wheels being connected with each other to rotate in unison, while a rod actuated by
the operator, and connected mechanism, imparts motion the operator, and connected mechanism, imparts motion
to platens swinging toward and from the type wheels. Any desired number of impressions may be made on the document and on the paper reel, the im
ing consectively numbered alike on both.
Starting Gate for Race Tracks. Philip McGinnis, Brooklyn, N. Y. This invention proper position for starting on race tracks. It coin prises posts at opposite sides of the track on which are brackets and sleeves supporting carriers and arms to
which are attached barriers. The latter preferably con sist of flexible material, snch as leather, and are readily detached from the arms by the pressure of a horse
against them. When the barrier or gate is in lowered against them. When the barrier or gate is in lowered
position, the horses are aligned against it, the starter at the proper time pushing downward on a lever which
releases a counterbalance and swings upward the arms emoving the barrier.
Gate.-Amon W. Chilcott, Stewartsadjusted vertically intion is for a gate which may be or free end any desired distance from the ground, peror free end any desired distance from the ground, per-
mitting the passage of small stock and enabling the
eate to be easily operated when there are snow drifts. Late to be easily operated when there are snow drifts.
A crank shaft has one of its crank arms in link connecA crank shaft has one of its crank arms in link connec-
tion with an extension from the gate, the second arm being connected with a lock lever, while shifting arms link connection with the lock lever. In opening and closing, the gate passes a dead center and will be locked
n either its open or closed position, from which it may be released and swung in either direction by levers
placed at opposite sides of the road or path crossed by the gate.
Elevator Doors and Safety De-vices.-Lucius N. Reed, Fulton, III. To operate the
vertically swinging doors of elevator shafts, and automatically lock the elevator, should the hoisting rope break, the mechanism provided by this invention comprises a vertically movable rod having chain connecaround a pulley at the base of the shaft, the cable being attached to another pulley on whose shaft is an operating
lever. Eccentrics mounted on shafts carried by the elevator car are adapted for engagement with brake strips arranged at opposite sides of the shaft, there being on the shafts segment gears, on one of which is a
weighted extension, a holding device for which comally locked in the whereby the car will be automatically locked in the
shaft should it commence to move downward too rapidly.
Funnel for Dust Collectors. also been patented in many foreign countries, has within also ben patented in many foreign countries, has within
its shell or body a number of vanes to break the current
of air passing through, there being a fixed runcated
cone supported on the vanes, and within the fixed cone cone supported on the vanes, and within the fixed cone
a flexible cone adjustably held and adapted to receive a flexible cone adjustably held and adapted to receive
atmospheric pressure and capable of being deformed to atmospheric pressure and capable of being deformed to
gradually contract or completely obstruct the lower gradually contract or completely obstruct the lower
orifice of the fixed cone. The device is adapted for orince of the ixed cone. The device is adapted for
weak as well as for strong currents of air, the funnel
being mounted on any ordinary dust collecting appaweak as well as for strong carrents of air, the funnel
being mounted on any ordinary dust collecting appa-
ratus, and the fnnnel and collector forming only a single ratus, and the fnnnel and
apparatus after mounting.
Window Shade Roller and Brack-eт.-George M. Parsons, Carson, Nev. According to
this improvement the spring of the spring roller may be quickly and conveniently placed under the desired tension when the roller is in position in its brackets, and the plished as the roller may be definitely turned but a partall revolution, an entire revolution, or a number of revolutions as required. In an offset member of the bracket is located a tension head forming practically a ratchet,
and a spring shaft in the roller is connected with a and a spring shaft in the roller is connected with a
winding diek at the end adjacent to the bracket, the ar winding disk at the end adjacent to the bracket, the ar
rangement being such that, by turning a key connected rangement being such that, by turning a key connected
with the outer end of the tension nead, the spring of the ler is placed under compression.
Sliding Door and Curtain Support. William Abraham, Fairchild, and William Schroeder tube forming a track in which travels a grooved ball, its groove registering with the slot of the tube, while a hanger formed of overlapping hook-shaped members en gages the ball and extends through the slot to carry the
door, curtain, etc. There is a pivot for the hook mem bers and a washer on the pivot, to clamp the door or curtain in place between the washer and the pivot end of the hook mem bers. The device is very neat and not lia-
ble to get out of order. Folding TRESTLE. -Thomas A. Clarke, Portlana, Oregon. This invention is for an im-
provement on a formerly patented invention of the eame inventor, the trestle being designed to support a table or like articles, and to be readily set up or folded for storing away. It has a main post with oppositely arranged lower recesses in which are pivoted legs, there being also leg
braces, while pivoted to the upper end of the post are braces, while pivoted to the upper end of the post are
outwardly extending arms. The stand when set up has points of support, and is very frm.
Removable Back for Razors. Samuel H. Barrett, Wallace Groves, and Jent C. Brown, Woodhull, N. Y. This device consists of a straight back having at each end downwardly extending spring fingers by which the bar may be removably attached to the razor. The side edges of the bar are extended beyond the razor to engage the honing surface and more decid-
edly tilt the razor, the invention being especially useful edly tilt the razor, the invention being especially useful
where the permanent back of the razor has worn down from long service.
Drawer Guide. - Torvald Hanson, Eau Claire, Wis. To compensate for shrinkage and wear a drawes the justable guides consisting of loosely contacting strips from which project threaded studs, contact bars attached to the case having apertures to receive the studs, and there being nuts on the studs between the contact bars
and guide strips. The nuts are readily adjustable by a and guide strips. The nuts are
Contagious Germ Incinerator.Helen S. Whitton, Fruitvale, Cal. This is a portable
incinerator more especially adapted for consuming the incinerator more especially adapted for consuming the discharges from diseased lungs, and comprises a vase-
like shell covered by a close-fitting lid, and within by means of an alcoliol or other lamp in the effected the shell, there being an annular draught passage the shell, there being an annula
around the thin walled chafing dish.
Punitive Chair.-Sauford J. Baker, aakland, Me. This is a chair made of metal slats, in
which the occupant is to be held in sitting postur whough not bound, the chair forming substantially
the cage secnred on a wheel base, to be drawn to and left on
a public square. It is designed for the a public square. It is designed for the confinement o drunkards, tramps, or other objectionable persons or
criminals, the occupant being visible from the sides as woor and food is placed there for the occupant.
Siphon Receptacle. - John Nageldinger, New York City. To preserve fermentive liquids in their natural state by means of carbonic acid gas, and of any desired quantity of the liquid, is the object of this invention. A cap having a pendent carbonic acid
receptacle extends down into the sidhon receptacle, the receptacle extenclas having a closely fitting exterior jacket of noncorrosive material in which is a pressure regulator,
which may be set to a predetermined amount of preesure whereby every glass of liquid drawn will be pas sparkling as the first glass. The device is simple and inex pensive, and especially adapted for preserving beer,
Carousel.-Milton T. Weston, Kenton, $\mathbf{O}$. This is a merry-go-round in which the fram and mast are tubular, and the mast may readily be made Simple and inexpensive means are provided for driving the machine, and there is an independent driving me-
chanism for each carriage, the mechanism of one carchanism for each carriage, the mechanism of one car-
riage, although stopped or no matter how worked. not interfe
whole.
(Jatch Basin.-Martin J. Nelles, Chi cago, ill. This is a cylindrical basin, made in sections or row having a continuous top sroove and a continuous bottom tenon, and the adjacent edges having ribs and grooves forming socket joints. The basin is indestructi-
ble by sewer gas or acid, takes but little mortar or ce ment, and may be built with less labor than the ordinary readily replaced by another, the several plates being of like size and form, so that any one may be used in any
tier.

Fountain Spittoon.-John C. Blair, Louisville, Ky. For attachment to dentists' chairs or in which a concave disk is arranged as a false bottom, a waste conduit extending down from a central aperture that separates the disk from the bowl proper. An upward
Water Closet.-Miguel Morell, Sana Barbara, Cal. The casing of this closet is provided with connected flush and discharge pipes, and an interior case or pan containing a central receiving basin fits in its action, and the parts are so constructed that they may be readily taken out for examination and cleaning.
Dfisign for Shade Roller TiP.William B. Shaw, Brooklyn, N. Y. This tip is in the form of a thin metal ferrule, having a longitudinal deflange near its outer end.
Note.-Copies of any of the above patents will be send name of the patentee, title of invention, and date of this paper.

NEW BOOKS AND PUBLICATIONS Coil and Current, or the Triumphs and W. Stepney Rawson. London
Ward, Lock \& Company, Limited.
1896. Pp. 294. Price $\$ 1.25$. 1896. Pp. 294. Price $\$ 1.25$.

Mr. Frith is known already as an author in the fild of
popular science. This book is of the same type, and the popular science. This book is of the same type, and the and electrical engineering in popular form. It is liberally illustrated and its interest is increased by the fact of the subject being treated from the Coninental as well as
English standpoint. It gives a specially good account English standpoint. It gives a specially good account
of what is being done abroad in electrical engineering, we being too apt to forget that there are wonderfully active developments in electrical engineering in constant progress on the other side of the Atlantic Ocean. The book, we feel, deserves warm commendation. On page
241 we notice the reproduction of a Scientific Ameri241 we notice the reproduction of a Scientific American cut of a simple form of microphone due to Mr.
George M. Hopkins. The author, however, omits the proper credit either to the originator of the very simple and satisfactory form of microphone or to the journal first publishing it.
Principles of Mechanism. A Treatise on the Modification of Motion, by
Means of the Elementary CombinaMeans of the Elementary Combina-
tions of Mechanism, or of the Parts
of Machines. For. use in college classes, by mechanical engineers, etc.
By Stillman W. Robinson. First edition. first thousand. New York
John Wiley \& Sons. London : Chap man \& Hall, Lim
In this volume we have at last something which has long been dne the inventor-a thoroughly scientific treatise on mechanical movements. They are treated
from the standpoint at once of theory and practice, and the work embodies the substance of lectures given by the author during the past twenty-seven years. As the work is largely addressed to those more conversant with the
drawing board than with mathematics, an effort has drawing board than with mathematics, an effort has
been made to treat the subjects from the standpoint of graphics rather than of pure analysis, which feature will popularize the work. The illustrations may be divided into two classes; diagrams, mechanical drawings of mechanisms, and, most interesting of all, process re-
productions of actual models. We feel that we shall be productions of actual models. We feel that we shall be
true prophets in bespeaking a large and long continued true prophets in bespeaking a large and long continued

sale of this work among those interested in practical | $\begin{array}{l}\text { sale of this } \\ \text { mechanics. }\end{array}$ |
| :--- |

Chemistrif for Engineers and Manu FACTURERS. A practical text book.
By Bertraw Blount and A. G.
Bloxam. With illustrations. 1896 .
Volume III. Chemistry of ManufacVolume III. Chemistry of Manufac-
turing Processes. London: Charles
Limited. Pp. Griffin \& Compa
484. Price $\$ 4.50$.
The title page tells the story of this work. By authorship alone its character is guaranteed. The range of
subjects treated within its less than 500 pages is ver subjects treated within its less than 500 pages is very
great, and the distribution of the subjects is so wide, the authors seeming not to be blased in one or the other branch of manufacture. that it really seems a most satis factory production. We notice in the chemical equations,
however, a certain amount of carelesseness which shows itself in the indiscriminate use of subscript and full size multipliers of elements; but this criticism is a very minor one and we warmly commend the work to our readers. An unusually good table of contents. a short bibliography, and a really model index of over forty pages, with the numerous illustrations, and graphic, bond and plain formulx, add no little to the value of the work. A sin
gle title may be cited to illustrate its thoroughness Under gle title may be cited to illustrate its thoroughness. Under
oils, resins and varnishes, the suject of birdlime is awarded a paragraph, giving its chemical composition.
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send. Price $\$ 1$.
This work presents a system of thought and the comwhich any subject can be printed. This system involves which any subject can be printed. This system involves
the idea of treating any topic from the standpoint of its causes and sources, its essentials, associations, incidents,
and effects. What it illustrates and the conclusions it and effects. What it illustrates and the conclusions it leads to are included in seven headings termed by the author "questioners." It reminds one of the divisions of a speech, the exordium, narration, proposition, argu-
ment, and peroration. There is no question that much ment, and peroration. There is no question that much
is to be gained by adhering to such formule, and the wherewithal system will do much to assist in tbe presentation of any subject to the mind of an investigator or to tation of any
his auditors.

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The charge for insertion under this head is one Doular a The charge for insertion under this head is One Dollar a
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The Garvin Mach Co., Spring \& Varick Sts., New York Concrete Houses - cheaper than brick, superior to
stone. "Ransome," 757 Monadnock Block, Chicago. Machinery manufacturers, attention! Concrete an mortar mixing mills. Exclusive rights for sale. "Ran The celebrated "Hornsby-Akroyd" Patent Safety Oi Engine is built by the De La Vergne Refrigerating MaThe best book for electricians and beginners in elec tricity is " Experimental Science," by Geo. M. Hopkin RT- Send for new and complete catalogue of Scientifl New York. Free on application.

## 

HINTS TO CORRESPONDENTS.
Names and Addiens must accompany all letters
or no attention will be paid thereto. This is for ou Befrerencen to former articles or answers shoul
 oe repeated: correspondents will bear in mind tha though we endeavor to reply to all either by lette
or in this department. cacs must take his turn.
or ers wishing to purchase any article not
Buers wishing to purchase any article not advertised
in our column will be furnished with addresses of
housin
 personal rather than general interest cannot be
expected without remuneration.
cientitic. Ancrician sulpploments referred
to may be had at the office. Prree 10 cents each.

| price. |
| :---: |
| $\begin{array}{c}\text { pinerals sent for ex examination should be distinctly } \\ \text { marked or labeled. }\end{array}$ |

(7103) A. D. asks if the Edison dynamo equire larger wire in armature than in field magnets. A. han that used on the field. The relative resistance of feld and armature varies with the relative sizes of wir and is fixed by such considerations
series, shunt, or compound winding
(7104) J. H. W. writes : Suppose a ther mometer to be frozen or embedded in a cake of ice, sur will it record under these circumstances, and to what ex ent wilit subsequently be affected by exterior change f temperature? Should the temperature fall say to 15 rate will I empease thould show show an approx Fah. so long as any ice covered it. A. The ice will act a protective covering and the thermometer will be but owly affected by the temperature of the surroundin air. If time enough is given, the thermometer will as me such temperature if below $32^{\circ}$ Fah. It will not rise bove $32^{\circ}$ Fah. until the ice has melted away from it nd the bulb is exposed all or in part to the air. A ther below $32^{\circ}$ Fah.
(7105) L. D. asks : 1. How many miniaretery 36 ampere what size can be run with a storage eres? A. The voltage is too low for a regular type lamp; the eight watts of your battery should give about ne candle power. 2. What is the largest size motor that can be used with this battery ? A. A small toy motor he simple electric motor, SUPPLEMENT, No. 641, is to arge.

## TO INVENTORS

An experience of nearly fifty years, and the prepara-
tion of more than one hundred thousand applications
Cor patentsat home and abmad enable or patentsat home nand abroad, enable us to understand




INDEX OF INVENTIONS

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 United States were GrantedJANUARY 26, 1897,
AND EACH BEARING THAT DATE
[See note at end of list about copies of these patents.]










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tions for skin diseases, including, Zomela
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