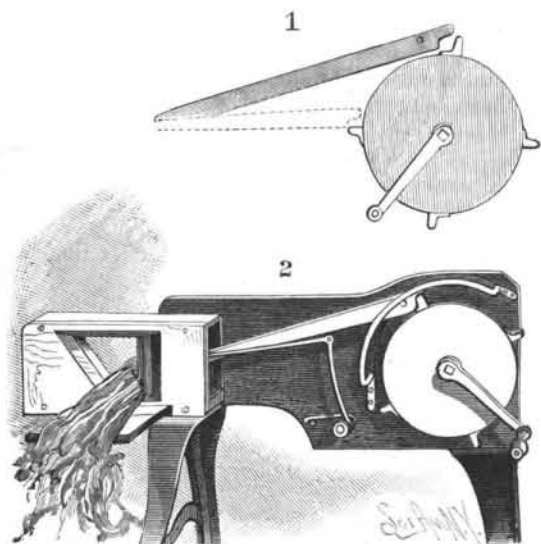


Railway Sand Blast.

The Hinckley Locomotive Works, of Boston, are building an express locomotive with a single pair of driving wheels. This engine is built to the order of a Boston syndicate, and is intended to run the fast express, the Flying Yankee, on the Boston & Maine. The engine will not be completed until Sept. 1. It is understood to embody many new features, and considerable interest will be felt in its performance. Any difficulty from slipping can probably be overcome by the use of the sand blast now successfully used on many English roads, and undergoing trial on the Chicago, Burlington & Quincy. The sand being thrown on the rail by a jet of compressed air, cannot be blown off before the wheel reaches it. Experience in England goes to prove that the success of engines with a single pair of drivers depends entirely upon the character of the sand supplied. If dry and delivered fairly on the rail close to the driving wheel tread, no time is lost from slipping, even where the tractive power of the engine is 94 lb. per lb. pressure on the pistons.

IMPROVED MECHANISM FOR RECIPROCATING PLUNGERS.

A novel means of imparting a reciprocating motion to a plunger, applicable for use in connection with a hay or vegetable cutter, or a hay press, or for other purposes, is shown in the accompanying illustration, and has been patented by Mr. George McCarn, of Goodland, Ind. The drum or disk, which may be operated by a crank arm or a sweep, has bosses or projections on its peripheral face, and a pitman, connected at one end to a plunger, is held against the peripheral face of the drum by circular guides, concentric with the axis of the drum. As the drum is revolved the pitman is forced to the position shown in dotted lines in Fig. 1, by one of the lugs upon the drum; and as the lug passes from engagement with the pitman, the latter is returned to its first position by

**MCCARN'S MECHANISM FOR RECIPROCATING PLUNGERS.**

a spring and link. In Fig. 2 the plunger is represented as being provided with a knife, arranged to be thrown against the cutting edge of another knife carried by a casing, within which the plunger is mounted, as the invention may be utilized for cutting hay, roots, etc.

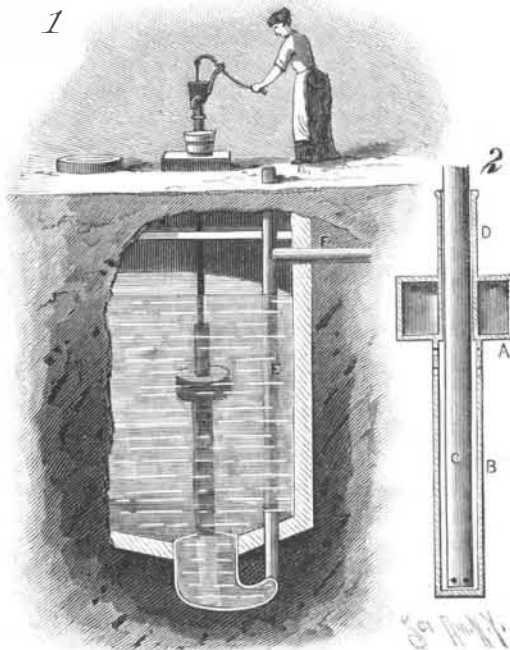
The British War Ship Undaunted.

H. M. S. Undaunted (12), belted cruiser, lately steamed out of Plymouth Sound into the channel for a final contractors' four hours' trial of her machinery with forced draught. The vessel was ballasted with heavy weights in order to bring her down to her deep load line draught, the same as if she had all her stores, guns, ammunition, coals, and crew on board ready for sea. Her draught of water forward was 20 ft. and aft 22 ft. The result of the trial was as follows:

Starboard engine horse power, 4,204; port engine horse power, 4,398; for both engines, 8,602, or 102 over the power contracted for, which was 8,500. The highest power obtained was 9,020, or 520 above what was contracted for. The speed of the ship on the measured mile was 19.4 knots per hour, which is the highest speed attained by any of her Majesty's heavily armed ships of war. The wave line was measured, and the curve proved that the protective belt was above and below the water line in the position as originally intended in the design. The Undaunted is the second of five vessels of the same class ordered about two years ago by the Admiralty. Messrs. Palmer & Co. have done important work in completing the two vessels entrusted to them to build, and which are the first two of the five. This vessel previously had a natural draught trial, when she attained a speed of over 17 knots, and indicated 5,640 horse power during the four hours' run, the maximum horse power being 5,890, or 390 horse power above the contract, which was 5,500.

AN IMPROVED CISTERN DEVICE.

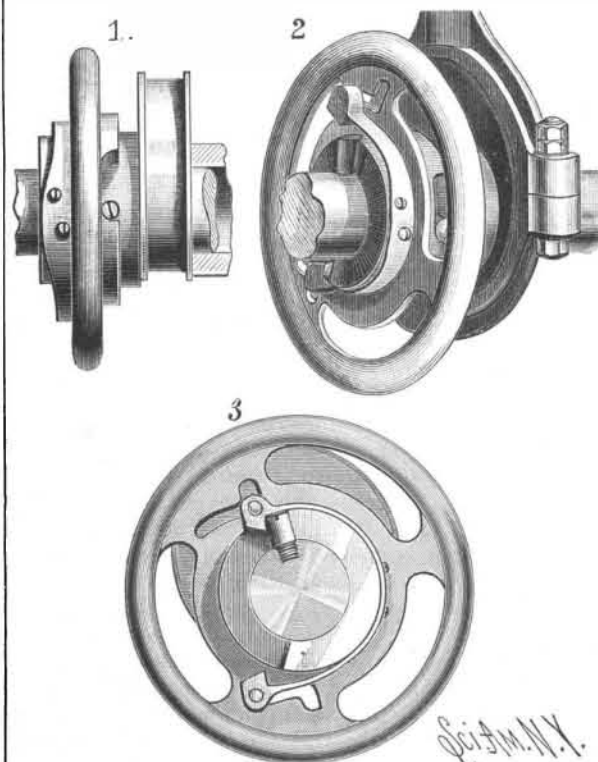
The illustration herewith shows a form of cistern and pumping arrangement by which water can always be drawn from the interior of the water in a cistern, avoiding both the scum on the surface and the sediment at the bottom. It has been patented by Mr. George A. Allen, of Madison, N. J. The cistern is made with a

**ALLEN'S CISTERN.**

bottom trap or elbow, this portion being preferably of glazed earthenware, and with it is connected an overflow pipe and branch, E, F. The open top of the pipe, E, prevents siphoning, and provides for the insertion of a suction pump, whereby sediment may be withdrawn. The pump pipe, C, is fitted, over its lower portion, with a slip tube, D, having an enlarged lower portion, B, and a float, A, the latter always locating the height of the slip tube in such way that the supply of water taken by the pump will be drawn from the holes in the slip tube beneath it in the body of the water, the slip tube being closed at the bottom.

AN IMPROVED REVERSING GEAR FOR ENGINES.

The invention herewith illustrated provides a novel form of reversing gear for engines, which has been patented by Mr. Edwin H. Whitney, of Providence, R. I. Fig. 1 shows a side elevation of the reversible eccentric, with hand wheel for operating it, Fig. 3 being a front elevation showing the engine shaft in cross section, and Fig. 2 a perspective view illustrating the application of the invention to an upright engine. The eccentric is formed with a hub having shoulders to engage a stop pin on the shaft, in combination with an operating wheel placed on the hub of the eccentric, and having a limited rotary motion thereon. The eccentric has a limited independent motion upon the shaft, and the hand wheel has a rotary motion

**WHITNEY'S REVERSING GEAR FOR ENGINES.**

independent of the eccentric, combined with spring catches arranged to lock the hand wheel to the shaft. Further information relative to this invention may be obtained of the American Ship Windlass Company, George Metcalf, treasurer, Providence, R. I.

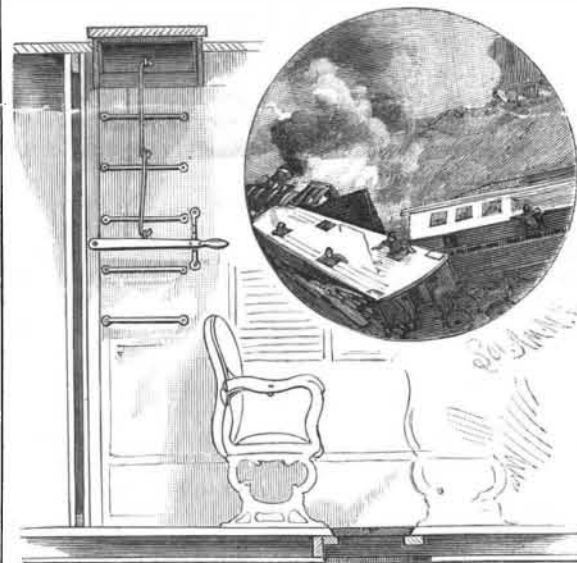
Electricity a Form of Matter.

Mr. Carl Hering, writing to the *Electrical World*, says:

"It is a well-known fact that quantity of electricity measured in coulombs never is generated, never is consumed, and never does grow less, excepting leakage. The current flowing out of a lamp is exactly the same in quantity as that going into it; the same is true of motors and of generators, showing that electricity of itself is neither consumed while doing work nor is it generated. After doing work in a lamp or motor, it comes out in precisely the same quantity as it entered. A battery is not able to generate quantity or coulombs of electricity; all it is able to do is to take the quantity which pours in at one pole and send it out at the other pole with an increased pressure, or E.M.F. Electricity, therefore, is not merely force (or a form of energy), but matter. It is precisely analogous to water in a water circuit. The water is neither consumed nor generated. The pump merely increases the pressure of the water which flows in at one end. The water motor merely consumes the pressure, and converts it into mechanical work of another kind. It does not consume the water. The quantity of water, measured in units of quantity, is the same in all parts of a closed circuit of water," etc.

A SAFETY APPLIANCE FOR RAILROAD CARS.

The invention herewith illustrated provides means by which escape can easily be made from railroad cars in case of accident, and has been patented by Mr. Thomas G. Gilfillan, of Union, Oregon. Openings are formed in the roof of the car, which are fitted with trap doors, from each of which depends a hooked bar, the lower end of which is engaged by the head of another bar, the latter being held down, to keep the trap door closed, by a hand lever, engaged by a vertical toothed bar. Upon releasing the lever from the toothed bar, the trap door may be readily raised or removed,

**GILFILLAN'S SAFETY CAR.**

and, iron steps or rails being attached to the side of the car, on both the inside and outside, a ready means of escaping from the car is thus afforded when other methods of egress might be cut off. In addition to these openings in the roof, similar openings, provided with trap doors, are arranged in the floor of the car.

Banana Liquor.

The *Indian Agriculturist* calls attention to the fact that India abounds in bananas or plantains, and wonders that the fruit has never been employed in the distillation of a fermented liquor. The common prickly pear has been utilized for this purpose in Malaga, and with considerable advantage to the distillers; and it now appears that missionaries in the Congo region have discovered that a beverage made of bananas is a preventive of malarial fevers. A banana liquor company has recently been started in India for producing banana liquor in either an alcoholic or non-alcoholic form, and which can be used with equal advantage as an ordinary liquor or diluted with hot or cold or soda water. For the temperatures of northern regions, including England, it will probably be best esteemed in conjunction with brandy or other spirits.

A New Torpedo Boat.

The Secretary of the Navy invites proposals for the construction of one first-class torpedo boat, complete, exclusive of torpedoes and their appendages, the vessel to be of the best and most modern design, to be constructed of steel of domestic manufacture, having a tensile strength of not less than 60,000 pounds per square inch, and an elongation in eight inches of not less than 25 per cent, and to have the highest attainable speed. Proposals will be received until November 1 next. Premiums will be paid or penalties exacted according as the speed of the vessel shall be above or below 22 knots per hour. The cost of the vessel, exclusive of premiums, is limited to \$90,000.