The Removal of the President.

The successful removal of President Garfield from Washington to Elberon, on the New Jersey coast near Long Branch, a distance of 240 miles, on the morning of September 6, afforded a striking illustration of the perfection of modern means of transit. The vitality of the wounded patient had sunk so low that it was morally certain that he could not survive for many days the heat and bad air of the Capital. As a last resort it was decided to remove him. The railway companies were notified, and in a few hours the necessary arrangements were made, including the construction of about a mile of railway from the Elberon Station to the cottage the President was to occupy.

Mr. Garfield was borne on a stretcher from the White House to a wagon, and slowly drawn to the railway station, where he was as carefully transferred to a car expressly fitted up for the occasion. The seven hours' journey by way of Baltimore, Wilmington, Philadelphia, and Trenton to the sea was admirably endured, a speed of a mile a minute being maintained at times without greatly discommoding the patient.

Opening of the Mechanics' Fair in Boston.

The second of the great exhibitions which Boston is having this fall was opened with due "pomp and ceremony," September 13, the Governor of the State, the Mayor of the city, and numerous other officials participating, with the military in the exercises. The attendance was large, so that the great building in which the fair is held was comfortably filled, and this, too, without lessening the crowds which all day flocked to the other exhibition, which had been about four weeks in progress. The fact that two such great shows are so well attended at the same time in a city no larger than Boston, and but moderately populous suburbs, not only speaks well for the management of these exhibitions, but tells of the active interest which nearly everybody in New England feels in manufactures and the mechanic arts.

The building in which this exhibition is held is an ornament to the city, and is so well fitted for the purposes for which it was designed as to reflect great credit upon the managers of the Massachusetts Charitable Mechanic Association. It is triangular in ground plan, having a frontage of 600 feet on Huntington avenue and 300 feet on West Newton street, a section of the city which has been wholly made by "filling in" the "back bay" on the Charles River, and all of this new portion is being built up with public edifices and private buildings which reflect great credit upon Boston architects.

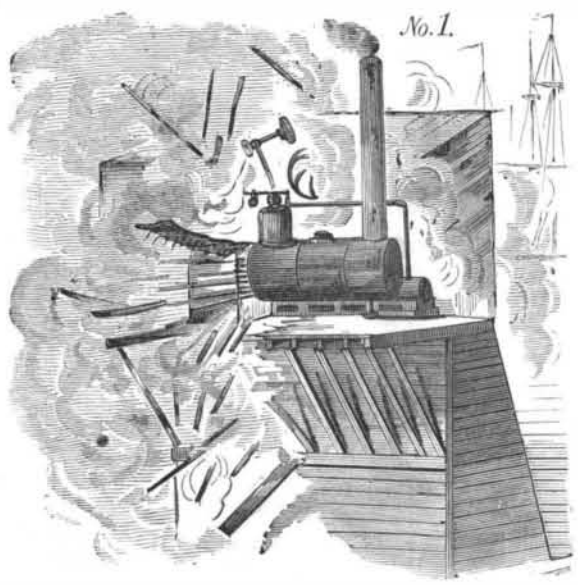
The exhibition building is in the Renaissance style, with free treatment. Distinct lateral lines, except that designating the basement, have been avoided. Arches of graceful curves rise nearly to the coping—giving space within their sweeps for numerous windows, through which the interiors are thoroughly lighted. These arches and the adjacent walls are massively laid in red brick with sills and caps of Longmeadow freestone and terra cotta ornaments. On one side of the main arch is a head of Franklin, on the other that of Oakes Ames, representing respectively electricity and railroading. They are surrounded by spandrels of palm, oak, and olive branches, in which appear the arm and hammer of the association's seal. Around the structure is a wide space of sodded ground, through which is laid a brick sidewalk, and in which are placed numerous gas and electric lights, under whose combined glow the beauties of the front are to be seen almost as plainly by night as they are by day. In the verdant triangle, at the eastern end of the building, a fountain of highly ornamental design is placed. An octagonal tower forms the easterly termination. It is about 40 feet in diameter and 90 feet high, and has in its upper story a lookout, from which a fine view may be obtained. There are two wide entrances into the tower, one directly from Huntington avenue sidewalk, the other through a covered porch and steps twelve feet wide, from the covered carriage porch, built of brick and stone, with hard pine open timbered and tiled roof. In the center of the octagon is the ticket office, and leading from it, and separated by a fence with three turnstiles, is a corridor 20 feet wide, which is the main avenue of approach to the exhibition halls. The administration building, which adjoins the tower, has a basement 15 feet high and three stories above it. At the left of the corridor, which runs through the building from the main entrance to the exhibition hall, is the president's room, a large apartment for the use of the president and directors of the association. Adjoining this is the treasurer's room; then comes a large room fitted with desks for the accommodation of the representatives of the press; and beyond this is the superintendent's office. At the right of the corridor is an elevator running from the basement to the upper stories; adjoining this is the janitor's room, the remainder of the space being occupied by toilet rooms and coat rooms. On the second floor of the administration building is the dining-hall, measuring 34 by 84 feet, and well finished. On the same floor, and separated from it by a corridor corresponding with the one on the main floor, is a private dining room for the managers of the association, the serving room, and ladies' toilet rooms. In the third story is a hall, 46 by 84 feet, which, during the fair, will be used for the military museum. At the close of the fair it will be handsomely finished for the use of the association, and will also be let for concerts, theatricals, lectures, balls, etc., the seating capacity being about seven hundred. It will have an open timbered roof, finished in hard wood, a hard wood floor, suitable for dancing upon, a stage, ladies' and gentlemen's dressing rooms, toilet rooms, committee rooms, etc. Five elevators are conveniently located in different parts of the building, giving ready access to each of the four floors on which the exhibits are arranged, and it is thought that, after the exhibition, and the reservation of the portions which the association will permanently occupy, the other parts may be so let as to cover the interest on a large portion of the money invested in the structure.

BOILER EXPLOSION ON A DRY DOCK.

The steam boiler on Bollman & Brown's floating dry dock, foot of Essex street, Jersey City, opposite New York, exploded with astonishing violence on the morning of September 13. No intelligent engineer who examines, even in a cursory manner, the principal witnesses, namely, the corroded safety valve and the torn crown sheet, will be likely to doubt the cause, while the responsibility may almost as readily be placed.

Capt. L. D. Decker, of the iron tug Gladwish, and James Tammany, a calker, were instantly killed, both being

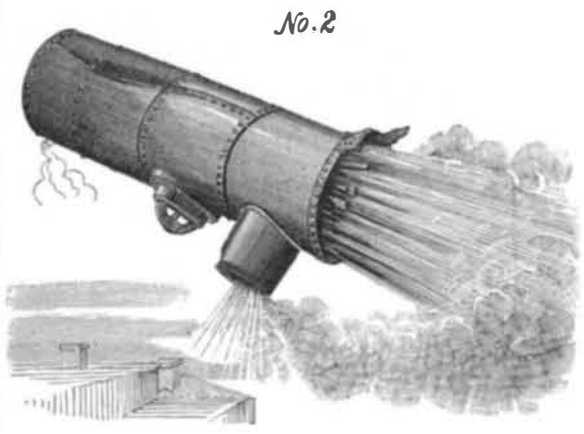
No. 1.



nearly abreast of the boiler and on the tugboat Gladwish, which was on the dock and about to be lowered after having undergone repairs. The names of the deck hands who were injured are John Smith, Alex. McQuinn, Walter Everson, who had temporary charge of the boiler in the absence of the regular attendant, and Victor Lambeck. Three of these persons will doubtless die of their injuries.

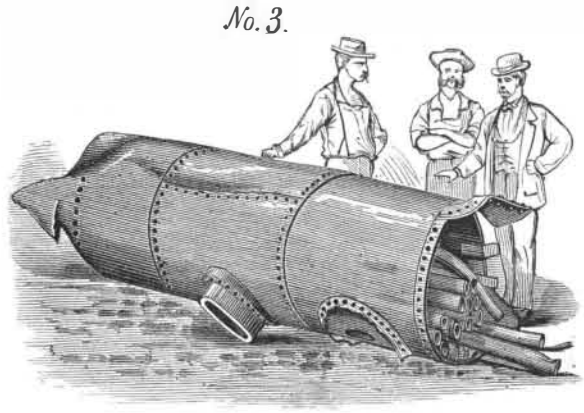
Sketch No. 1 shows how the boiler, which was of the locomotive type, was located on an overhanging platform, built upon the second section of the dock, about 20 to 25 feet,

No. 2



according to the stage of the tide, above the street level. It furnished steam to a 14" x 24" horizontal engine which stood alongside of it, through a 2½ inch wrought iron pipe flanged to the body of the safety valve, as shown in the engraving. The engine and boiler were covered by a shed building having a tinned roof, and they were used in connection with suitable gearing to pump the water from the four pontoon sections that composed the floating dock. The boiler was 16 feet long, including the 4 feet of the fire box

No. 3.



part (see Fig. 1) which was blown to pieces. The original form of this part is shown in dim outline, while the external sheet, with the screw stays attached, is seen spread out in the act of commencing its flight to parts unknown. Up to this time this plate has not been found.

The top and sides of the inner shell of the furnace were flat and formed of a single plate, which was driven down upon the grate bars by the pressure as soon as the overloaded stays gave way by pulling through this plate. It fell upon the dock in the background of Fig. 1, and its condition is shown in Fig. 4. It is five sixteenths of an inch thick; and in another part of the firebox the quality is indicated as Glasgow C H No. 1 flange, tensile strength 50,000. The barrel of the boiler is three eighths, single riveted, and contained 37 tubes 3 inches in diameter and 10 feet long. The boiler itself, well made, is clean inside, and shows no defects indicating long use. It is said to be four years old.

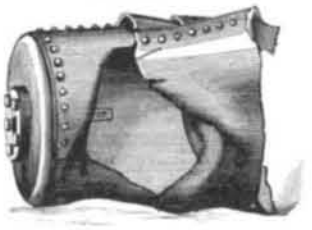
There was no indication of overheating of the plate shown in Fig. 3, which would be the first uncovered portion of the fire

No. 4.

surface in case of low water in the boiler; but there was unmistakable evidence that the so called safety valve was and had been for some time absolutely inoperative. The iron stem of the valve was immovably fixed by corrosion in the iron bonnet of the valve case. This valve, which is of the wing pattern, is 2½ inches diameter, was loaded by lever and weight to blow off at about 60 pounds when in order.

On the morning of the explosion the engine was not running, the temporary attendant was absent, a brisk fire was burning, and there being no outlet for the steam the pressure accumulated till the boiler gave notice by leaking steam through the weaker seams of the fire-box. The young man in charge, on seeing this, was in the act of running to open the furnace door when the explosion took place. The stay bolts pulled through the inner plate, and the flat top of the furnace was forced down upon the furnace grate bars, and the outer shell plate was forced upward, as indicated in the sketch No. 1. The whole furnace part of the boiler was thus separated from the barrel, which, impelled by the issuing contents, flew like a rocket in nearly a direct line of its projected axis, as indicated by sketch No. 2, up Essex street, plainly marking its trajectory upon buildings and signs; it reached the ground after turning about one-fourth of a revolution on its axis, at a distance of about 300 feet, where it encountered and cut down a fire hydrant, leaving the marks of the fluted casting plainly embossed in the iron of the dome, which was crushed and detached from the boiler, as shown in sketch No. 5. At this point in its course it struck the curbstone, and several rivet heads were ground smoothly off as though by contact with a fast running dry grindstone, changing the iron to a blue color by the heat of the friction. Here also it struck two large trees near the ground and the man-hole yoke was broken off. It was diverted by contact with these objects slightly to the left, and thereby prevented from entering a large dwelling house, and continued by a single bound up the middle of the street to a total distance of nearly 750 feet from the starting point—demolishing two wagons, killing a horse, and finally resting upon a two-wheeled truck to which the animal was attached. The explosion was followed by a terrible roar of the expanding water, which so frightened the horses along the street that they ran away; and the people fled terror-stricken into the nearest buildings.

No. 5.



The safety valve was found after the explosion firmly fixed in its seat, in which it is rusted in. The coroner proposes to weigh the force that will be necessary to move the safety valve from its seat, and no doubt there will be many guesses at the pressure that was required to do this work of destruction.

This case is very nearly parallel to one that occurred at the works of the Standard Oil Company, in Centerville, N. J., in 1878, and from the same cause—overpressure from a defective safety valve. Some of the parts of that boiler, which was also of the locomotive type, flew a distance of 1,200 feet. The boiler was broken into twelve principal fragments, and scattered over several acres of open ground.

The lesson taught by these disasters is obvious and should be learned by every steam user. It is that no steam boiler is safe without an efficient and well kept safety valve.

The worn-out theory of low water as a common cause of boiler explosions must soon give way to the more common causes—defective safety valves and weak boilers. It has become a trite remark among engineers that the most stupid boiler attendant knows enough to keep plenty of water in his boiler, while, on the other hand, many well-informed engineers are too careless about their safety valves, and seem to think if once well fitted and properly proportioned it will remain a safety valve without trouble and care. There is now more than one observer of boiler explosions that believes that the Eleventh street explosion in New York City arose from leaving the fastening upon the valve after the annual hydrostatic test, simply forgotten by the person who placed it there.

Strong Magnets.

For some time past M. Trouve, the eminent Parisian instrument maker, has been engaged in discovering the best mode of making powerful magnets of identical strength. For this purpose he has investigated the best kinds of steel, the most suitable degree of temper, and the most practical and simple method of magnetization. In testing the different kinds of steel, he cut the pieces of the same dimensions and magnetized them, then measured their portative force. They were afterward tempered and magnetized anew. The portative force after this second magnetization has led M. Trouvé to the conclusion that the best French steel for making bar magnets is that of Allevard, as already known. He also finds that the portative forces, as determined after the two magnetizations, are connected by a simple law, which can be expressed by saying that they are to each other in the ratio of $n : n^2$, that is to say, if the portative force of the first magnetization is represented by 2, 3, and 4, that due to the final or saturated magnetization is represented by 4, 9, 16. As regards the temper of the steel, M. Trouvé finds that a regular temper is necessary, and to insure this condition he employs a muffle furnace heated by gas to a constant temperature. The actual magnetization of the bars is performed by placing them in two solenoids in juxtaposition, and closing the magnetic circuit by means of two plates of soft iron. The solenoids are then electrified by means of the current from six Wollaston elements. By proceeding in this manner M. Trouvé succeeds in preparing bar magnets which will sustain from twelve to fourteen times their own weight, and if they are bent into the horseshoe form the portative force is quadrupled, that is to say, it becomes from forty-eight to fifty-six times the weight of the magnet.

Absorption of Oxygen in Coal Mines.

The Belgian Academy of Sciences has received a report on the researches made by M. Fabre, regarding the diseases to which coal miners are especially liable. He finds that, as coal absorbs rapidly up to one hundred times its own value of oxygen, the air which the miners have to breathe is deprived of oxygen to a hurtful degree; the atmosphere of a mine is also further vitiated by the gaseous carbon compounds given off by the slow combustion of the coal. M. Fabre concludes that a supply of air is more essential than that of light, and even the best ventilated mines require better ventilation.

A Suspended Aqueduct.

A cheap suspension aqueduct was invented and used by some miners in California in 1852. A river ran between two bluffs, one of which was considerably higher than the other. Water was available on the one, but it did not "pan out" as well as that upon the lower. Some sailors, including the mate of a whaler, took up a claim, and succeeded in making a hose of strong duck, about eight inches in diameter, and stretching it from the higher to the lower hill, by means of a strong rope running through it. Water was then carried through this weak hose, which could not have resisted the pressure if lowered into the valley, and the ingenious sailors realized handsome fortunes out of the land that had been hitherto worthless.

AN EASILY MADE CHAIR.

We give an engraving of a very cheap yet strong and comfortable chair which may be made as elegant as the tastes of the maker may dictate. The chair, as will be seen by reference to Fig. 1, consists merely of a barrel cut off above the second hoop so as to form a complete back with half arms at the side. The barrel thus cut is mounted on two strips of wood, having casters under their ends, and brackets above to form the legs and to add to the appearance of the chair. A head is fitted to the circular portion, and the whole is neatly upholstered, as shown in Fig. 2.

Of course it is necessary to select a good barrel bound with iron hoops, and a little care should be taken in the upholstering to disguise the barrel form as much as possible.

A Strong and Handy Cement.

One of the strongest cements, and very readily made, is obtained when equal quantities of gutta percha and shellac are melted together and well stirred. This is best done in an iron capsule placed on a sand bath, and heated either over a gas furnace or on the top of a stove. It is a combination possessing both hardness and toughness, qualities that make it particularly desirable in mending crockery.

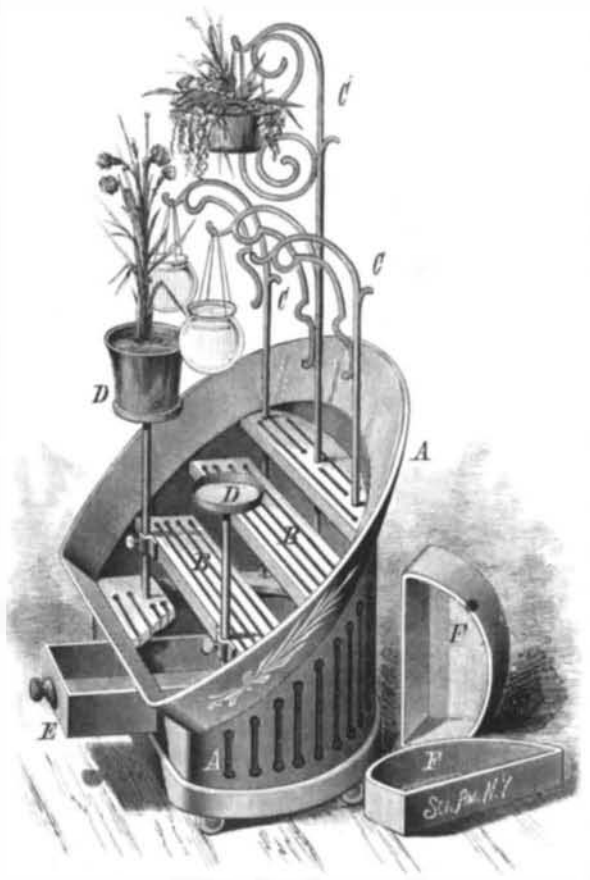
When this cement is used the articles to be mended should be warmed to about the melting point of the mixture, and then retained in proper position until cool, when they are ready for use.

Whooping Cough.

On an extended trial the author, Dr. Gaspar Griswold, of this city, finds *carbolic acid in whooping cough*, in doses of one-fourth minim to a child of six months, one-half minim for one of a year, and one minim for one of two years and upward, to be the best remedy. "The whoop goes; the vomiting ceases; the paroxysms are modified in intensity and frequency." This result he believes to "arise from a similar action to that of creosote on the motor fibers of the vagus to the stomach, and from a lowering of the vitality of the specific germ of whooping cough disease."

IMPROVED FLOWER STAND.

The engraving shows an improved ornamental flower stand lately patented by Mr. William D. McCallum, of Truro, N. S. The stand, as will be seen by the engraving, is intended not only for the support of flower pots and vases, but for hanging baskets, fish globes, etc. When properly filled it makes an elegant window garden, holding a great number of plants, while the ornamental brackets support the fish globes and hanging baskets, and form a trellis for the vines.



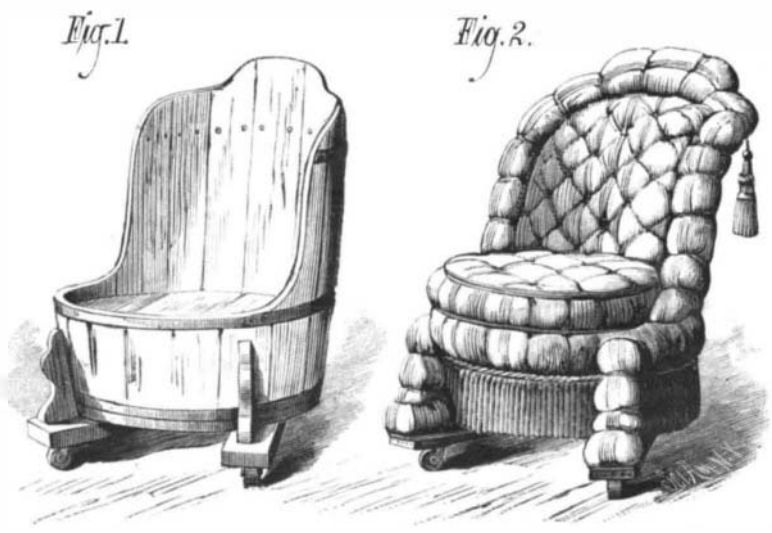
McCALLUM'S FLOWER STAND.

The capacity of the stand is increased by two or more vertical rods, provided with cups at the upper ends for receiving flower pots.

The flaring rim around the stand supports the foliage and prevents water from getting on the floor while sprinkling the plants.

A Naval Experiment with the Electric Light.

The Providence *Journal* gives an account of a trial of the electric light as used to detect the movements of vessels, at night, especially torpedo boats in time of war. The light is placed in a parabolic reflector, which is pivoted to turn in any desired direction and moved by a small electric engine in the horizontal plane of the motion. In this respect it seems to differ from the calcium reflectors that were often displayed on our streets, although hand power may be applied to the new reflector by detaching the small motor. The experiment was directed by Captain Selfridge, of the United States Navy, and with the United States steamship Nina and a small steam launch from the torpedo station of Newport, R. I. The launch was sent to the outer harbor, followed after some time by the Nina, fitted with a light on each side, to seek for her in the darkness. The launch was to play around and approach with muffled ores and hidden lights as near as possible to the Nina without being heard. The little craft was promptly detected at considerable distance as soon as the light swept over her locality, and the experiment was considered a success.



A CHEAP AND COMFORTABLE CHAIR.

RECENT INVENTIONS.

Mr. John K. Harris, of Springfield, Ohio, has recently patented a novel and comparatively simple construction of buttonhole worker, applicable to the ordinary sewing machines, which, for neat and substantial work, bids fair to greatly extend the use of this class of devices. In its general organization it comprises a cloth clamp that holds the cloth and oscillates it under the needle at right angles to the line of feed, first on one side of a center line, and then (after shifting its position at the end) returns on the other side of the center line, which center line is then opened or cut with a knife to disconnect the two lines of stitching and form the buttonhole. The cloth clamp is oscillated by a connection with the needle bar of the machine. The prominent feature of the invention is to be found in causing the lateral oscillation of the cloth clamp to be converted directly into a secondary intermittent progressive feed longitudinally with the buttonhole, by the direct impingement of the cloth clamp against an adjustable stop or resistance that causes the cloth clamp to react and move longitudinally, the length of feed and depth of stitch having always an automatic correlation to each other. This, in connection with the other features of the device, gives a nicety of adjustment and accuracy of work that must be seen to be fully appreciated. Mr. Harris has also patented other constructions aiming at analogous results.

Mr. Rece W. Trude, of Lock Haven, Pa., has patented a cheap, simple, and durable folding drier for drying clothes.

Mr. John J. McLean, of Hillsborough, Ill., has patented an improved folding case or cabinet for holding and preserving court and other papers for use particularly by clerks of courts. It is so constructed that the file papers in different causes on the docket may be conveniently selected from and returned to their respective pigeon-holes, and which will exhibit at all times the absence of papers and by whom taken.

An improved animal trap, patented by Mr. Russell Elliott, of Somerset, Ky., consists in a box divided into three compartments by two partitions, a sliding plate for closing the entrance apertures in the front of the trap, the rock shaft carrying the sliding plate, an oscillating treadle, and chains or cords connecting the treadle and the rock shaft.

An improved wardrobe bedstead has been patented by Mr. Ernest N. Doring, of New York city. This wardrobe bedstead is so constructed that the frames or cases of the bedsteads and the weight boxes can be readily disconnected, when desired, for convenience in moving the bedstead from place to place.

Mr. Fred Terstegen, of Elizabeth, N. J., has patented an eyeglass having the nose-piece or bow-spring jointed in the middle so as to permit the lenses to fold sidewise toward each other, and having the ends of the two sections of the nose-piece or bow-spring extended past the pivot and provided with locking devices for holding them in position for use.

Mr. Charles Oyston, of Little Falls, N. Y., has patented an improvement in syringes. The invention consists of a nozzle with flaring lip, containing several fixed crossbars and adjustable basket-like devices and a tapering screw thimble, by whose adjustment relatively to each other and to the crossbars the fineness of the spray issuing from the nozzle is regulated.

Mr. Albert Back, of New York city, has patented an improved box for packing and exhibiting ruchings, laces, embroideries, and analogous articles. The invention consists in a box provided with a reel pivoted to arms of one of the longitudinal sides of the box, which side is hinged to the bottom of the box so that it will swing outward into a horizontal position, the arms carrying the reel being in a vertical position, and thus permitting the reel to turn freely.

Mr. John M. Cookingham, of Hudson, N. Y., has patented a secure and inexpensive fastening that is durable and will not require openings cut in the inner case. This invention is applicable to hunting and open cases and key and stem winders; and it consists in a locking pendant fitted to slide on a stem and formed to lap over the case.

Mr. Joshua W. Trussell, of Rockland, Me., has patented an improved door securer for fastening doors, drawers, cases, or where locks are ordinarily used, in which a central shaft armed with sharp projections from two opposite sides is inclosed in a rectangular wedge-shaped frame, the shaft being provided with a thumbscrew head in one instance and a lever in the other, for turning it at right angles with the frame.

Mr. Bertram G Seebach, of Peru, Ill., has patented a composition for cleaning and polishing metals, consisting of potash, lime, mineral oil, and the oil of *Elais guiniensis*.

The American Institute Fair.

The annual exhibition of the American Institute Fair began September 15. As this is the fiftieth exhibition of the Institute special efforts have been made to celebrate its semi-centennial becomingly. The applications for space are said to have been larger than ever before, and the exhibition promises to be the finest ever held. But the exhibitors are, as usual, sadly behind in their preparations, and the exhibition opens in the customary state of unreadiness.