New Theory of the Resistances of Ships and other Moving Bodies in Water.

The following is an abstract of the address of Mr. W. Froude, C.E., F.R.S., as president of section G (Mechanical Science), British Association:

"I propose," he said, "to treat of certain of the fundamental principles which govern the behavior of fluid, and this with special reference to the resistance of ships. By the term "resistance" I mean the opposing force which a ship experiences in its progress through the water. Considering the immense aggregate amount of power expended in the propulsion of ships, or, in other words, in overcoming the resistance of ships, I trust you will look favorably on an attempt to elucidate the causes of this resistance. It is true that improved results in shipbuilding have been obtained through accumulated experience; but it unfortunately happens that many of the theories, by which this experience is commonly interpreted, are interwoven with fundamental fallacies, which, passing for principles, lead to mischievous results when again applied beyond the limits of actual experience. The resistance experienced by ships is but a branch of the general question of the forces which act on a body moving through a fluid, and has within a comparatively recent period been placed in an entirely new light by what is commonly called the theory of stream lines. The theory as a whole involves mathematics of the highest order, reaching alike beyond my ken and my purpose; but I believe that, so far it concerns the resistance of ships, it can be sufficiently understood without the help of technical mathematics; and I will endeavor to explain the course which I have myself found most conducive to its easy apprehension. It is convenient to consider first the case of a completely submerged body moving in a straight line with uniform speed through an unlimited ocean of fluid. A fish in deep water, a submarine motive torpedo, a sounding lead while descending through water, if moving at uniform speed, are all examples of the case I am dealing with. It is a common but erroneous belief that a body thus moving experiences resistance to its onward motion by an increase of pressure on its head end, and a diminution of pressure on its tail end. It is thus supposed that the entire head end of the body has to keep exerting pressure to drive the fluid out of the way, to force a passage for the body, and that the entire tail end has to keep on exerting a kind of suction on the fluid to induce it to close in again--that there is, in fact, what is termed *plus* pressure throughout the head end of the body and *minus* pressure or partial vacuum throughout the tail end. This is not so: the resistance to the progress of the body is not due to these causes. The theory of stream lines discloses to us the startling but true proposition that a submerged body, if moving at a uniform speed through a perfect fluid, would encounter no resistance whatever. By a perfect fluid I mean a fluid which is free from viscosity, or quasi-solidity, and in which no friction is caused by the sliding of the particles of the fluid past one another, or past the surface of the body. The property which I describe as 'quasi-solidity' must not be confused with that which persons have in their minds when they use the term 'solid water.' When people in this sense speak of water as being 'solid,' they refer to the sensation of solidity experienced on striking the water surface with the hand, or to the reaction encountered by an oar blade or propeller. What I mean by 'quasi-solidity' is the sort of stiffness which is conspicuous in tar or liquid mud; and this property undoubtedly exists in water, though in a very small degree. But the sensation of solid reaction which is encountered by the hand or the oar blade is not in any way due to this property, but to the inertia of the water. It is in effect this inertia which is erroneously termed solidity; and this inertia is possessed by the perfect fluid, with which we are going to deal, as fully as by water. Nevertheless it is true, as I am presently going to show you, that the perfect fluid would offer no resistance to a submerged body moving through it at a steady speed.

It will be seen that the apparent contradiction in terms which I have just advanced is cleared up by the circumstance that in the one case we are dealing with steady motion, and in the other case with the initiation of motion. In the case of a completely submerged body in the midst of an ocean of perfect fluid, unlimited in every direction, I need hardly argue that it is immaterial whether we consider the body as moving uniformly through the ocean of fluid, or the ocean of fluid as moving uniformly past the body. The proposition that the motion of a body through a perfect fluid is unresisted, or, what is the same thing, that the motion of a of a perfect fluid past a body has no tendency to push it in the direction in which the fluid is flowing, is a novel one to many persons; and to such it must seem extremely startling. It arises from a general principle of fluid motion, which I shall presently put before you in detail—namely, that to cause a perfect fluid to change its condition of flow in any manner whatever, and ultimately to return to its original condition of flow, does not require, nay does not admit of, the expenditure of any power, whether the fluid be caused to flow in a curved path, as it must do in order to get round a stationary body which stands in its way, or to flow with altered speed as it must do in order to get through the local construction of a channel which the presence of the stationary body practically creates. Power, it may indeed be said, is first expended, and force exerted to communicate certain motions to the fluid; but that same power will ultimately be given back, and the force counterbalanced, when the fluid yields up the motion which has been communicated to it, and returns to its original condition." He illustrated this portion of his address with several interesting experiments, in one of which he was assisted by Sir William Thomson, showing that, if a chain be set rotating at a very high velocity over a pulley, the centrifugal forces did not tend to disturb the path of the running chain, and that a stream of fluid in a tortuous flexible pipe would behave in a strictly antagonistic manner. He also introduced an experiment to show that, in a pipe of varying diameter, the pressure of a running stream is greater in the wider part. He then pointed out that the causes of resistance to the motion of a ship through the water are: First, surface friction; secondly, mutual friction of the particles of water (and this is only practically felt when there are features sufficiently abrupt to cause eddies); and thirdly, wave genesis; and that these are the only causes of resistance. He also showed that a ship at the surface experiences no resistance in addition to that due to surface friction and the action of eddies, except that due to the waves she makes.

He then said: "I have done my best to make this clear; but there is an idea that there exists a form of resistance, a something expressed by the term 'direct head resistance', which is independent of the abovementioned causes. This idea is so largely prevalent, of such long standing, and at first sight so plausible, that I am anxious not to leave any misunderstanding on that point. The notion of head resistance, in the ordinary sense of the word, or the notion of any opposing force due to the inertia of the water on the area of the ship's way, a force acted upon and measured by the area of midship section, is, from beginning to end, an entire delusion. No such force acts at all, or can act. No doubt, if two ships are of precisely similar design, the area of midship section may be used as a measure of the resistance, because it is a measure of the size of the ship; and if the ships were similar in every respect, so also would the length of the bowsprit, or the hight of the mast, be a measure of resistance, and for just the same reason. But it is an utter mistake to suppose that any part of a ship's resistance is a direct effect of the inertia of the water which has to be displaced from the area of the ship's way. Indirectly the inertia causes resistance to a ship at the surface, because the pressure due to it makes waves. But to a submerged body, or to the submerged portion of a ship traveling beneath rigid ice, no resistance whatever will be caused by the inertia of the water which is pushed aside. And this means that, if we compare two such submerged bodies, or two such submerged portions of ships traveling beneath the ice, as long as they are both of sufficiently easy shape not to cause eddies, the one which will make the least resistance is the one which has the least skin surface, though it has twice or thrice the area of midship section of the other. The resistance of a ship, then, practically consists of three items—namely, surface friction, eddy resistance, and wave resistance. Of these the first named is, at least in the case of large ships, much the largest item. In the Grayhound, a bluff ship of 1,100 tuns, only 170 feet long, and having a thick stem and sternposts, thus making considerable eddy resistance, and at 10 knots visibly making large waves, the surface friction was 58 per cent of the whole resistance at the speed; and there can be no doubt that, with the long iron ships now built, it must be a far greater proportion than that. Moreover, the Grayhound was a coppered ship; and most of the work of our iron ships has to be done when they are rather foul, which necessarily increases the surface friction item. The second item of resistance—namely, the formation of eddies—is, I believe, imperceptible to ships as finely formed as most modern iron steamships. Thick square shaped stems and sternposts are the most fruitful source of this kind of resistance. The third item is wave resistance. On this point, the stream line theory rather suggests tendencies than supplies quantitative results, because, though it indicates the nature of the forces in which the waves originate, the laws of such wave combinations are so very intricate that they do not enable us to predict what waves will actually be formed under any given condition. In order to reduce wave resistance, we should make the ships very long. On the other hand, to reduce the surface friction we should make her comparatively short, so as to diminish the surface of wetted skin. Thus, as commonly happens in such problems, we are endeavoring to reconcile conflicting methods of improvements; and to work out the problem in any given case, we require to know actual quantities.

We have sufficient general data from which the skin resistance can be determined by simple calculation; but the data for determining wave resistance must be obtained from direct experiments upon different forms to ascertain its value for each form. Such experiments should be directed to determine the wave resistance of all varieties of water line, cross section, and proportion of length, breadth, and depth, so as to give the comparative result for each. An exhaustive series of such experiments could not be tried with full sized ships; but I trust that the experiments I am now carrying out with models for the Admiralty are gradually accumulating the data required on this branch of the subject. I wish, in conclusion, to insist again, with the greatest urgency, on the hopeless futility of any attempt to theorize on goodness of form in ships, except under the strong and entirely new light which the doctrine of stream lines throws on it. It is, I repeat, a simple fact that the whole framework of thought, by which the search for improved forms is commonly directed, consist of ideas which, if the doctrine of stream lines is true, are absolutely delusive and misleading. And real improvements are not seldom attributed to the guidance of those very ideas which I am characterizing as delusive, while in reality they are the fruit of painstaking, but incorrectly rationalized, experience. I am but insisting on views which the highest mathematicians of the day have established irrefutably; and my work has been to appreciate and adopt these views when presented to me. No one is more alive than myself to the plausibility of the unsound views against which I am contending: but it is for the very reason that they are so plausible that it is necessary to protest against them so earnestly; and I hope that, in protesting thus, I shall not be regarded as dogmatic. In truth, it is a process of scepticism, not of dogmatism; for I do not profess to direct any one how to find his way straight to the form of least resistance. For the present we can but feel our way cautiously towards it by careful trials, using only the improved idea which the stream line theory supplies, as safeguards against attributing this or that result to irrelevant or, rather, non-existing causes."

Remarkable Shower of Ice---Perils of Rocky Mountain Railway Traveling.

At Potter station, on the Union Pacific Railroad, recently, a train was just pulling out from the station when a storm commenced, and in ten seconds there was such a fury of hail and wind that the engineer deemed it best to stop the locomotive. The hailstones were simply great chunks of ice, many of them three and four inches in diameter, and of all shapes—squares, cones, cubes, etc. The first stone that struck the train broke a window, and the flying glass severely injured a lady on the face, making a deep cut. Five minutes afterward there was not a whole light of glass on the south side of the train, the whole length of it. The windows in the Pullman cars were of French plate, three eighths of an inch thick, and double. The hail broke both thicknesses, and tore the curtains into shreds. The wooden shutters, too, were smashed, and many of the mirrors were broken. The decklights on the top of the cars were also demolished. The dome of the engine was dented as if it had been pounded with a heavy weight, and the woodwork on the south side of the cars was plowed as if some one had struck it all over with sliding blows from a hammer. During the continuance of this terrific fusillade, which lasted fully twenty minutes, the excitement and fear among the passengers ran very high. Several ladies fainted, and one lady, Mrs. Earle, wife of the superintendent of the Mountain division of the road, went into spasms, from which she did not recover for over an hour after the cessation of the storm. Several persons sitting on the south side of the cars were more or less injured about the head and face.

As soon as the storm abated a little, the matting in the cars was hung up in front of the windows, and the train moved ahead, the drifted hailstones proving an obstacle for some miles. At the next station, strips of tin were procured and fasted over the windows the entire length of thd train. The cars have been run into shop for repairs, ane the damage will amount, it is estimated, to several thousand dollars.—*Denver News.*

DECISIONS OF THE COURTS.

United States Circuit Court.---Northern District of New York.

PATENT PRESS.—GEORGE B. BOOMER AND RUFUS E. BOSCHERT *vs* UNITED POWER PRESS COMPANY *et al.*

Shipman, J.

This is a bill in equity filed February 5, 1874, praying for an account and an injunction, for infringement of letters patent for an improvement in cheese presses, granted to the complainants and to Thomas G. Morse, on November 1, 1870. A reissue was granted to the complainants on January 28, 1873, Morse having previously assigned his interest in the invention to Boomer.

The alleged invention of the patentees consisted in constructing sliding standards, the lower ends of which are attached to the platen, and the upper ends extend through a socket in the head block. When one end of the platen is depressed, these standards tend to incline towards the side of least resistance, and in an opposite direction from that towards which the screw shaft tends to move. In order that these opposing tendencies may be made to counteract each other, a central hub is attached to the screw shaft between the standards; when the standards incline to the side of greatest depression, this central hub or bearing attached to the screw shaft comes in contact with the standard, prevents its further movement, and at the same time, by its pressure upon the standard, prevents the movement of the screw shaft to the side of greatest resistance.

The two styles of machines which the defendants' corporation manufactured and sold, in the city of New York, prior to April 10, 1874, differ only in immaterial details from the press of the complainants.

The defendants contend first that the reissued patent is void because it is not for the same invention as the one which was claimed in the original patent.

But the court held that the claim of the reissued patent embraces, in comprehensive terms, the actual invention, and describes what is claimed to be new, and it was not necessary to mention in that part of the specification that toggle levers and a platen were also used in the press. The only ingredients which entered into the invention for which the original patent was granted are those which are specified in the claim of the reissued patent.

The defendants insist, in the next place, that the complainants' patent is invalid, because the elements which are specified in the claim, as forming in combination the invention, do not of themselves perform or accomplish anything.

But the Court held that the claim is properly confined to the invention, and specifies only the improvement which the parentees invented. The elements of the invention are operative in connection with the mechanism of the press, which is accurately described in the specifications.

The defendants contend, thirdly, that the complainants' patent is void, in view of the previous state of the art, as shown in the presses which are described in the patent of Robert Harding, of September 3, 1842, in the patent of P. G. Gardner, of February 28, 1845, in the patent of Nathan Chapman of January 12, 1858, in the patent of Pickens B. Weaver, of August 21, 1860, and in the French press of P. Samin.

But the court held that no one of these presses contained the combination of sliding standards with the central hub of the complainants' press and no one was constructed upon the principle of keeping the platen level by means of the active resistance which standard and hub make to the tendency of the screw shaft to move towards the side of greater resistance when the platen commences to tilt. The point upon which the defendants most strongly relied in this part of the case was that the sliding standard of the Harding press and the central hub or wheel of the Gardner press could have been combined, and thus the complainants' press could have been constructed without the exercise of invention. This theory is not supported by the facts, and it is manifest that an operative machine could not, prior to the date of the complainants' invention, have been constructed from a combination of the two machines of Gardner and Harding without inventive skill of more than ordinary character.

Let there be a decree for the complainants declaring the infringement, and directing an account of profits and an ascertainment of damages until April 10, 1874, with costs.

[*W. B. Smith* and *A. J. Todd* for complainants.
J. Van Santvoord for defendants.]

Recent American and Foreign Patents.

Improved Screw-Pegging Machine.

A. C. McKnight, Philadelphia, Pa.—This invention consists of several novel devices in a screw-pegging machine, by which the fastening together of sole and upper of boot or shoe may be greatly facilitated. These new features, both separately and in the aggregate, will materially contribute to the cheaper manufacture of boots and shoes, while the pegging is done thoroughly and in a workmanlike manner.

Improved Machine for Stiffening Hats.

Granville B. Fuller, Middletown, N. Y.—The hats are dipped into stiffening in a tank, and are placed upon blocks, to which a rapid rotary motion is then given to throw off the surplus stiffening. The hats are given a heavy or a light stiffening by varying the gravity of the stiffening solution contained in the tank.

Improved Knock-Down Bedstead.

William S. Moses, Lebanon, N.H.—This consists of a method of detachably locking the end boards and standards of the head and foot portions of a bedstead by hooks on the lower end board and screws at the top, by which the parts may be readily separated for packing and be put together without the aid of skilled labor.

Improved Wrench.

Peter Samuel, New York city.—A movable jaw is first adjusted relatively to the stationary jaw, to embrace the nut between them. The effect of pressure applied to the handle is to cause it to advance the movable jaw and clamp the nut tightly. The increase of pressure increases the closeness of such contact, so that abrasion of the nut is impossible. When the handle is turned, a cam will act on an arm, and thus on the movable jaw; and when turned in the opposite direction, another cam acts similarly, so that the wrench may be operated to screw nuts on or off the bolts. A spring moves the jaw away from the side of the nut; at once the action of the handle ceases, so that the wrench may be readily removed from the nut.

Combined Spark Arrester and Stove Register.

Thomas R. Freeman and Perine Y. Jones, Ripon, Wis.—The body of the stove has a register frame, to which is attached a frame in which is formed a groove to receive a plate of wire gauze, by which the escape of any sparks through the openings of the register is wholly prevented. The plate can be readily removed when worn and replaced with a new one, and does not interfere with the operation of the register.

Improved Beer Refrigerator.

John N. Bohart, Denison, Texas.—This consists of a skid for supporting the barrel, an ice box arranged above the latter, and an outer case or cover. It was illustrated and described on page 150, current volume of the SCIENTIFIC AMERICAN.

Improved Brush.

Moritz Leiner, New York city.—This consists of a brush having the twisted wire which secures the bristles fastened over the block of the brush, the invention applying only to brushes which have blocks of wood or metal or other suitable material, and of sections of twisted or braided wire and bristles.

Improved Toy Store.

Elias Durlach, New York city.—This consists in a toy grocery store, made of sheet metal, and provided with the detachable sign and ornament, shelves, drawers, boxes, or canisters, a movable counter, and pivoted detachable chandeliers.

Improved Grain Drill Tooth.

George L. Ives, Galesburg, Mich., assignor to himself and Henry L. Keith, same place.—This is a tooth for grain drill tubes, consisting of a front wedge-shaped furrow opener and shank, and having a rear cavity running through both, and passing out on a rearward curve near the bottom.

Improved Animal Trap.

Ebenezer Oliver, New York city.—The body of the trap is made with an offset, formed by bending back the upper part of the front wire of the frame. A wire is secured to the frame of the body and carries a spring, one end of which is secured to the body, and its other end is secured to the door. The door is provided with upright wires at a little distance from the side wires of its frame. The door is made a little narrower than the opening, and in the space thus left is placed a wire, secured to the bottom and to the front wire of the body of the trap. Rings pass around the side wires of the door frame and around the wires last mentioned. When the trap is sprung, the rings slide down upon the wires and fasten the door securely, so that no effort of the animal can open it.

Improved Car Coupling.

Peter Harper, Marshall, Texas.—The drawbar has an upwardly extending hook part, and a coupling link, which is passed through a slot of the bar, and raised for coupling with the approaching drawbar by a forked lever, operated by an intermediate lever rod connection from the platform. The link is retained, raised by a hook arm of the buffer rod engaging the connecting lever mechanism, and is released by the concussion of the cars, dropping forward over the drawbar of the adjoining car. A fulcrumed lever with forked lower part engages the hook arm of the buffer rod, and admits the direct lowering of the link independently of the buffer rod.

Improved Windmill.

Chesley Gates, Locust Grove, Mo.—A small wind wheel for regulating the speed of the large one is arranged where it is subject to the varying wind, and has a cord attached to its hub and connected to a brake lever, so as to pull it against the wheel with more or less force, according to the action of the wind on it. Its effect is varied by an adjustable weight.

Improved Grain Drill.

John T. Lynam, Louisville, Ky.—Around the bearings for the wheel shaft are formed circular projections, upon which rest the edges of a curved plate, the outer part of which projects outward, is bent upward, and is attached to a cross bar. To the cross bar are attached arms, which control and regulate the equal movement of the circular plate. A cross bar is moved to adjust the plate to regulate the amount of seed dropped. An arm is provided with an index that points to division marks upon the side of the bar to indicate the amount of seed the machine will drop to an acre when the plate is adjusted in any particular position.

Improved Screw-Cutting Die.

George R. Stetson, New Bedford, Mass.—In this improvement the chasers are fitted in sockets of a solid die, tapered so that they are held by a binding screw at one side of each. Two of the chasers are provided with an adjusting screw to set them up toward the others as they become worn away.

Improved Crown Bar for Steam Boilers.

James McPhail, Ellis, Kan.—This invention is an improvement upon that covered by letters patent No. 129,634, and consists in the employment of a detachable lock bar, having lugs on its ends, in connection with a crown bar composed of two parallel parts. The lock bar aids in preserving the parallelism of the bars, and strengthens and braces the same. It also prevents the bolts being thrown out of vertical parallelism with the bars by reason of the warping of the crown sheet.

Improved Wrench.

John H. Morrissey, Indianapolis, Ind.—The invention consists of a wheel wrench having a central socket part, with diametrically extending arms that are securely locked by fastening springs to the hub hand, to be applied to the nut for unscrewing the same, and in reversed position for being stored away without engaging the nut

Improved Picture Nail.

Owen W. Taft, 221 Pearl Street, New York city.—This consists of an ornamental head made of two cups of sheet metal, one being permanently attached, and the other detachable. The cups are ornamented with spiral ribs, which also form screw threads, by which the detachable part is connected to the permanently attached part. The cup, which is permanently attached to the nail, is fastened by filling it around the shank by solder.

Improved Combined Harrow and Cultivator.

William McCray, Black Oak, Mo.—Wings are used upon each side of the central bar. The forward ends of the wings are connected by bars. The rear ends of the wings are connected by bars secured to their upper sides. To and between the rear ends of the bars and the rear braces are secured the outer ends of the two bars, in which several holes are formed to receive the bolts by which they are secured to the plate, so that the wings may be expanded or contracted to make a wider or narrower cut, as may be desired. The wing teeth, which are curved outward and rearward, are made thin upon their forward edge.

Improved Hose Spanner and Key.

Andrew J. Barnard, Camden, N. J.—By this implement, a hose may be quickly and tightly connected to the water pipe, and the stopcock of the same opened. The handle is made of a double curved or S-shaped form. At one end, and csat in one piece therewith, are arranged recessed prongs, which fit in a semicircle around and, by their recessed parts, on the lug of the hose coupling. The coupling is first screwed on by hand, and then drawn tightly by applying the prongs. A key at the other ends of the handle serves to turn the water on or off by being applied to the stopcock of the water pipe. A tapering lug, forming an extension of the key, serves for lifting the lid of the box, so that the hose may be coupled and the water turned on.

Improved Car Wheel Lubricator.

John Woodville, Washington, Ind.—The car wheel has an oil chamber arranged between its spokes or arms. As the wheel revolves, oil will slide down the back wall and turn into the passage; but if more falls than is required, the superfluity falls back, the collar and washer in the hub preventing its escape.

Improved Rotary Engine.

Jacob W. Vanarder and George F. Savage, Utsaladdy, Wash. Ter.—This invention is an improvement in the class of rotary engines whose pistons are caused to reciprocate as they rotate, by means of a fixed cam; and it relates to cutting out the middle portion of the pistons and fitting them together in such a manner that space is economized within the wheel case.

Improved Device for Hanging Pictures, Mirrors, etc.

Harvey D. Pope, Dayton, Ohio.—The object of this invention is to provide a device for adjustably hanging pictures, mirrors, etc., so as to vary them in their inclination to the wall, according to the hights at which they are hung, and the different quarters whence the light proceeds. It consists of a frame to be attached to the wall, to which the picture or mirror is fastened upon both sides by links which are long enough to give the desired adjustment. The lower part of the picture is hinged to a hollow bar which slides inside a hollow pendent bar or case attached at the top to the frame, and provided upon one of its inner sides with ratchet teeth or notches. Inside the inner bar is a rod or wire attached to a spring pawl at the top, and a thumb latch below, by pressing upon which latter the pawl is disengaged from the ratchet teeth and the picture raised or lowered, the links serving to control the different inclinations to the wall.

Improved Dovetailing Machine.

Charles P. Baile, New Windsor, Md.—This invention relates to certain improvements in that class of dovetailing machines in which a revolving cutter is moved against the boards to be cut so as to produce, by a single movement, the reciprocally fitting tenons and mortises. It consists in a vertical cutter revolving in a sliding carriage moving in horizontal guides, the said carriage being actuated by a treadle, cord, and spring, and the guides in which it is contained being supported upon a vertically adjustable bed.

Improved Insole for Boots and Shoes.

Charles F. Hill, Baltimore, Md.—The object of this invention is to increase the flexibility of the soles of boots and shoes, and it consists in cutting in the insole or lasting sole, or both, slits transversely to the same at the bend of the sole.

Patent Heating and Ventilating Stove.

Marius C. C. Church, Parkersburg, W. Va.—This invention relates to certain improvements in heating stoves, and it consists in a detachable fire pot back, having flanged sides that slide vertically into guide ways in the outer casing. It also consists in the particular construction of the smoke flue ascending vertically from the stove and having partition plates attached thereto, in combination with a detachable cover above the heating chamber, so constructed as to leave an annular outlet for the heated air, which, passing up in columns adjacent to said pipe, heats the room better by affording a more perfect convection. This invention is claimed to be a valuable improvement; but our readers can form their own opinions on obtaining further information from the inventor, as above.

Improved Plow.

J. Freeman, Corpus Christi, Texas.—This invention contemplates an improvement in the present mode of securing the share and moldboard of a plow to a skeleton frame, so as to enable a single bolt both to serve as a fastening of the parts and a brace to the whole structure.

Improved Signal Lantern.

George J. Cave, Elizabeth, N. J.—Two glass tubes, made of different colors and of the same diameter, are placed end to end, and are connected together and kept in place upon each other. The lower tube is secured to a base ring, to which is rigidly attached a handle, so that the glasses can be conveniently raised by grasping and raising the said handle. A spring catch receives the base ring when the glass tubes have been raised sufficiently to display the upper tube above the case. Another spring catch receives the base ring when the glass tubes have been raised sufficiently to display the lower tube. By this construction, by operating a handle, the upper or the lower catch may be drawn out, or both catches may be drawn out at the same time. To the base ring are attached three spring rods, which pass up along the sides of the colored glass tubes, and which, when the said glass tubes are fully raised, rest against the upper part of the globe, and prevent the said glass tubes from shaking about. A shade, made in telescopic parts, is secured to the cap of the lantern, and extends downward so far as to cover the upper glass tube when the tubes are fully raised, so as to prevent any light from shining through said upper tube.

Improved Method of Scouring and Polishing Rice.

Philip R. Lachicotte, Waccamaw (Georgetown P. O.), S. C., assignor to P. R. Lachicotte and Sons, of same place.—This is a method of scouring and polishing rice by applying friction surfaces to the previously hulled article commixed with the ash of rice chaff.

Improved Railroad Rail Joint.

Joseph C. Wright, Monocacy Station, Pa.—This invention consists of an inside spring plate for the flange, and an outside spring for the tread of the wheel, to take off the weight of the wheel, or a portion of it, from the ends of the rails, and thus prevent the pounding and hammering due to the springing down of the rails when the wheel passes over the ends. It also consists in the form of the plates, and arrangements for fastening them in position, whereby they are secured without bolts or screws.

Improved Oil Can.

John Askwith, Chicago, Ill.—This is an attachment to the bottom of the can, so contrived that the drip escaping from the nozzle or any leak will be caught and retained while pouring from the nozzle. It also consists of a nozzle for pouring out the drip, so contrived with the attachment that it serves for a handle to use in pouring, and of a nozzle so combined with the drip attachment and the nozzle for pouring out of the can that the drip may be poured out together with the contents of the can or through the same nozzle.

Improved Cultivator Teeth.

John Flynn, Monches, Wis.—The invention consists in the combination of the spring and its wheel with the tooth, having a concavity formed in its rear side contiguous to a lug, through which passes a set screw, whereby the wheel can be adjusted in such manner as to cause the tooth to yield more or less readily, as required in different soils.

Machine for Making Crimping Tacks, Awls, Etc.

Henry A. Williams, West Medway, Mass.—This invention relates to roller die machinery for shaping shoemakers' awls, also crimping tacks; and it consists, first, of notches in the surface of the rollers surrounding the dies, and between the dies, and the cavities outside of the dies, for clearance, the object being to utilize the holding-back tendency of the notches on the metal expelled from the sides in the form of fins, to counteract the longitudinal strain which the metal is subject to by the drawing action of the rollers. Second, the invention consists of feed mechanism, in combination with die rollers contrived to automatically feed a long rod forward between the die rollers, hold it until the dies gripe it, and, after the blank is formed, draw the rod back to the cutters, and then leave it and slide back to take hold for feeding again. Third, it consists of gripers contrived to seize the rod as soon as the dies have performed their office, and hold it while the carrier continues to go back for a new hold, and while the cutters detach the rolled piece; and, fourth it consists of the rollers contrived for shifting laterally along the feed mechanism, and provided with mechanism for so shifting them to utilize one feed for all the different dies of a set of rolls having different sizes or forms for different articles.

Improved Automatic Gate.

William W. McKay, Ossian, Iowa.—This gate is so constructed that it may be readily opened by a person in a vehicle or upon horseback, and again closed after the said vehicle or horse has passed through. The only operation is slightly pushing upon levers before and after passage, which, through the medium of counterpoises, cause the gate to shut into compact form, or to extend.

Improved Hat.

Charles Sinclair, New York city.—The invention consists of a crown plate, which is adjusted on radial supporting wires into higher or lower position, the wire ends being attached in suitable manner to the sweatband of the hat. The head is thereby kept cool and comfortable, as no pressure of the hat is exerted on the forehead or back of the head.

Improved Stamp-Mill Feeder.

John Walker, Sonora, Cal.—This invention relates to an improved feeder for stamp mills, which is operated in combination with the stamp, and so constructed that a uniform and continuous feed of ore is secured. The invention consists of a feeding disk, with stationary hopper, directing gage piece, and discharge apron, the disk being rotated by pulley, rope, and weight connection of its shaft with a pivoted lever and conical collar of the stamp shaft.

Improved Vehicle Top.

Jerome B. Relyea, Hicksville, assignor to himself and Lewis E. Brewster, Bryan, Ohio.—The case of the device is concaved upon its inner side to fit upon the rear bow of a buggy top. In the middle part of the concaved plate is formed a slot to receive the rubber block, the inner edge of which is designed to rest against the bow to which the device is attached. Upon the outer sides of the concaved plate are formed two caps, the inner ends of which form shoulders for the rubber block to rest against, to prevent the said rubber block from falling out.

Improved Cloth Measure Register.

James Brown, Jr., Matteawan, N. Y.—This is an improved machine for attachment to a store counter, to register the number of yards, of cloth or any other flexible material sold by the yard, measured off, so that the clerk can always know exactly how many yards he has measured, and "will not be under the necessity of re-measuring the goods one or more times, should the purchaser persist in talking to him."

Improved Farm Fence.

Andrew Miller, Guntersville, Ala.—This improvement in fence consists of one of the upper boards of the panel extended a little longer than the others, to drop into a slot in the top of the post, while at the lower part the corners drop alongside of stop cleats nailed on the posts. Cleats are on the middle portion, which, at the same time, drop down on the top of a stake on the opposite side to the stop block, which effectually holds the panel upright, and at the same time allows it to be lifted off the posts readily. The posts are driven into the ground, and are not as high as the panels, being small and light.

Improved Champagne Freezer.

Charles H. Ludwig, New York city.—A frame is applied to the cooler in a fixed or detachable manner, as desired. A central vertical rod is revolved in cross bearings at the top part of a frame by gearing operated by a crank handle, the rod being provided at the lower end with a fixed cross piece, to which jaws, that are fitted to the necks of champagne or other bottles, are hinged. A clamp bolt and screw nut connects the hinged jaws, and admits their rigid attachment to the bottle for being revolved by the rod, and thereby quickly acted upon by the ice in the ice receptacle. Any beverage may thus be cooled in a very short time, and the champagne *frappé* be made in quick and convenient manner. Information regarding territorial or shop rights, purchase of machines, etc., may be had by addressing Ludwig and Battin, No. 50 East 26th street, New York city.

Improved Spring Power.

Valentine Moeslein, Waterloo, Ill.—This invention is a contrivance of double but independent springs in a spring power apparatus, so that both work together to drive one and the same train, and each can be wound up independent of the other, whereby one may be wound up when the other is partly run out, and *vice versâ*, making a regular and uniform continuous power.

Improved Folding School-Desk.

David I. Stagg, New York city.—This folding school-desk is so constructed that when the desk board is folded down, its upper edge will not project above the desk back. Bars are arranged to serve both as handles to the leaf and as a brace to the shelf.

Improved Manufacture of Horseshoes.

Alfred B. Seymour, Jersey City, N. J.—This is a process of making horseshoes by rolling steel bars with a V-shaped flange, then notching said flange transversely, and finally bending the blank into horseshoe shape, whereby the calks are brought closer together at the toe.

Improved Chuck.

Edward S. Perot and Harry C. Beitenman, Philadelphia, Pa.—There is a ring under the wheel, having inclines to ride up and down studs in the bottom of the groove for the wheel, and a shank extending out through the shell of the chuck, for turning it. The slot for the shank is inclined, to correspond with the inclines, so that by shifting the stud to one end of the slot, the ring will push the wheel into gear with the pinions; and shifting it the other way, it will allow the wheel to move back out of gear, thereby causing the jaws to work in the manner of a universal chuck. A stop lug locks the ring when raised up the inclines, to hold the wheel in gear by filling the slot out of which the shank projects.

Improved Center Board.

Joseph L. Dickenson, Hempstead, N. Y.—This is an improved method of hanging center boards, which will enable the center board to be shipped and unshipped while the vessel is floating in the water and loaded, and which will prevent leakage around the center board bolt. The center board trunk has a hole bored into but not through its timbers. There is a bolt, shorter than said hole, and a superimposed plug of wood to be driven into the aperture.