

\$5,000,000. The payment to the contractors will be about three quarters in cash, for which the money is now in hand, and the remainder in the debentures of the railway company, guaranteed by the Brazilian Government. The Philadelphia and Reading Coal and Iron Company will receive immediate cash payments on shipment of the materials from the port of Philadelphia.—*Engineering News.*

New Inventions.

A novel Horse Detacher has been patented by Mr. John L. Kellum, of Salem (Maxwell Station P. O.), Tenn., the arrangement of which is such that the animal may be quickly let go, should he become frightened or unmanageable. The device also enables the traces to be conveniently fastened to or loosened from the whiffletree when attaching or detaching the horses.

A new Sun Dial, patented by Mr. Axel W. Anderson, of Bedford, Pa., consists of a ring having circumferential slots, surrounded by a perforated adjustable band, and containing an adjustable dial or scale, formed in an epicycloidal curve. A pencil of light falls upon hour marks engraved on the device, through an aperture in the band. This invention is both curious and ingenious, and as the inventor states it may be made small enough to serve as a charm for a watch chain, it doubtless would be a profitable article to manufacture.

Mrs. Julia Wuerfel, of Sheboygan, Wis., has devised a new Dress Pattern Chart, which is quite simple, and which furnishes a guide for any size or style of cutting. Its use is quickly learned.

A new Photographic Camera, invented by Mr. John C. Moss, of New York city, is adapted for drawings, photographs, etc. It consists mainly in a device for suspending the instrument so that it will not be affected by the jarring or vibration of the building in which it is placed, and also in novel mechanism for focusing and adjusting the camera.

Mr. Joseph G. Densmore, of West Dresden, Me., has invented a Ferry Boat, which is impelled across rivers, etc., by the action of the current. The boat is adjusted at an angle with respect to the crossing rope, so that the current will strike directors at an angle which may be increased or diminished at will.

A novel Thill Coupling has been devised by Mr. David R. Silver, of Sidney, Ohio, which is so constructed as to have little wear, to allow of wear being taken up, and which admits of the thills being readily and quickly attached, or they may be detached by removing one bolt from each coupling.

A Surgical Apparatus, patented by Frank Green, of Columbia, S. C., for preparing bandages, spreads the plaster of Paris simultaneously with the winding of the bandage, so as to save time and material. It consists of a box with guide, tension, and winding devices, used in connection with a hopper for the plaster of Paris, having slides to regulate wide and thickness of plaster to be spread, and to cut off the supply when the bandage is nearly covered. The box has also a tank to apply soluble glass to a bandage. It is valuable to surgeons.

A new method of Attaching Shanks to Door Knobs, patented by A. E. Young, of Boston, Mass., consists in pouring into the hollow knob a quantity of melted cement, sufficient to partly fill it, inserting the shank or socket, and inverting it to permit the cement to settle around it.

In a Rein Holder patented by Gregory Jennings, of West Cairo, O., a slotted tube is provided with a hook and spiral spring. The rod is fitted with a screw and crosshead, which fits between the arms of the hook. It holds the reins firmly and prevents their falling to the ground.

In a Bicycle, patented by John Smith and E. T. Thurston, of Rockville Center, N. Y., the driving wheel is provided at the axle with end pinions, which are operated by internally geared wheels loosely pivoted on each side and provided with treadles. It has the merit of simplicity.

G. Keilicks, of Chapin, Ill., has invented a Door Securer. At one end of a slotted bar is a chisel-shaped point at right angles, which fits into the jamb of the door. A thumb screw is fitted to the other end, which works through brackets. It is of use to travelers.

An improved Brush has been patented by B. R. Hill, of Pompton, N. J. After boring the usual holes in the wood, a suitable tool is introduced into them, and interior tapering holes are made larger than the outer hole. The brush is driven in with a small wedge, which expands in the large hole within and firmly holds the bristles.

In a Smoke Ventilator, invented by C. K. Edwards, of Boston, Mass., the strips and openings being all constructed by sixes, three openings will receive the wind, leaving three for the smoke and foul air to escape through. By an ingenious device the strips and openings are so arranged that the wind cannot blow into the main pipe, but must pass out through the openings on the opposite side, carrying the smoke with it and increasing the upward draft of the flue.

A Tucker, patented by Eliza Ann Vance, of Gallipolis, O., consists of two movable parts, both of which are clamped to the cloth plate of the sewing machine. The upper part is movably attached to the lower by flanges, to regulate the distance apart of the tucks, and edges of arms are turned over each other. It is a useful addition to the sewing machine.

An Oil Well Torpedo has been patented by C. A. McCoy, of Edenburg, Pa. It consists of a cylindro-conical vessel adapted to contain nitro-glycerin, and which is provided externally with annular elastic cushions to prevent premature explosions. Percussion cap plungers are secured to a weight

and suitably guided and arranged to strike upon anvils fixed inside of the vessel. It is an effective instrument.

JOHN WILLIAM DRAPER.

John William Draper was born at St. Helen's, near Liverpool in 1811. From an early age his attention was devoted to chemistry, natural philosophy, and the higher mathematics. After prosecuting his chemical studies for some time at the University of London, he emigrated to the United States and entered the University of Pennsylvania. He took the degree of M.D. there in 1836, with the rare distinction that his thesis was selected for publication by the medical faculty. For a time he was Professor of the Natural Sciences at Hampden, Sidney College, Va., and in 1839 he was called to the chair of chemistry in the University in the City of New York. Among the first studies to which Dr. Draper directed his attention was the chemical action of light. In 1842 he discovered that not only might the Fraunhofer fixed lines in the spectrum be photographed, but that there exists a vast number of others beyond the violet, which up to that time had been unknown. Of these new lines, which more than doubled in number those already known, he published engravings. He also invented the instrument for measuring the chemical force of light, the chlor-hydrogen photometer. His memoir "On the Production of Light by Heat," published in 1847, was an important contribution to spectrum analysis. It gave the means for determining the solid or gaseous condition of the sun, stars, and nebula. He established experimentally that all solid substances, and probably liquids, become incandescent at the same temperature; that the thermometric point at which such substances are red hot is about 977° Fah; and that the spectrum of an incandescent solid is continuous—it contains neither bright nor dark fixed lines.

Dr. Draper was the first person who succeeded in taking portraits of the human face by photography, and was also the first to take photographs of the moon. His memoir on the Distribution of Heat in the Spectrum showed that the predominance of heat in the less refrangible regions is due to the action of the prism, and would not be observed in a normal spectrum, such as is formed by a grating; and that all the rays of light have intrinsically heating power.

He discovered more than forty years ago the facts in regard to capillary attraction, claimed by Mr. Lippman and which lately excited so much attention in Europe.

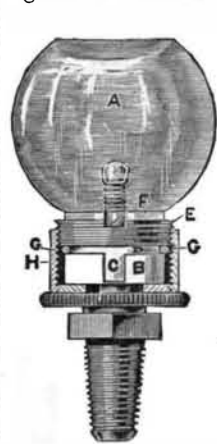
Dr. Draper has published many works on scientific and other subjects, and has made many other important discoveries, too numerous for us to mention here. He stands in the front rank of living scientists. His two sons, Professor J. C. Draper and Professor Henry Draper have also written much and made many important researches, the latter having lately discovered the presence of oxygen in the sun.

The large and elegant likeness we present on our front page was engraved from a recent photograph by the Photo-Engraving Company of 67 Park Place. It shows to what perfection the art of photo-engraving has been brought, and the fineness of the work which it performs. There is no hand work whatever on the block, and yet the lines are deep sharp, and even, and fairly rival the best work of skilled wood engravers. It seems eminently proper that the portrait of one of the first discoverers of photography should thus be beautifully displayed by a further development of his own discovery.

AUTOMATIC SHAFT OILER.

The annexed cut represents a new and simple shaft oiler, by means of which it is claimed that the difficulty experienced in making an air-tight joint between the glass globe and its brass socket, and in regulating the flow of oil, is avoided.

A is a glass globe with grooved neck, B, the end of which is ground smooth to form a tight joint against a cork washer.



A threaded brass ring with a projection, C, to prevent turning, slips over the neck, and is retained by a soft brass ring to the groove above B. The feed is regulated by a hole in slotted screw, D, with air-tight packing, E. The slot in screw is parallel with the hole, and will show the amount of fuel like a cock. A new glass is easily replaced by removing the soft brass ring from the groove, and the feed regulated without removing the cup.

By the use of these cups, waste in oiling machinery is claimed to be avoided, as it is stated that a cupful of oil will keep machinery

well lubricated for many months. For further particulars address F. Lunkenheimer, Cincinnati Brass Works, Cincinnati, Ohio, sole owner and manufacturer.

New Regulation about Boilers.

Supervising and local inspectors of steam vessels are now notified by the Treasury Department Supervising Inspector-General, that some manufacturers of boiler iron are stamping iron of their manufacture at much higher tensile strain than such iron will bear when tested by the Riehle testing machine. In consequence of this practice, injury has resulted to boiler manufacturers, who innocently purchased such iron, and failed to apply the test until after the com-

pletion of the boilers, as recently occurred in two cases in the local districts of New York and Philadelphia.

To prevent a practice so unjust and manifestly dangerous, Inspectors are directed to obtain samples from the plates of all boilers about to be constructed in their districts, and subject them to an actual test before the boilers are begun, and to represent to boiler manufacturers the importance to themselves of this precaution. Whenever the results of such tests fall below the tensile strength stamped on the iron, Inspectors must report such results to the Supervising Inspector-General.

Inspectors are also directed to carefully ascertain that all samples of boiler plates tested by them have the homogeneity and toughness required by Revised Statutes, and to be especially careful in that respect where the plates are stamped above 50,000 lbs. tensile strength.

New Mechanical Inventions.

An improved system of Friction Gearing has been patented by Mr. Daniel H. Merritt, of Marquette, Mich., which consists in making a V-shaped groove between the bases of the ribs or teeth, the angle being more acute than that of the latter. As the teeth travel faster at this periphery than at their bases, they are consequently liable to greater wear at the former portion, but by this construction as they are abraded they maintain their original form.

Mr. Greene Chote, of East Saginaw, Mich., has devised a new Pipe Elbow Seaming Machine. The parts of the elbow are passed through collars, so that the seam is closed directly over the edge of a plate. The rear collar is then drawn down, forming one bend of the seam and holding the inner section. The drawing down of the forward collar closes the seam.

A new Breech-Loading Firearm, patented by Mr. Victor Bory, of New York city, is an improvement on the arm patented by same inventor June 5, 1877. The construction is materially simplified, and new devices for hinging the barrel to the breech-piece, working the extractor, etc., are added.

A new Rock Drill has been patented by Mr. Uriah Cummings, of Buffalo, N. Y. The novelty consists in constructing the clutch head with ratchet teeth on its upper end, in combination with a pawl, which is so arranged on the frame of the machine that the drill rod will receive intermittent rotary movement during its ascending strokes.

Mr. Albert S. Todd, of Pultneyville, N. Y., has invented a very ingenious Mechanical Movement, which may be driven either by hand or foot, and by one or more persons, for actuating machines, propelling boats, and carriages. Several correspondents have asked us for a machine of this kind, and their attention is accordingly directed to Mr. Todd's device.

J. R. Vellacott, of Buffalo, N. Y., has patented a Tension Attachment for Scroll Saws. It consists in the combination, with a suitable frame, of two curved levers, connected by a link of flexible material, and drawn upward by spiral springs attached to stirrups, in which are journaled rollers, that travel on the under surface of the curved levers and equalize the strain upon the saw. It is a good device.

A Hinge patented by Benjamin Fahnstock and H. F. Peckham, of Watsonville, Cal., consists in a reversible or right and left butt hinge, which is constructed with a removable solid eye, having secured to it a washer and also pintles, which are designed to enter double barrel eyes formed on one of the leaves. It is a good hinge.

H. Niles Harrington and Mitchel Stoddard, of Stockbridge, N. Y., have invented an improved Washing Machine. It consists of a permanent suds box with side uprights or standards. Oscillating upon a cross rod at the top is a slightly convex rubber board grooved diagonally on its lower face. A curved lever, suitably attached, serves to press the rubber upon the clothes, which are placed on a series of rollers which are themselves supported on springs, which yield to the varying thickness of material. It will prove a very useful article in the laundry.

George W. Higgins, of Shelbyville, Ind., has invented an improved Saw Frame for Sawing Machines. It is independent of and detachably fastened to the vehicle frame, and can be slid upon the latter, so as to allow the vehicle to turn conveniently among the trees. It can be operated easily by one attendant.

In a Water Meter invented by D. P. Weir, of Salem, Mass., a toggle-jointed spring lever works the valve by the recoil of the spring, which is compressed by the piston of the engine in the forepart of its movement, and escapes after passing the center, and then acts on the valve. It is geared to the valve by a simple and effective device, thus furnishing a reliable meter.

A Cut-off Valve has been patented by Thomas Whittaker, of Passaic, N. J. The top plate of the cylinder has steam ports and induction and eduction channels, and is combined with a balanced side valve with correspondingly tapering cavities, to which longitudinal and transverse motion is imparted for regulating the speed of the engine, so as to secure uniformity of speed. The valve is guided by a transversely reciprocating slide frame connected to the governor. A steam chest is thus dispensed with and a simple slide valve obtained.

An improved Circular Saw patented by C. Y. Wilson, of Macon, Ga., has three teeth in each set, the front one being a base recessed clearer in line with the saw plate, and the other two being cutters vertical on one edge, inclined on the other, and sharpened as well as rounded on the points. It cuts smoothly and quickly.