bags to be filled, and also funnels for guiding the grain into the bags as the rotating frame brings them successively beneath the discharge spout of a hopper. When filled, the weight of their contents causes the release of the bags from their suspending hooks, and at the same time closes the mouth of each bag by tension on a cord attached to it. The carrying frame is intermittingly rotated by means of a hinged trap and ratchet mechanism. Each bag, as it drops, falls upon and tilts the trap, which then rotates the frame sufficiently to bring the next empty bag in position for filling.

Mr. C. M. Mallory, of Wauseon, Ohio, has patented an improved Hay Elevator, by which the hay may be carried to and dropped in any corner of the mow, thus economizing space in a barn. This invention consists in a novel arrangement of hoisting, balancing, and guiding tackle of ropes, pulleys, etc., in connection with a windlass or horse power, arranged suitably for the purpose.

An improved Fruit Drier has been recently patented by Mr. Peter Riley, of Fort Scott, Kan. It has several tiers of sliding trays arranged laterally above a longitudinal fireplace at the bottom of the drier. The tiers are separated by vertical draught channels, and the front and rear parts of the trays are heated by lateral T-shaped pipes. A convex guard plate on the central part of the fire chamber protects the center of the trays from too great heat. The smoke pipe extends upward at the rear of a shorter tier of trays, and centrally through the space at the top part of the drier, to reheat the air at the top and keep up a draught through the trays.

IMPROVED SAW MILL DOG.

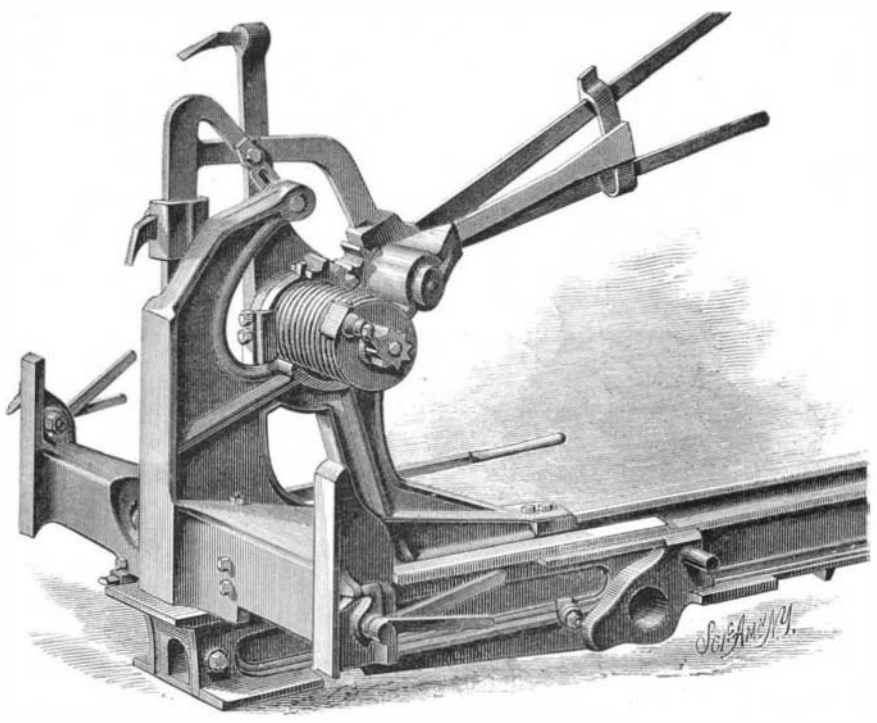
In the annexed engraving we illustrate a new dog for holding logs in the saw mill, which, we are informed, is built of the best material, is strong and durable, has very few joints, and retains the log with great firmness.

The arms are of such certain length, and their pivoted point of such height and distance from the face of the standard, that logs of large, small, or medium size are held with equal facility. The bits are of cast steel, set so as to enter the log easily, and are easily taken out and sharpened or replaced by duplicates. The shafts on which the arms are hung carry springs of such length, strength, and flexibility as make them convenient and effective in forcing the dogs into the log and holding them with a relentless grip until withdrawn by the lever by which they are operated. The length of the dog arms is made adjustable by spring pins, so as to allow a log of any size to be sawed into the thinnest flitches without danger to the saw.

The board dog, also of cast steel, is carried in a socket made to slide on an upright bar. The dog is raised or let down into the edge of a cant by a link and arm from a lever pivoted back of that by which the log dog is handled. Cogged segments connect this lever with one end of the spring case, so that the spring is utilized to operate either the log or the board dog as the lever of either is released from the latch which holds them when withdrawn from the timber. Pawls from the cases catch notches in the log dog shaft, so that more or less strain may be given to the springs at pleasure. The upright bars extend above the standards, so that the board dog may rise high enough to catch the highest cants. Its lower end is pivoted to the knee, so that the upper end will recede and allow large logs to come back over and rest on the standards. Strong leaf springs throw the bars forward when the log is turned away from them. Link joints connect the upper ends with the standards and hold them perpendicular or parallel with the face of the standards. The levers come back within convenient reach of the setter, who does not have to stoop to handle them.

A single dog only in each block is required to hold either the log or the cant, and its hold is sure. Any vibration or straining of the timber to get away only causes it to work in deeper, and to maintain its hold. The single dog, with straight tooth or bit, is easily kept in order and easily operated. Improved yielding spring dogs catch the under side of the cant and hold its lower edge. Thus both edges of the cant are held between jaws drawn together by powerful springs, and the face of the timber is uninjured by the perforations of any dog teeth.

The device has been in use in one of the largest mills in Michigan, and has, we are informed, proved in every way efficient. For further information address the Stearns Manufacturing Company, Erie, Pa.

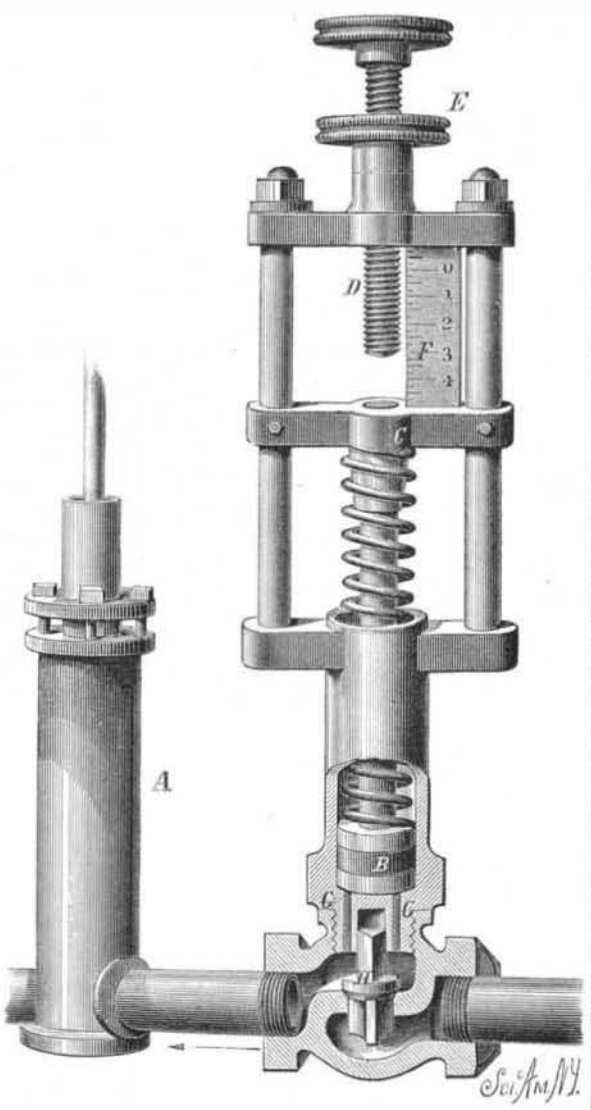


IMPROVED SAW MILL DOG.

OIL DISCOVERIES IN PENNSYLVANIA.—A singular circumstance is reported from the Holder Run oil section, in the shape of the striking of a deposit of oil which exhibits none of the impurities of petroleum when it comes from the ground, but, on the contrary, spouts from the sand in a refined condition. The oil comes from the well a pale green transparent fluid, and can be used in lamps at once. It gives a brilliant light, with no smoke or odor, and stands a fire test of 110°, a lighted match being thrown into a vessel containing the oil failing to ignite it. It deposits very little sediment.

IMPROVED FEED REGULATOR FOR BOILERS.

It is the usual practice of engine builders to make the feed pump about two or three times the theoretical size, and to regulate the supply of water to the boiler by partially closing the suction valve. A little thought will convince any engineer that this system is open to many objections. Suppose the pump, if completely filled and discharged at each stroke, to deliver twice the volume of water into the boiler that was required. Thus the suction would be closed off so that the pump would only half fill with water at each stroke. When the plunger descends and is half down it meets the water coming up, and the result is a disagreeable pounding causing much strain and wear on the connections, and a rapid destruction of the check valves. Moreover there is a tendency for air to leak into the pump through the stuffing box. This, in very high pressure engines such as are used on small boats, is a source of great annoyance and danger, as a very little air will from its elastic nature prevent the pump from working. In small boats it is also a desideratum to have a certain and definite volume of water enter the boiler at each stroke of the engine. This cannot be done with the common pump now in use. For suppose the engine is making 400 turns per minute and the valve in the suction is opened just sufficient to allow the proper volume to enter, half filling the pump. If the engine is slowed to 200, less than one half the steam is being used and twice as much water being pumped into the boiler per stroke, or fully three times as much as is required. When the engine slows down from a lack of pressure the trouble is greatly aggravated by a much larger quantity of cold water than is requisite being put into the boiler. Boat boilers, being very active and liable to quick fluctuation, require very close watching when supplied in the usual manner.



FEED REGULATOR FOR BOILERS.

Our illustration shows a very simple device which, it is claimed, obviates all the above objections. It is the invention of Hiram S. Maxim, M.E., who contrived it for use on his small and fast steam yachts. A is the ordinary form of feed pump, the discharge valve being on the left and not shown. The regulating apparatus is placed on the right between pump and suction valve. It consists of a cylinder of the same volume as that of the pump in which works the air-tight piston, B. The stem of this piston passes up through the guide piece, C, and is surrounded by a coiled spring which keeps it down. On the upper part of the device is a screw, D, which may be adjusted so as to limit the upward movement of the piston rod when the piston is raised against the action of the coiled spring. On said screw is a binding nut, E, and beside it is placed a graduated scale, F, whereby the screw may be set to limit the movement of the rod or stem at any point, as for instance at one half, one third, or one quarter the total possible travel of the piston in the cylinder. Beneath the piston are two apertures or channels, G, and between them is a recess in which plays the stem of the valve, H, which is seated in a horizontal partition in its casing as shown.

Supposing for example the screw, D, is brought down so as to prevent any motion of the piston, B. Then when the pump makes an upstroke water will be drawn through the valve, H, and the latter closing in the down stroke of the pump all the water drawn into the pump barrel will be forced on into the boiler. This is the ordinary condition of affairs with the regulating device being rendered inoperative. Now suppose the screw, D, moved up to 0, so that the piston, B, has full play. The up stroke of the pump draws in water through valve, H, as before, but on the down stroke the conditions are altogether different from before. The water will, as a matter of course, pass in the direction where it meets the least resistance, and it must either enter the boiler against the pressure or it must lift the piston, B, and enter the barrel of the regulator. Now, the strength of the coiled spring in the latter is so adjusted as to make it easier to raise the piston against it, than for the water to pass to the boiler. Hence the contents of the pump barrel will flow into the regulator barrel and fill the same, the piston rising. Consequently no water would enter the boiler, and there would simply be an oscillation of the fluid alternately from pump to regulator and regulator to pump as the latter continued in operation.

This brings us to the third condition, namely, suppose the screw, D, to be moved partially down, say to 3, as in our engraving. Obviously, then, the piston, B, will be permitted to rise only one fourth of its stroke, only one fourth of the contents of the pump barrel can therefore enter the regulator cylinder, and the remaining three fourths must go on to the boiler.

It will be clear that we have simply to adjust the screw, D, and secure it by the binding nut so that no jar can displace it, to reduce the quantity of water delivered by the pump by any desired fraction.

One very important advantage claimed for this invention is the facility with which the discharge of the pump may be ascertained. A glance at the movement of the piston rod indicates whether the pump is or is not working. Should the water supply give out the motion ceases. The contact of rod and screw makes a slight click like that of a telegraph sounder, the cessation of which would attract attention to any failure of supply. The device may be made of any size and adapted to any form of boiler.

For further particulars address H. S. Maxim, M. E., 74 Coal and Iron Exchange, New York city.

Absorption and Evaporation in Plants.

M. Vesque has recently made some researches into the relation between taking up water by the roots and evaporation by the leaves of plants. He concludes that the absorption of water by the roots is not proportional to the temperature of the leaves if these be placed in an unsaturated atmosphere. At a low temperature it increases but slowly in proportion as the temperature rises, but at a certain temperature fixed for each plant the absorption rapidly increases. It becomes stationary at a temperature maximum, which is different for different species.

The absorption of water by the roots is independent of the temperature of the leaves, when these are in an atmosphere which is saturated, dark, and protected against heat radiations. Dark heat rays act very powerfully on the transpiration in saturated air, and have the same action on the absorption as a rise of temperature when the leaves are in a dying condition.