(No Model.)

J. REESE.

APPARATUS FOR DRAWING WIRE, STRIPS, OR RODS.

No. 338,363. Patented Mar. 23, 1886.

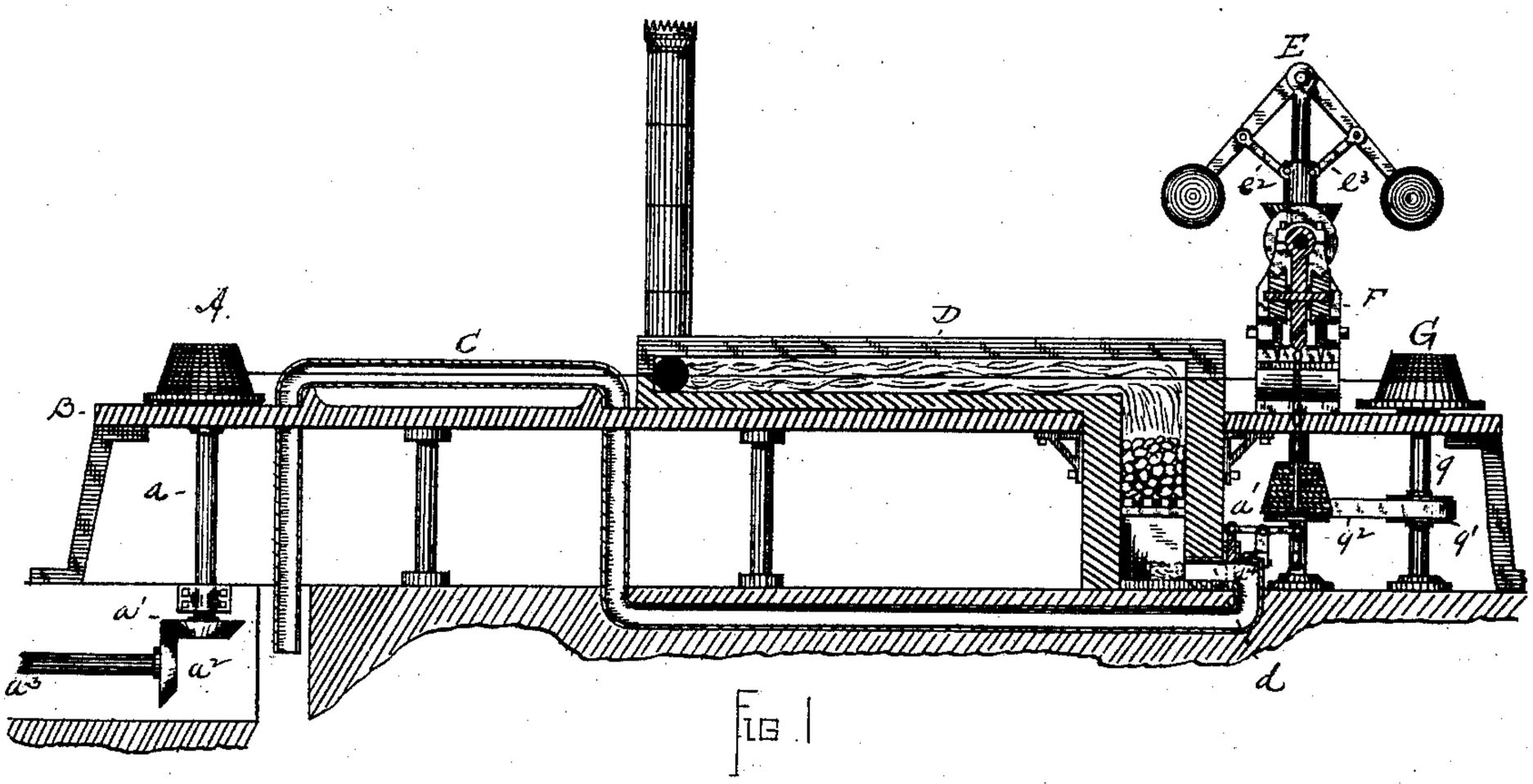

FIG. 1

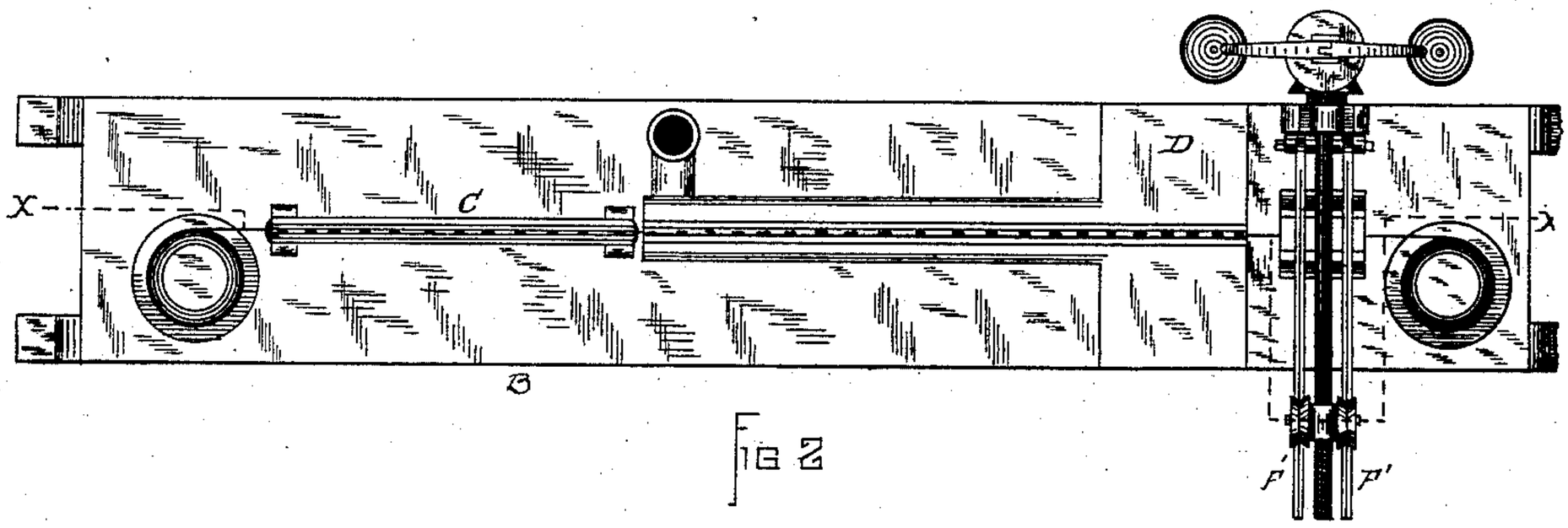

FIG 2

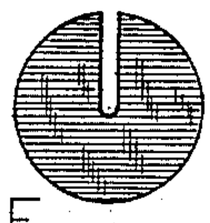

FIG 4

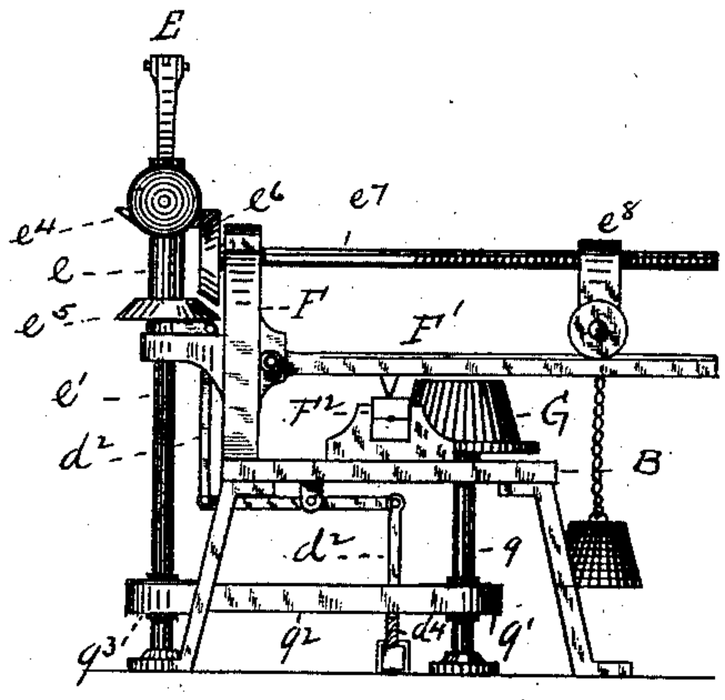

FIG 3

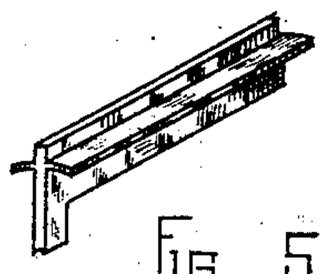

FIG 5

Witnesses

Walter Reese,

Frank M Reese

Inventor

Jacob Reese

UNITED STATES PATENT OFFICE.

JACOB REESE, OF PITTSBURG, PENNSYLVANIA.

APPARATUS FOR DRAWING WIRE, STRIPS, OR RODS.

SPECIFICATION forming part of Letters Patent No. 338,363, dated March 23, 1886.

Application filed March 17, 1884. Serial No. 124,451. (No model.)

To all whom it may concern:

Be it known that I, JACOB REESE, a citizen of the United States, and a resident of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Drawing Metals; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 indicates a vertical longitudinal sectional view of an improved metal-drawing plant, taken through the same at the irregular dotted lines *x x* shown in Fig. 2. Fig. 2 indicates a plan view of an improved apparatus for drawing a metallic rod, blank, or wire through a heating apparatus interposed between a drawing-pulley and a set of resisting-dies which are automatically adjustable and are adapted to retard or resist the forward passage of the metal, the object being to produce and regulate the tensile strain upon the metal and simultaneously raise its temperature during its passage from the resisting-dies to the receiving or drawing spool or pulley. Fig. 3 indicates an end view of the automatic die-compressing mechanism and the delivering drum or spool. Fig. 4 indicates an end view of the furnace-flue. Fig. 5 indicates a perspective view of a stopper for closing the opening in the end of the furnace-flues.

The objects of my invention are, principally, first, to secure a uniform predetermined reduction of the cross-sectional area of the metal during the drawing operation; secondly, to secure a rapid and heavy reduction by the tension upon the metal. The first of these results are secured, first, by rotating the drawing-pulley at a determined rate of speed, placing the metal to be drawn on a free rotative pulley, and then fastening one end of it to the drawing-pulley, so that motion may be communicated by the tension on the wire from the former to the latter; secondly, then compressing the metal by means of interposed dies adapted to resist or retard the forward movement, and thus put the metal under a drawing tension after its passage through the dies; and, finally, by regulating this drawing tension by regulating the impression of the dies by means of an automatic pressure-regulator actuated by the rotative movement of the delivery-pulley, so that the decreased speed of the delivering-pulley shall decrease the pressure upon the dies, and thus decrease the tension when the metal is too rapidly reduced, and an increased speed of the delivery-reel shall cause an increased pressure upon the metal, and increase its tension when the reduction falls below the determined normal standard. The second objects are secured by subjecting the metal to a reducing tensile strain, and simultaneously raising its temperature during its passage through the drawing mechanism.

I shall now describe my invention more fully, so that others skilled in the art may make and use the same.

In the drawings, A indicates the drawing spool or pulley, which is keyed or mounted on the upper end of a vertical shaft or spindle, *a*. This vertical shaft *a* is suitably journaled in the frame-work B, which supports the drawing mechanism, and is provided at its lower end with a beveled gear-wheel, *a'*, which meshes into and receives motion from the beveled gear-wheel a^2, mounted on the end of the power or driving shaft a^3.

C indicates a cooling-chamber and blast-connection, which passes from a blower (not shown) up through the frame-work B, some distance along the top of the frame, then down through the frame-work, and extends back to the rear of the heating-furnace D, where it has a valved inlet below the closed fire-chamber of the same.

d indicates a valve for regulating the admission of air from the blast-conduit and cooling-chamber C into the lower part of the closed fire-chamber of the furnace. This valve is pivoted to one end of a regulating-lever, *d'*, which is fulcrumed or pivotally attached at its center to a support on the upper side of the blast-conduit, and is connected at its other end to a compound lever, d^2, which is attached at its upper extremity to the lower part of a vertically-adjustable sleeve, *e*, so that the admission of air into the furnace may be automatically regulated by regulating the action of the valve d^4 from the vertical motion imparted to the sleeve *e* by the governor.

E indicates the governor for automatically regulating the admission of air into the furnace and automatically regulating the pressure of the resisting or compressing dies on

the metal during the drawing operation. The governor is composed of two weighted arms pivoted on the upper end of a vertical shaft, e', which arms are provided with two pivoted connecting-rods, e^2 and e^3, pivotally attached to a vertically-adjustable sleeve, e, which is provided with two friction gear-wheels, e^4 and e^5, which are adapted to be thrown by the action of the governor alternately into and out of contact with a beveled friction gear-wheel, e^6, attached to one end of a rotative weight-adjusting shaft, e^7. This rotative weight-adjusting shaft e^7 is journaled in a vertical standard, F, attached to the upper side of the frame which supports the drawing mechanism, and is provided with a screw-threaded surface, which engages in a threaded surface of an aperture in the weight-carriage e^8, to cause the latter to travel forward and backward over the carriage-way of the die-compressing lever.

F′ indicates the die-compressing lever, which is pivotally connected at one end to the vertical standard F, and has its fulcrum resting upon the upper half of the two-part resisting or compressing die F^2, which is mounted in a suitable die-block on the upper part of the drawing-table.

G indicates the delivering drum or pulley, which is mounted on a vertical shaft, g, suitably journaled in the drawing-table and in the shop-floor to admit of its easy rotation by the tension on the wire as it is delivered to the receiving drum or spool. This rotative shaft g is provided with a belt-pulley, g', which communicates motion by means of a belt, g^2, to a similar pulley, g^3, mounted on the vertical governor-driving spindle e', in order that the governor may be actuated from the rotative movement of the delivering-reel.

In the practice of my invention, compressing-dies or a two-part compressing-die of suitable shape to grip the metal tightly are put into place. A coil of wire or rod is then applied to and pressed down onto the coned delivering spool or pulley G, and attached at one end thereto in such a manner as to cause the latter to be rotated as the metal is drawn therefrom. The free end of the coil is then drawn forward through the two-part die, which is opened for this purpose, down through the open slots in the top of the heating-flue and the cooling-pipe, and then attached to the drawing or receiving drum or pulley. The open slots in the top of the furnace-flue and in the top of the cooling-tube are then closed by the insertion of stop-plates like that shown in Fig. 5, and the upper half of the two-part die is pressed down by the action of the weight upon its compressing-lever. The mechanism now being ready for operation, power is applied to the main driving-shaft a^3, causing it to rotate and impart a rotary motion to the receiving or drawing spool A, which latter movement commences to produce a tensile strain upon the wire, which draws the latter through the cooling-chamber, through the furnace and the resisting-dies, and imparts a rotative movement to the delivering-reel, and a rotative movement is communicated from the latter to the governor or automatic die-compressing mechanism.

The length of wire and the uniformity of reduction are controlled as follows: The receiving spool or reel is rotated at a certain rate of speed—say to receive four hundred and eighty feet of wire per minute—and the weighted carriage is adjusted to throw the weight out sufficiently beyond the fulcrum of the die-compressing lever to press the die against the metal with sufficient force to retard its forward movement to such an extent that the tension produced thereby will be sufficient to draw down the metal twenty per cent. during its passage from the dies to the receiving-spool. This drawing action of course retards the speed of delivery from the delivering-spool, and in this case the delivering-reel will deliver the metal at a speed of four hundred feet per minute. This being assumed as the normal standard of delivery-speed when accompanied by twenty per cent. reduction, the relative size of the pulleys of the delivery-reel shaft and the governor-spindle should be such that the rotative movement of the latter shall be just sufficient to throw the governor-balls half-way up, and keep both of the beveled friction-gears e^4 and e^5 out of connection with the gear e^6, which actuates the rotative threaded shaft which shifts the weighted carriage upon the die-compressing lever. Assuming, then, that the mechanism is rotated and adjusted as described, the metal will be drawing off the delivering-reel at a rate of four hundred feet per minute through the resisting-dies, and will pass through the furnace and become heated, to a greater or less degree, while subjected to a severe tension. This causes it to become reduced rapidly in cross-sectional area, and it then passes through the cooling or blast chamber to lower its temperature before being wound up upon the receiving-reel. As long as the reduction of the cross-sectional areas of the metal continues to be twenty per cent., the delivering-reel will continue to deliver the metal at the rate of four hundred feet per minute, and consequently the rotary speed of the governor will be just sufficient to keep the latter entirely out of gear with the die-compressing regulating mechanism; but it is evident, however, that whenever the reduction falls below or is less than the desired normal standard the delivering-reel will rotate above its normal rate of speed. This increased rate of speed increases the rotary speed of the governor, elevating it and throwing its lower friction-wheel into contact with the lower part of the friction-wheel e^6, rotating it and its threaded shaft, thus gradually running out the weighted carriage upon the die-compressing lever until the increased compression of the die upon the metal causes a sufficient tension to be produced to again bring the reduction of the cross-sectional area of the metal to the de-

sired normal standard. When the reduction is too great, a reverse strain takes place, as in this case the delivering-speed would be diminished, which, being transmitted to the governor, causes the latter to drop down, bringing its upper side of the friction-gear e^4 in contact with the upper side of the friction-gear e^6, thus imparting a reverse movement to the threaded shaft which actuates the weight-carrying carriage, and drawing the same in nearer to the fulcrum of the die-compressing lever, so that the pressure of the dies upon the metal becomes gradually diminished until its reduction by tension again falls to the determined normal standard.

In addition to the means described for securing a uniform and predetermined amount of reduction, I also automatically regulate the temperature of the metal, because if it is too cold rupture may take place, and if too hot it will not be able to stand the load of resistance and rotate the delivering-reel and automatic pressure-regulating mechanism; hence I construct my furnace with a closed fire-chamber, and supply it with air through an automatically-adjustable valved opening. This valve *d* is pivoted to a compound lever attached at its upper end to a collar, which works on the lower part of the vertically-movable rotating sleeve *e* of the governor in such a manner that an increased speed of the governor (which indicates that the metal is not drawing enough) will elevate the sleeve and actuate the compound lever in such a manner as to draw the valve farther open and admit more air or blast to the furnace, and to reverse this operation when the metal draws down more than is contemplated. It will be readily understood, therefore, that when the wire is being drawn through dies adjusted to resist its passage and produce sufficient tension upon it to reduce its cross-sectional area twenty per cent. the governor will be at its normal height, and will not interfere either with the action of the blast-inlet or with the die-pressure-regulating mechanism; but if the temperature of the metal is too low for the rod to draw sufficiently, the action of the governor will not only increase the pressure of the dies upon it, but also will open up the blast-inlet to increase the heat of the furnace and the temperature of the wire, and that it acts in a reverse manner when an opposite state of affairs is had.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a wire-drawing plant wherein the wire is reduced while passing through a heating medium, the combination, with a furnace, of a valve for regulating the supply of air thereto, and controlled by an automatic regulating device operated from the rotative movement of the delivering-reel, substantially as set forth.

2. In a wire-drawing plant, the combination, with a wire-drawing pulley and a set of wire-compressing dies, of a heating apparatus arranged between said pulley and the compressing-dies, substantially as set forth.

3. In a wire-drawing plant, the combination, with a set of compressing-dies, of a die-pressure-regulating device, substantially as described, adapted to be regulated by the rotative movement of the wire-delivering reel, substantially as set forth.

4. In a wire-drawing plant, the combination, with a drawing-pulley and a delivering-pulley, of a wire-heating device arranged between them, and a set of wire-compressing dies, substantially as set forth.

JACOB REESE.

Witnesses:
FRANK M. REESE,
WALTER REESE.