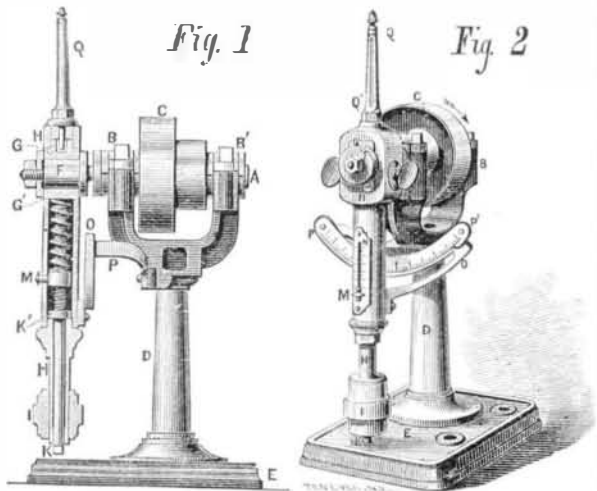


## IMPROVED LUBRICANT-TESTING APPARATUS.

We illustrate herewith Professor R. H. Thurston's machine for testing lubricants, the construction of which is clearly shown in the sectional view, Fig. 2. At F is the journal on which the lubricating material is to be placed for test. This journal is on the overhung extremity of a shaft, A, which is carried in bearings, B B', on a standard, D D', mounted on a base plate, E E'. The shaft is driven by a pulley, C, at any desired speed. Where desirable, a counter may be placed at the rear end of the shaft to indicate the number of revolutions. Usually, the shaft is driven at a fixed speed, corresponding to the velocity of rubbing surfaces approximating that of journals on which it is proposed to use the oil. In the inventor's practice, a standard speed of 750 feet per minute is adopted. The test journal, F, is grasped by bearings of bronze, G G', and with a pressure which is adjusted by the compression of a helical spring, J. This spring is carefully regulated, and the total pressure on the journal and the pressure per square inch are both shown on the index plate, N N', by a pointer, M. Above the journal is a thermometer, Q Q', of which the bulb enters a cavity in the top brass, and which indicates the rise in temperature as wear progresses.



The brasses, thermometer, and spring are carried in a pendulum, H, to which the ball, I, is fitted; and weights are nicely adjusted in such a manner that the maximum friction of a dry but smooth bearing shall just swing it out into the horizontal line. The stem, K K', of the screw, which compresses the spring, projects from the lower end of the pendulum and can be turned by a wrench. A pointer, O, traverses an arc, P P', and indicates the angle assumed by the pendulum at any moment. This angle is very large with great friction, and very small with good lubricating materials. This arc is carefully laid off in such divisions that dividing the reading, by the pressure shown on the index, N N', gives the corresponding co-efficient of friction. The machine can also be arranged to give the friction directly.

In practical use, a standard quantity of oil is placed on the journal. The bearings are slipped on and set up to the proposed pressure; the machine is started at the speed determined upon, and the observer notes the time, speed, pressure, and temperature. These observations are repeated and recorded at regular intervals, and cease when a rapid rise of temperature to an objectionable or dangerous extent indicates that the lubricant has become destroyed.

The machine is made by the mechanical laboratory of the Stevens Institute of Technology, Hoboken, N. J., and by Messrs. Bailey & Co., of Salford, near Manchester, England. It is adapted to the uses of makers of and dealers in lubricating materials, and all classes of consumers of the same. It was patented through the Scientific American Patent Agency.

## The American Railway System.

The total length of the railways in operation in the United States on the 1st day of January, 1877, was seventy-six thousand six hundred and forty miles, being an average of one mile of railway for every six hundred inhabitants. The railways are as follows:

Miles.	Miles.	Miles.
Alabama..... 1,722	Kentucky..... 1,464	Ohio..... 4,680
Alaska..... 0	Louisiana..... 539	Oregon..... 251
Arizona..... 0	Maine..... 987	Pennsylvania..... 5,896
Arkansas..... 787	Maryland..... 1,092	Rhode Island..... 182
California..... 1,854	Massachusetts..... 1,825	South Carolina..... 1,352
Colorado..... 950	Michigan..... 3,437	Tennessee..... 1,638
Connecticut..... 225	Minnesota..... 2,024	Texas..... 2,072
Dakota..... 290	Mississippi..... 1,028	Utah..... 486
Delaware..... 285	Missouri..... 3,016	Vermont..... 810
Florida..... 484	Montana..... 0	Virginia..... 1,648
Georgia..... 2,303	Nebraska..... 1,181	Washington..... 110
Idaho..... 0	Nevada..... 714	West Virginia..... 576
Illinois..... 6,090	New Hampshire..... 942	Wisconsin..... 2,575
Indiana..... 4,072	New Jersey..... 1,594	Wyoming..... 459
Indian Territory..... 281	New Mexico..... 0	
Iowa..... 3,937	New York..... 5,520	
Kansas..... 3,226	North Carolina..... 1,371	
		Total..... 76,640

## A New Fire Detecting and Extinguishing Apparatus for Ships.

Mr. Daniel W. Howes, of East Dennis, Mass., has patented through the Scientific American Patent Agency, November 14, 1876, a novel means both for detecting and extinguishing fires on shipboard, one and the same apparatus serving both purposes. A system of perforated pipes is led through the hold or other portions of the vessel to be protected and connected with a fan blower. The latter communicates with a receptacle for carbonic acid gas. In order to remove hot air or dangerous gases produced in the process of spontaneous combustion, connection between fan and gas recep-

tacle is shut, so that the former acts as an exhaust. If any fire be present in the hold, the smell of smoke in the air withdrawn, will announce the fact. If such is found to be the case, communication with the carbonic acid gas reservoir is opened and the air discharge of the blower closed, so that the latter then forces the gas through the pipes, whence it escapes at the perforations and so extinguishes the fire.

## Recent American and Foreign Patents.

## NEW MECHANICAL AND ENGINEERING INVENTIONS.

## IMPROVED DUMPING DEVICE.

William Willes, Salt Lake City, Utah Terr., assignor to himself and Wm. H. Rowe, of same place.—This invention was illustrated under the name of the "Lightning Dumper" on page 4 current volume. It is an excellent and strongly constructed device for loading and unloading vessels and vehicles with substances that may be dumped without injury; for dumping mortar and rubble in building concrete walls, and for other similar uses.

## IMPROVED RETORT FURNACE FOR STEAM BOILERS.

George K. Stevenson, Valparaiso, Chili.—This inventor proposes a new furnace for burning coal dust, which is made in the shape of a retort, of firebrick, open at both ends, and provided with radial or inclined discharge channels at the upper parts. This is placed in position on the supporting walls, and is partly charged with a quantity of wood and coal, and lighted. The apparatus by which the powdered fuel is introduced is then placed in position and the fuel fed to the furnace, after the coarse fuel is thoroughly ignited by the blast from a blower used in connection therewith. The powdered fuel is then continually introduced, care being taken to remove the ashes from beyond the mouth or inner end of the retort, which can be done in a few minutes. The apparatus may be detached and replaced, and the operation proceeded with, without a great decrease of temperature, as the firebrick retort retains some of the heat from previous firing. The fuel is said to be completely consumed by the addition of air injected with the same into the retort, and thereby a high and uniform degree of temperature be kept up, while the fire may be instantly interrupted without the loss of large quantities of fuel, and also be started again with great rapidity, so as to facilitate the getting up of steam in boilers.

## IMPROVED FORCE PUMP.

Chas. Houston McKeehan, Texarkana, Ark.—The pump consists of four vertically-acting plungers, operated in pairs, alternately, by slotted reversely-vibrated levers. The plungers force the water out of a valved receiving or suction chamber into another, whence it passes into the exit pipe.

## IMPROVED ORE-ROASTING FURNACE.

William K. Aldersley, Colusa, assignor to Abbott Quicksilver Mining Company, Colusa, Cal.—A useful invention for the reduction of quicksilver ore, devised by an inventor well acquainted with the practical necessities of the industry. The forming of adobes of fine dirt is dispensed with, and the ore reduced by the application of heat, both to the top and bottom of the ore, during its gradual passage through the furnace. The latter is provided with double fireplaces, and a double inclined roasting sole, along which the ore is fed from a feed hopper, with adjustable check, to the slag pit. A longitudinal partition divides the furnace into two sections, through which the fire is drawn, passing over the top of the ore, while a heating chamber below the furnace floor heats up the ore from below. We are informed that the furnace has in practical use proved economical both in time and in fuel.

## IMPROVED BOAT-LAUNCHING APPARATUS.

James Strachan, Goderich, Ontario, Canada.—In this device the boat davits are attached not directly to the ship out to horizontal portions which by rollers and guides traverse thwartship ways. They are connected and secured laterally by diagonal braces. They may be moved bodily inboard, so that passengers can easily step into the boat from the deck. The davits are moved outboard and the boat is lowered in the usual way.

## IMPROVED TALLOW CUP.

Devore Parmer, Fort Madison, Iowa, assignor to Hugh McConn, of same place.—An excellent invention which will doubtless prove of great convenience to millers. The cup in which the tallow is placed also receives the spindle. When the latter becomes heated the tallow of course melts and runs down into the bush. Friction is thus relieved, the spindle cools and the melting ceases, and this operation is repeated as often as the heating occurs. The action is therefore entirely automatic. The cup is applicable to vertical shafts of various descriptions, and is effective in preventing heating and the accumulation of dust.

## IMPROVED WINDMILL.

Charles B. Post, New London, O.—This embodies a new and simple construction of the governing mechanism which renders the windmill self-regulating under any wind pressure. There is an ingenious combination of regulated levers which as the wheel revolves with increased velocity turn the vanes so as to expose less surface to the wind. The vanes have a twisted or winding surface. This seems to be a device well calculated to add to the efficiency of perhaps the cheapest motor a farmer can use.

## NEW HOUSEHOLD INVENTIONS.

## IMPROVED SAD IRON.

Salathiel C. Fancher and William W. Judson, Kansas City, Mo.—In this improved reversible and self-heating sad iron there are novel means whereby the flow of alcohol from the lamp to the burner is regulated, and a new and valuable feature is supplied in a tubethat extends from a point near the top of the lamp to the interior of the sad iron, running along the wick tube to the burner, where the gas generated in the lamp by the heat of the iron is consumed as fast as generated.

## IMPROVED LAMP EXTINGUISHER.

Martin P. Flanders, An Sable Forks, N. Y.—A useful safety appliance for lamps so constructed that the leverage exerted by a sliding weight and wire frame on a cap swings the same over the wick tube, and extinguishes thereby the flame without being obstructed by sticky coal and oil particles, as is frequently the case with the common sliding extinguishing tubes in use.

## IMPROVED FLY FANS.

Samuel W. Mills, Kingsville, Mo.—This is an ingenious arrangement of fans secured to a vertical shaft which rises from the center, say of a dining table. By means of a very simple treadle and pulley mechanism some one sitting at the table can cause the shaft and fans to rotate and so drive flies from the dishes.

## IMPROVED DOUGH KNEADER.

Ezra Staples, Rochester, N. H.—It is well known that nothing is so essential to the production of good light bread as thorough kneading. When large batches of dough are to be worked, this becomes an exceedingly arduous operation; and even in the small quantities necessary for family use the work is by no means light. The present inventor therefore merits the thanks of bakers and housekeepers for an ingenious machine for kneading the dough in a thorough manner. By turning a roller in one direction, and then in an opposite direction, a moulding board is carried forward and back simultaneously beneath it, while a top roller with eccentric cams serves to regulate the pressure of the kneading roller on the dough.

## NEW MISCELLANEOUS INVENTIONS.

## IMPROVED ORGAN ACTION.

Archibald N. Hanna, Murray, Ind.—This invention consists of the arrangement of several sets of reeds that are operated with or without stops, by different pressure on the keys, a light pressure operating only the first set of reeds, a heavier pressure the first and second sets, by actuating a shorter series of pitman or push pins, and a still heavier pressure, a still shorter series of pins of the third set of reeds. In this way a change of the music from a soft tone to medium or very loud tone, and, *vice versa*, from a loud tone to medium and a very soft tone, may be accomplished without moving the hands from the key board.

## IMPROVED BALE TIE.

Ball Hempstead, Little Rock, Ark.—This improvement consists in constructing an open rectangular frame with a hook upon one of its bars, which hook is extended laterally to the bale band, and formed of one and the same piece of metal with the frame. One end of the band is passed through the open rectangular frame and bent around, while the other is slotted to receive the hook.

## IMPROVED SLATE PENCIL SHARPENER.

William H. S. Hennaman, Philadelphia, Pa.—There are few sounds more annoying to sensitive nerves than that produced by the sharpening of a slate pencil with a knife. In schools, where such pencils are constantly required to be sharpened, the operation, besides making constant noise, often involves cut fingers of young children, or else is the cause of perpetual requests to the teacher for its performance. The present invention suggests a simple little device which may easily be attached to every child's desk. It consists in a V-shaped file or rasp, made convex in the direction of its length, and provided with graduated teeth, coarser at the upper and outer edge of the V, where the greater portion of the cutting is done, and finer in the angle of the V, where the point of the pencil is formed. The file is conveniently mounted in a block of wood.

## NEW AGRICULTURAL INVENTIONS.

## IMPROVED FENCE.

Orlando Cleaveland, Middlesex, N. Y.—The movable panels are supported between short stakes which stand in pairs, those of each pair being inclined toward each other at a right angle or thereabout. The heads of the stakes are bound together by wires, and the projecting ends of the lengthwise boards of the panels lap past each other and rest on the binding wires between the stake heads; a wire brace is also applied for holding the fence panels vertical and rigidly in place.

## IMPROVED COMBINED WHEELBARROW AND CULTIVATOR.

John D. O'Callaghan, Chattanooga, Tenn.—The tray and legs of the wheelbarrow are so constructed and connected together that they may be readily detached from the truck or wheeled frame, whenever it is desired to use a cultivating attachment, thus saving the cost of a frame for the latter.

## IMPROVED CORN-HUSKING MACHINE.

John Lund, East Oxford, Ontario, assignor to David N. Moore and John Henry, Beachville, Canada.—This is a very ingenious invention that will doubtless interest farmers, as it husks corn very rapidly, whether on or off the stalk. The mechanism consists of a vertically-reciprocating knife, operated by treadle, that cuts off the ear from the stalk, while an ejector, passing down with the knife, releases, by a lever and pawl arrangement, a spiral governing spring, and throws out the ear. The release of the treadle carries the knife up, and draws the ejector back in position to allow its locking pawl to drop into place until the knife descends again for cutting.

## IMPROVED CHURN.

Friend Murdock, Centreton, O.—The new feature in this churn lies in the shaft of its rotary dasher which, provided with flanged sleeve in combination with a latch for retaining the crank in place. The general construction embodies many other useful improvements, notably a spout through which hot or cold water may be introduced for tempering the cream. Provision is also made for a thermometer by which the temperature of the contents can always be observed.

## IMPROVED AUTOMATIC GATE.

William Nairn, Monterey, Ill.—This is an ingeniously constructed gate, which can be opened and closed by the occupant of a carriage without requiring his moving from his seat. A weight on the side to which the passerby comes is raised by a cord, then the latch is lifted by a cord, when the weight on the opposite side of the gate swings it open. After passing through, the weight which opened the gate is raised, which allows the other weight to close it.

## IMPROVED HARVESTER.

James D. Winans and Gilbert Vandusen, Sycamore, Ill.—An endless chain of cutters work in a recess in a cutter bar, and in the forward part of the platform, and the latter is so pivoted in arms that when raised and lowered the necessary gear wheels always remain engaged. New devices are provided to catch the grain and rake it from the platform. The invention as a whole embodies many valuable novelties in construction which commend it to the examination of all agriculturists.

## NEW WOODWORKING AND HOUSE AND CARRIAGE BUILDING INVENTIONS.

## IMPROVED WAGON GEARING.

Levi W. Frederick, Hall, Ind.—The new features in this invention are, first, a brace that passes along the top of the reach, and its rear end is slotted to receive the rear king-bolt. The brake bar attached to the brace rests upon a plate secured to the forward part of the rear hounds, and has hooks fastened to it, which hook upon the ends of the said plate. The brace plate and hooks keep the brake bar always parallel with the rear axle, and thus in position to apply the brake shoes to the wheels. To the rear side of the brake bar is pivoted a rod which controls the brake mechanism. The invention has for its object to render the gearing stronger, freer in movement, and more fully under the control of the team.

## IMPROVED SEWER TRAP.

Frederick B. Wells, Montreal, Quebec, Canada.—This invention suggests a simple and ingenious device for preventing the escape of sewer gas without obstructing the flow of surface water. It consists of a conical or funnel shaped tube, that is supported on a top ring, and provided at the lower end with a cup shaped and weighted trap. The latter extends by an annular flange around the lower end of the cone, to seal the same until it is forced open by the weight of the collecting water. The whole apparatus is easily removable to afford access to the sewer; and the conical shape of the tube prevents its rupture in case of the freezing of the contents.

## IMPROVED LEVER PAWL AND RATCHET FOR WAGON BRAKES, ETC.

James R. Robinson, Shawnee Mound, Mo.—This is an ingenious device so constructed that when pressure is applied to force the lever forward the pawl slides over the teeth of the ratchet bar and engages another tooth. Thus the brake is applied with a degree of force corresponding to the pressure on the handle; but the pawl is released from such engagement when the handle is pressed backward.