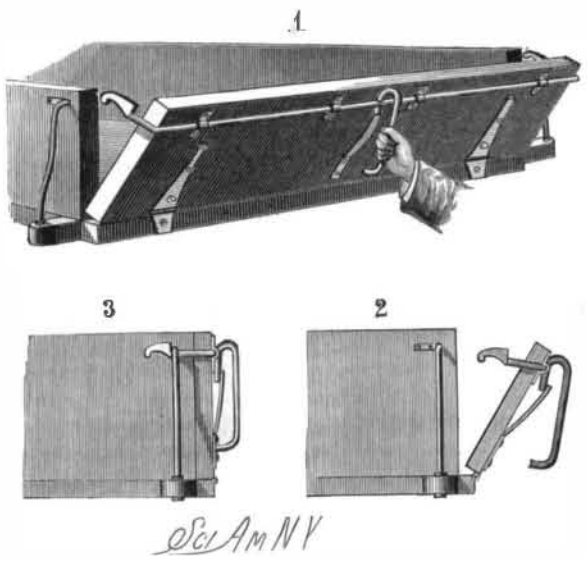
END GATE FASTENING.

The fastening for the end gates of wagon boxes shown in the annexed engraving is simple, strong, and durable, and can be very easily operated. Fig. 1 is a perspective view of the gate, which is shown open in Fig. 2 and closed in Fig. 3. Near the top of the outer surface of the gate is a rod held by clips; the ends of



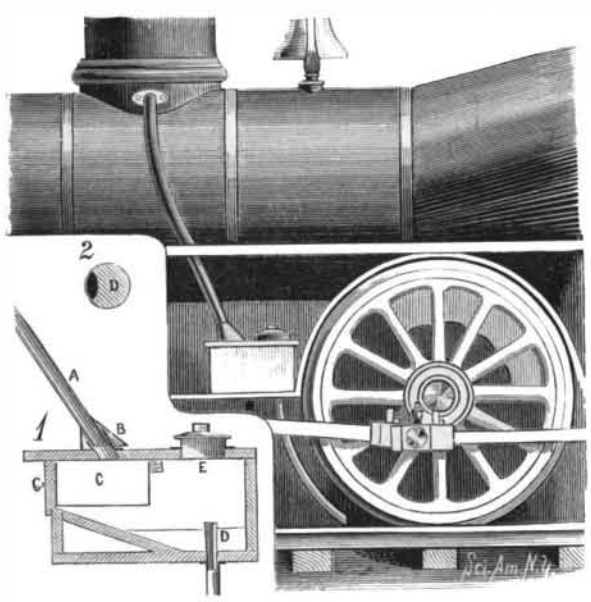
McKINNON'S END GATE FASTENING.

the rod are bent over on the sides of the box, and form beveled hooks adapted to catch on the usual side braces on the rear end of the box. At the middle of the rod is a downwardly projecting lug, against which the free end of a flat spring rests, its opposite end being secured to the gate. The spring presses the lug against the gate, thereby pressing the hooks upward. A handle arm projects downward from the rod, as shown in the drawings. When the gate is swung up against the end of the box, the hooks catch on the braces and hold the gate in place. To unlock the gate, the lower end of the handle is pulled outward, whereby the hooks are swung down and disengaged from the braces.

This invention has been patented by Mr. D. W. McKinnon, of North Sydney, Nova Scotia, Canada.

SAND FEEDER FOR LOCOMOTIVES.

A discharge pipe, A, leads from the sand box usually carried by a locomotive to a feed box secured to some convenient part of the engine in front of the drivers. The construction of the inlet opening is clearly shown in the sectional drawing, Fig. 1. In the bottom of the feed box is an outlet opening, D (Fig. 2 is a plan view



CAMPFIELD'S SAND FEEDER FOR LOCOMOTIVES.

of the opening), in which is held the end of an outlet pipe passing down in front of the driver and terminating near the rail. In the opening is inserted a plug, in one side of which is formed a groove of such size as to permit a stream of sand of the desired amount to flow through the outlet pipe. The amount of sand discharged can be regulated by using plugs with larger or smaller grooves. Access to the interior for changing or removing the plug is had through the opening, E, which is closed by a cover. Directly under the inlet opening is placed a drawer, C, formed of woven wire, with the exception of its outer end. The upper edge of the drawer is strengthened by bars, the side ones being grooved to slide on tongued bars attached to the sides of the box. The drawer is designed to retain any pebbles or refuse that would be liable to clog the groove in the plug.

This invention has been patented by Mr. Hampton R. Campfield, of Susquehanna, Pa.

Influence of the Moisture upon Plants.

Prof. Hellriegel.—If a soil becomes so far desiccated as not to convey moisture to plants so rapidly as it is lost by evaporation, the energy of the movement of the sap within the plant and the tension of the organs are reduced. When this process has continued for some time, the elasticity of the cell walls sinks so far that it becomes outwardly manifest by the relaxation of the parts of the plant. Fading indicates not the beginning of the affection, but the commencement of the last stage. External fading does not begin until the plant has lost nearly half its moisture. Different plants do not behave quite alike with different degrees of moisture in the soil, but the differences are not very important. The production of plants is much reduced even by short periods of drought, and a subsequent abundant supply of water does not remove the injurious effects of a previous deficiency.—*Biedermann's Centralblatt.*

Repairing with Brass.

A special method of repairs with cast brass for large and valuable castings which cannot well be spared while new ones are procured, such as cylinder saddles broken through a steam connection or other projecting part, has been devised by Herr Haas, Government Master Mechanic at Berlin, and is illustrated in the *Organ.*

The process is as follows: The main casting is cut off inside the crack to a fairly uniform line. A model is then made by means of the portion cut off to fit over the end of the break and make the necessary junctions with the adjoining parts of the machine. The lower half of the mould flask is fitted around the broken end of the casting and well secured to it, and the joint is sealed with clay. The model is then set into the flask over the broken end, on which it, of course, should lap a certain amount, and the moulding is proceeded with. The upper half of the flask has, of course, a core fitting into the hollow of the broken end, if such there be. Before casting, the broken end is well warmed by a charcoal fire placed within, and the precaution is generally taken of boring several holes into the broken end around the part on which the patch takes hold, into which the fresh metal runs and forms lugs, making a firmer connection between the new and the old parts, though the chief reliance is on the shrinking of the new casting around the end of the old one. The heating of the old portion is done to avoid having this shrinking excessive and to prevent chilling.

Several repairs of this sort have been made by Herr Haas, with entire success, the parts still remaining in active use, though a considerable time has elapsed since the repairs were effected.

AN IMPROVED MECHANICAL MOVEMENT.

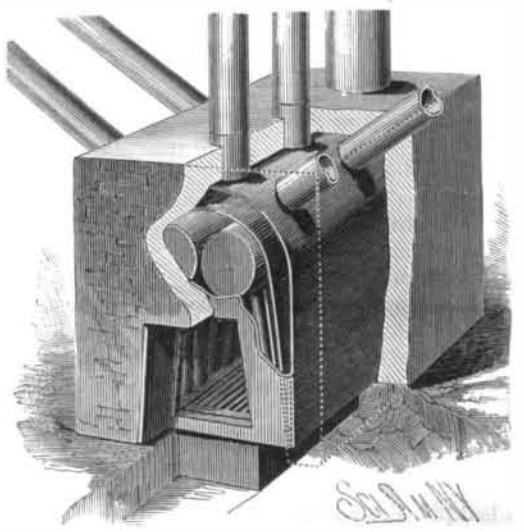
Mounted upon a suitable frame is a shaft carrying at one end a pulley and pinion, the latter meshing with a mutilated pinion on a shaft mounted on the same frame. To one side of the first pinion is fixed a cam (Fig. 2), which is so disposed that when required it may act on an arm or finger attached to a sleeve on the second shaft; this arm rotates with the shaft, and extends between two guide lugs projecting from the side of the pinion. By means of a lever, shown in Fig. 1, the sleeve may be moved longitudinally on the shaft so as to throw the finger in and out of gear with the cam. Secured to the opposite side of the first pinion is a wiper so placed as to act upon a spring bar (Fig. 3) attached to the frame, and provided with an opening to receive a pin projecting from the side of the mutilated pinion opposite the finger.

Upon revolving the driving shaft—the lever having been properly shifted to force the finger toward the pinion—the second shaft will be turned until the teeth of the first pinion reach the mutilated or untoothed portion of the second, when the latter will become stationary, thus imparting a "dwell" to the machinery in communication with the second shaft. During the stoppage, the spring arm engages with the stud and firmly holds the pinion. The first pinion continues its rotation, making the second turn, and as the finger is now in the path of rotation of the cam, it is struck by the latter. At the same time the wiper enters between the spring and pinion, and forces the former from the stud; and thus as the finger is pressed by the cam, the first pinion is rotated and the teeth of the two again mesh. The lever may be connected with other parts of a machine, in order to be automatically operated, or the finger may be fixed to the pinion, which will then be stopped and started as long as the machine is running.

This movement can be applied to printing, punching, shearing, or stamping presses and other machines where a given time is required for feeding or other purposes. This invention has been patented by Mr. L. D. Farra, of 25 Mill Street, Germantown, Philadelphia, Pa. Particulars regarding American and foreign patents can be had from the inventor.

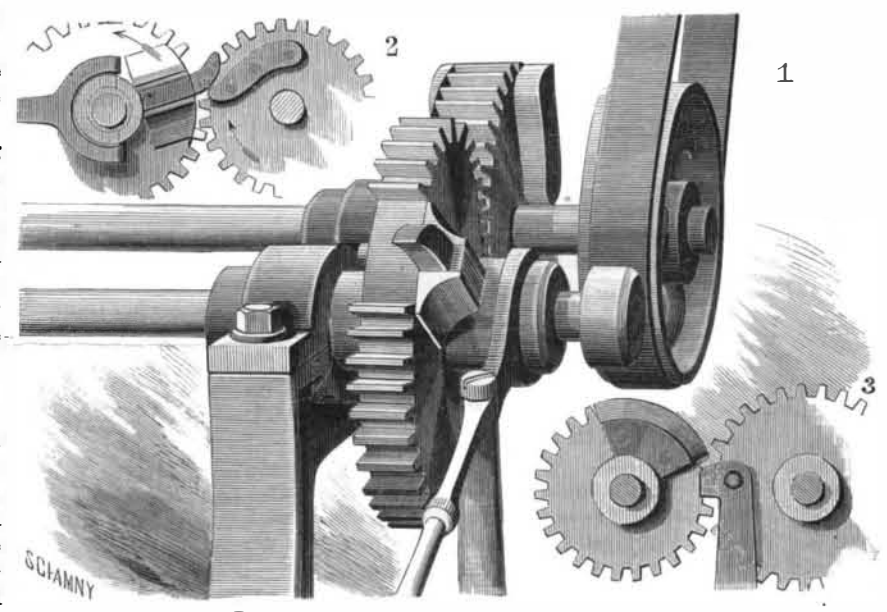
HOT AIR FURNACE.

Within the outer casing of the furnace, which is closed at its ends by walls, is a smaller one having one of its ends closed by the end wall of the main casing, and its other end closed by an inner wall. A hot air space is thus formed surrounding the two casings except at the ends having a common wall. The space inclosed by the inner casing forms the fire box of the furnace, and is connected with the chimney by a pipe. In the fire chamber, above the center, are placed horizontal air heating drums and a series of nearly vertical air inlet and heating pipes, which connect the drums with the external air through suitable openings made through the bottom. The drums communicate with



OAKES & CAMP'S HOT AIR FURNACE.

the hot air space between the casings through openings made in the inner wall of the small casing. Pipes lead the heated air from the hot air space to distributing pipes extending to different parts of the building. Through the front wall, above the drums, is an opening closed by a cap, and through which the drums may be cleaned of any soot or ashes that may collect upon them. Below this opening is the furnace door. The grate bars are located between the series of air inlet pipes, which are inclined toward each other so as to stand partly over the grate at their uper ends, leaving considerable space between the outer surfaces of the pipes and the inner surfaces of the small casing; the heat from the fire is thus free to circulate around the pipes, and the flame is caused to spread and nearly encompass the drums. A larger and effective heating surface is furnished within the fire box without materially interfering with the draught; the space between the rear end walls of the casings also provides a large heating surface, so that all the available heat from the furnace is taken up by the air and distributed through the building.



FARRA'S IMPROVED MECHANICAL MOVEMENT.

This invention has been patented by Messrs. C. W. Oakes and E. B. Camp, of Billings, Montana.

AN artesian well in Kern County, Cal., has been completed which gives a flow of 1,575,000 gallons in twenty-four hours, and the water rises 11½ in. above the pipe.