

ORD'S CUT-OFF GOVERNOR.

This invention is a graduated steam cut-off, conveniently adapted to most engines in general use, and designed to take the place of the common governor. In its construction the inventor claims that the valuable advantages of sensitiveness, isochronism, strength of action, durability, simplicity, and cheapness, are all included. How such result is obtained we shall explain as we proceed, reference being first necessary to the details of the device which are represented in the accompanying illustrations.

In Fig. 1, the complete apparatus is shown in perspective. Motion is communicated to it by the wheel, A, which, it will be observed, is provided with a corrugated periphery. Into the indentations of the latter fit the links of a chain, which is employed to transmit the power, in place of the ordinary belt. In Fig. 2 is represented one of these links, and also a section of the wheel and chain. This device, we are informed, secures a smooth, noiseless, and positive action. The chain is also said to be cheap, readily applied, and durable.

At the inner extremity of the shaft of wheel, A, is a bevel gear, by means of which motion of the same speed is transmitted to an upright shaft, B. Upon the latter is a pinion, C, which, being to the wheel, D, as 1 to 4, causes said wheel, and consequently the valve stem, E, to rotate once to every eight strokes of the piston.

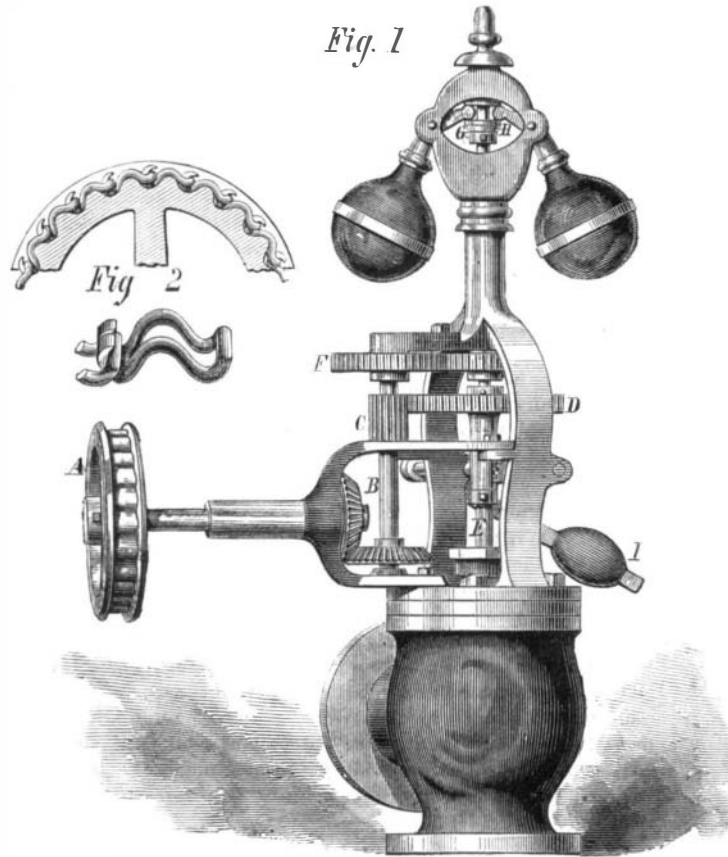
Also, on shaft, B, is a wheel, F, which, by the gear shown, rotates the balls. Below the inner ends of the arms of the latter is a fixed collar, G, on the valve stem, E, and above is a loose collar, H, into grooves in which the extremities of the arms fall, turning the same upon the stem with them during their revolution. It will be plain that, as the balls fly outward, the arm ends will press down on the collar, H, and consequently push the valve stem also downwards.

I is a lever and weight, suitably pivoted to the frame and provided at the inner end with a gear segment, which works in a rack upon a sleeve sliding upon the valve stem. By moving this weight, speed can be increased or lessened, or the device may be used to open the valve in starting the engine.

The valve arrangements are shown in sectional detail in Fig. 3. There is a movable valve, J, secured to the extremity of the valve stem, and a fixed valve, K, in which the former fits, within the steam chamber. In each cylinder are four horizontal rows of eight triangular orifices each, making thirty-two orifices in all, considered jointly, which open and close at every stroke of the piston. It will be seen by reference to the diagram, Fig. 4, that by thus providing a valve with steam port openings, so arranged in connection with a movement that will give the necessary aperture to secure full boiler pressure at the beginning of each stroke of the engine, and which will close at any part of the stroke, according to the power required, that the supply of steam is regulated in an efficient and economical manner. Referring to the steam port, K, which is represented as moving to the right, the upper corner overlapping the lower corner of the stationary port, and touching the horizontal line denoting three eighths, should the governor carry the valve in that line, it will intersect the perpendicular line corresponding to three eighths in the cylinder, which is the point where steam

main valve opens to take steam. Consequently the degree of pressure acting on the piston valve is also applied to the end of the valve stem. This has a tendency to force the latter up and enlarge the opening, holding the engine to its speed, although the balls are not carried as high as when running light.

The parts of the valve are made of a fine grade of iron and fit perfectly true. No difficulty, we are informed, has been encountered through expansion. The inventor submits a number of laudatory testimonials from well known firms in Cleveland, Ohio, with reference to the successful working of the device, which also obtained a first premium at the



ORD'S CUT-OFF GOVERNOR.

New Orleans Fair of 1873. Patented May 6, 1873. For further particulars regarding rights, etc., address the inventor, Mr. William Ord, Brooklyn, Ohio.

Oil Fired by Lightning.

An extensive conflagration, in which 60,000 barrels of oil were destroyed, recently took place at the Erie Railway oil depot, Weehawken, N. J., opposite this city. The origin of the fire was due to lightning, an eye witness stating that the flash appeared to descend into the oil tanks, from which, before the reverberations of the thunder had ceased, flames shot up hundreds of feet into the air. Tank after tank burst, adding their contents to the already burning streams, from which a tremendous blaze and dense clouds of smoke poured almost uninterruptedly for over forty-eight hours. Several buildings in the yard where the material was stored were destroyed, the total losses aggregating an estimated sum of \$250,000. The tanks were of iron. The ignition is supposed to be due to the contact of the electricity with the light, inflammable gases which are given off by the oil and rise in the air above the oil tanks. It has been suggested that high masts, with lightning rods upon them, should be erected in such positions, in the vicinity of oil tanks, as to protect them from such disasters as the present.

Screw Propellers.

Mr. J. E. Wilson, of Brazoria, Texas, writes to say that Mr. Griffiths' screw propeller, inserted in a channel within the bow or stern of the vessel, appears to be similar to his invention of a spiral screw placed between two keels of a ship so constructed. Mr. Wilson applied for a patent, but the application was rejected on the ground that a patent had already been issued for a screw to be worked in a channel running the entire length of the vessel. In the latter, a cog wheel was on the screw shaft and in the water, and it would need a larger cog wheel, also in the water. "The most ordinary mechanical intellect," says Mr. Wilson, "would unhesitatingly and truthfully decide that a spiral screw arranged after the manner of my invention could be driven with greater speed and with half the power that it would take to drive one with cog wheels thus submerged, besides avoiding the liability of the latter to be broken or clogged by drift." Mr. Wilson is making further experiments, and will communicate the results thereof.

Metal Ornamentation.

Mr. W. C. Aitken, in a paper recently read before the British Society of Arts, gives the following interesting details regarding some ornamental processes connected with metallic industries: Enamel is simply glass, composed of lead and sand. When transparent, oxide of tin renders the transparent glass opaque; mixed with oxide of gold, it changes the clear or opaque glass into a purple; red is produced by the addition of sulphate of iron; oxide of copper produces green, violet is produced by manganese, blue by oxide of cobalt.

The enamel is poured from the crucible in which it is

melted into flat cakes; these cakes are broken up and reduced to a fine granular condition in a mortar, or to an impalpable powder by grinding with a muller on a slab; it is applied on metal which will stand a red heat without changing its form or fusing. Gold, silver, copper, brass, or iron can be enameled. There is no true enamel which has not been fused at a red heat. The modes of application vary; applied on a flat plate or plaque, it is worked with a brush. Of this class are the Limoges enamels. Other methods of application consist in incising or cutting small troughs in the surface of the metallic object intended to be enameled. In these the enamel is placed or applied; this method of application is called the *champlevé*. Another method of reproducing is by means of electro-deposition.

The next variety of enamels is the partitioned or *cloisonné*; in this variety the cells are formed by bending a flat narrow strip of metal in such a manner as to form the retaining walls. These, after being prepared, are arranged on the object and soldered to it. The various colors of enamel are then applied in the cells, and fired by subjecting the object to be enameled to the heat of a muffle. Repeated applications of enamel with repeated firings are required to fill the cells. The superfluous enamel is finally removed by grinding it away with pumicestone, and smoothing it with stones of different degrees of fineness. Apart from the labor of forming and placing the minute cells, there are difficulties attending the firing operation. Should one part of the muffle be too hot, and the solder become melted which holds the cells, the more the enamel is in a fluid condition, the colors mingle, and a confluent mixture of colors is the result.

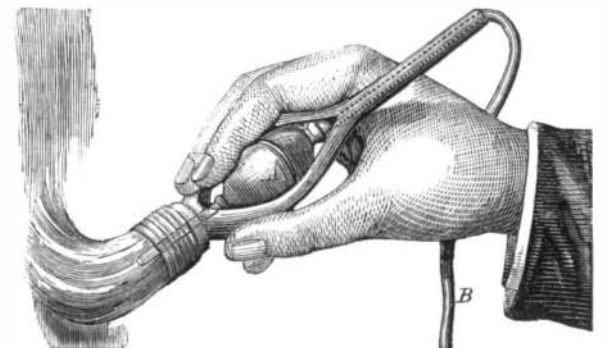
Niello may be called a metallic enamel composed of silver, copper, lead, and sulphur; in its preparation the most difficult metal to fuse is first melted, the next fusible added, and so on; the melted metals in the crucible are stirred with stick charcoal to insure homogeneity; the result is a black compound, which, poured from the crucible, is beaten into strips. The design to which it is applied is engraved on the metal object to be decorated, the lines being more pronounced and stronger than on an ordinary copper plate for printing from. The mode of applying the niello is by heating the object and rubbing the niello into the lines; when skillfully applied, the niello adheres firmly; excess of it is removed by files, the surface is then stoned, and finally polished.

Niello is undoubtedly by far the best means for decorating in a quiet, rich manner surfaces exposed to friction or wear; it is tougher than enamel.

Damascening, or inlaying one metal in another, is an art which has been practiced for a very long period, introduced chiefly on armor and caskets, etc. There are two methods of practicing the process. By one method the surface of the metal to be damascened is raised up into a file-like surface; the artist, by his skill, causes to adhere, to the roughened surface, threads of gold or silver, which are applied and burnished down. Broad surfaces are produced by working the threads or wires side by side. Heat is applied; the degree necessary requires great judgment. In the other the surface to be damascened is incised or cut into, the incision at the bottom being expanded; into this channel gold or silver is introduced and beaten down.

IMPROVED PAINT BRUSH.

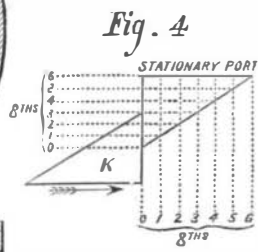
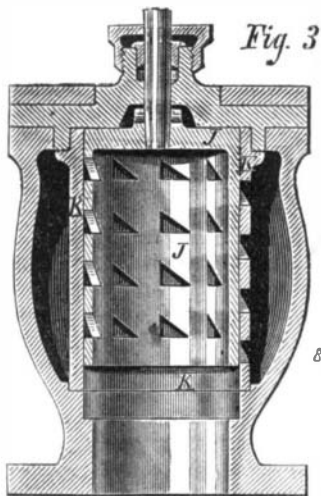
A convenient device for painters' use, recently patented through the Scientific American Patent Agency, by Mr. Amasa S. Thompson, of Little Falls, Minn., is represented in the accompanying illustration. It consists in constructing the



handle of an ordinary brush to contain an india rubber syringe bulb, A. One end of the latter communicates with a rubber tube, B, which, connecting with the upper and hollow portion of the handle, dips into the paint. The other extremity of the syringe carries a short pipe, which terminates, as represented in the dotted lines, among the bristles of the brush. Through the working of suitable valves within, the bulb, on being compressed, draws up and discharges the paint into the brush, so that the latter is kept constantly supplied.

GEORGE M. MANN, C. E., of Brooklyn, N. Y., was recently killed by an accident on the Canal Railway, near New Haven, Conn. He was a young man of brilliant promise in the profession. The recent surveys of the harbor of New Haven were conducted by him, also the West River Canal and other engineering works. He was also assistant engineer of the new Quinpiac bridge.

SCIONS and cuttings of fruit trees have been worked with success nine months after being severed from the parent stock.



is cut off. Should, however, the engine be more heavily loaded, the balls will drop and give a correspondingly increased opening, cutting off at a later period of the stroke. The increased pressure on the end of the valve stem, together with the changed position of the weight, secures the same rate of speed as when running light.

The valve has a limited up and down motion, and, when at rest, the moving cylinder takes against the steam chamber cover. The openings in the two portions of the valve do not then correspond, so that steam is thus shut off, and a means of safety provided, should anything occur to prevent the proper action of the governor. Similarly, if the movable valve should become disconnected, steam would be again shut off, as the valve would drop to a seat in the bottom of the chamber, and the orifices would not correspond. Steam from the boiler being around the exterior of the valve, the latter is perfectly balanced.

The inventor directs especial attention to the fact that steam is admitted to the cylinder at the point where the