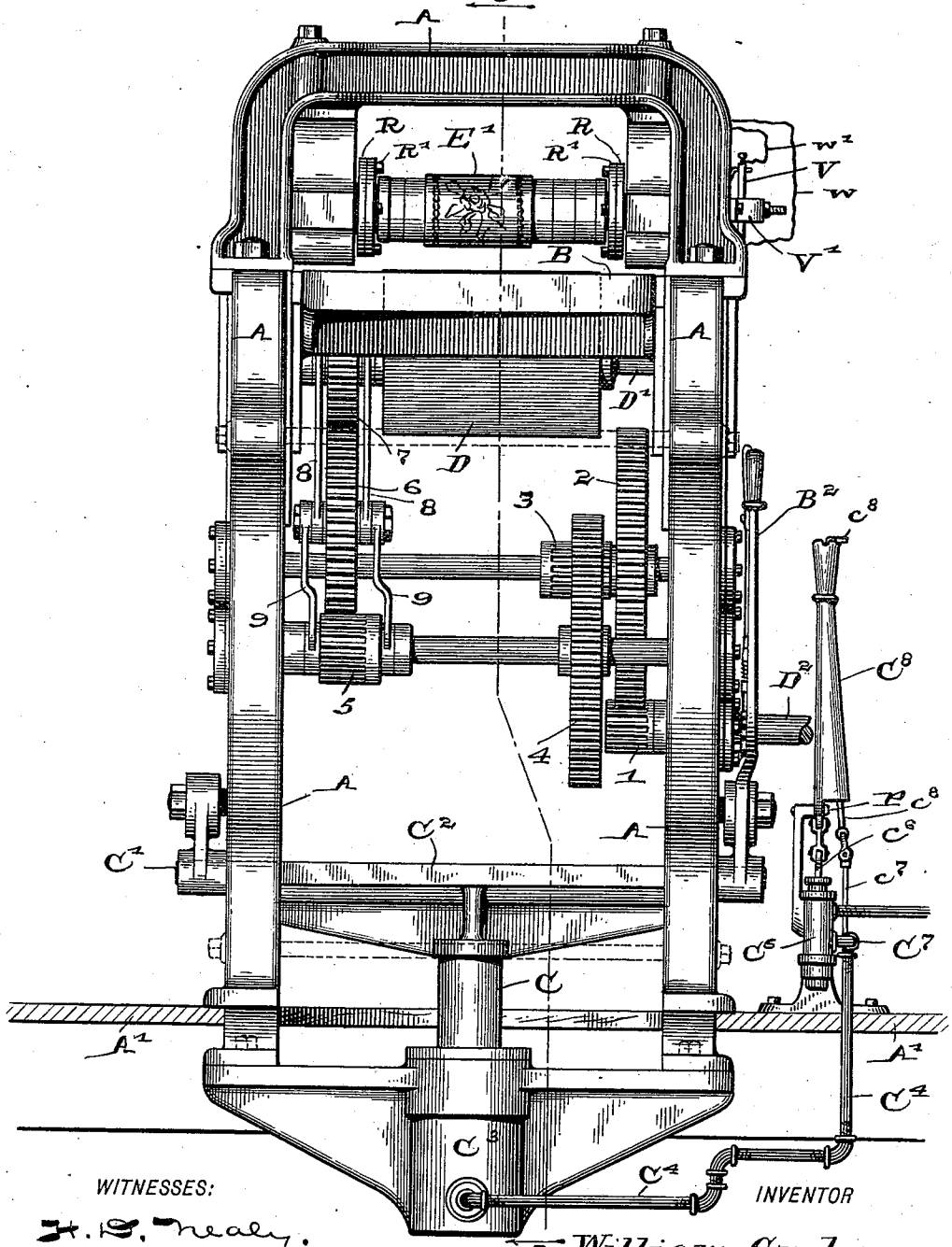
(No Model.) 4 Sheets—Sheet 1.

W. CRAHAN.

EMBOSSING MACHINE.

No. 556,491. Patented Mar. 17, 1896.

Fig. 1.



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4 Sheets—Sheet 2.

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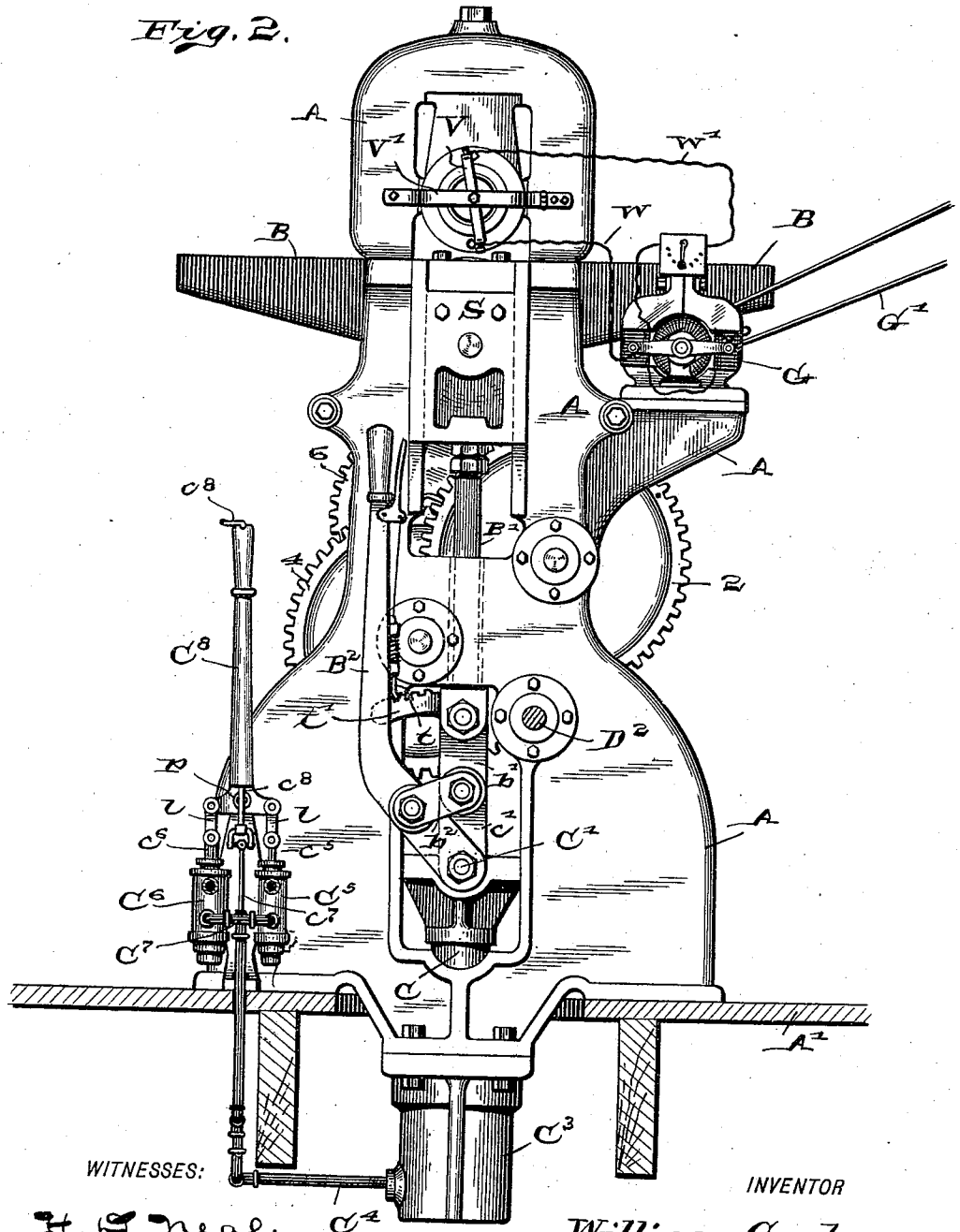
Fig. 2.



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EMBOSSING MACHINE.

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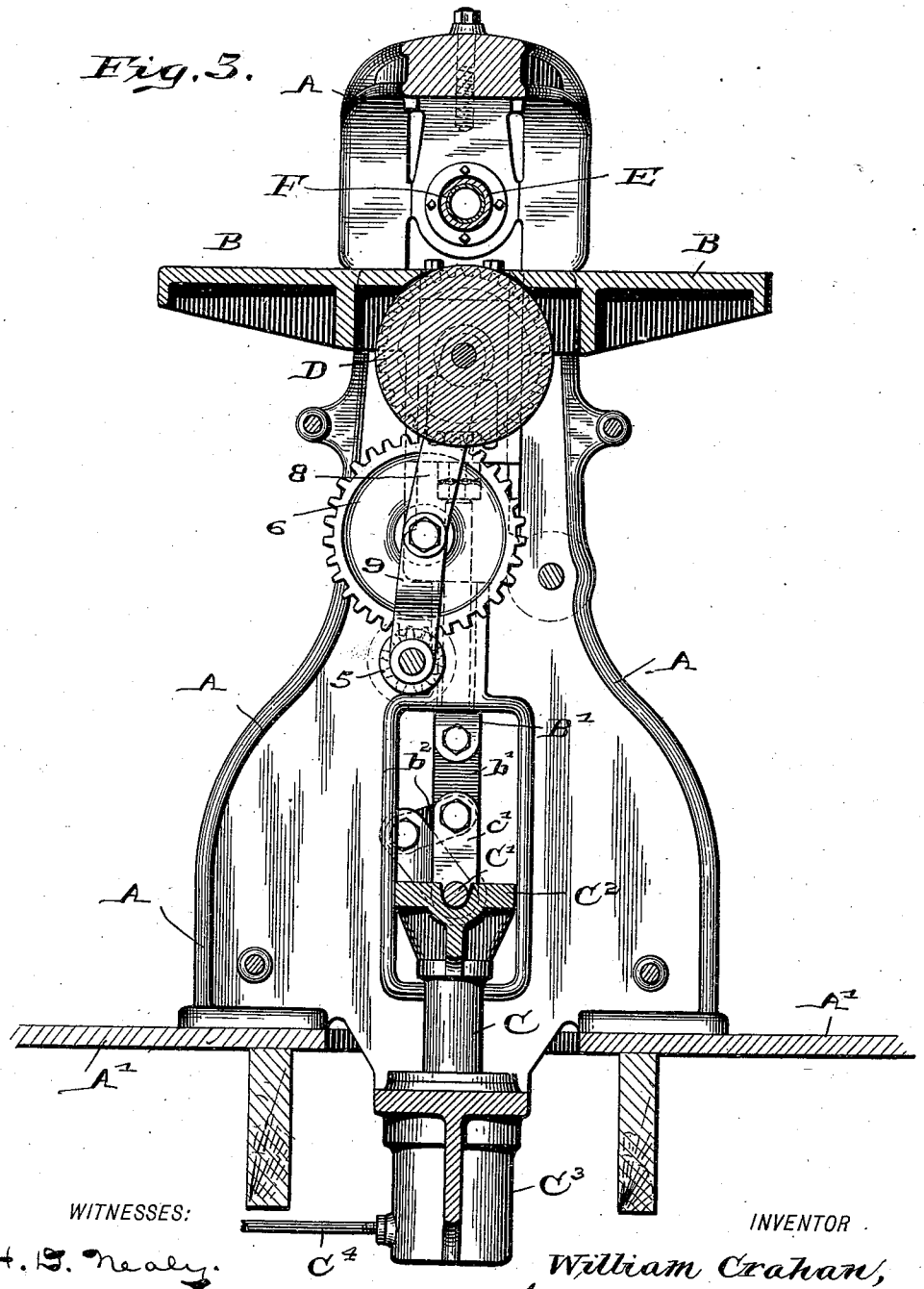
Fig. 3.



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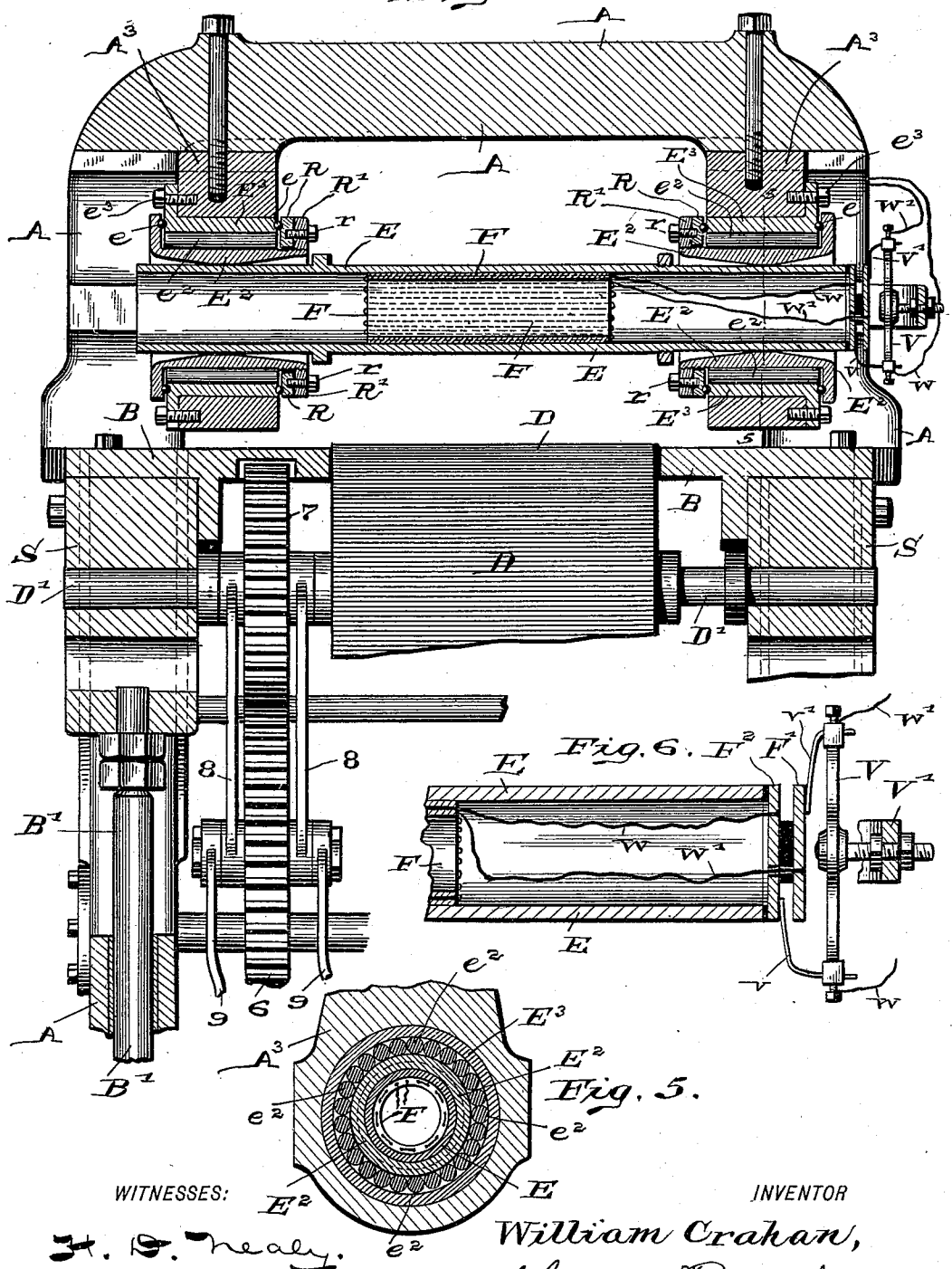
EMBOSSING MACHINE.

No. 556,491. Patented Mar. 17, 1896.

Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM CRAHAN, OF INDIANAPOLIS, INDIANA, ASSIGNOR OF ONE-HALF TO HENRY G. BYRAM, OF SAME PLACE.

EMBOSSING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 556,491, dated March 17, 1896.

Application filed April 25, 1895. Serial No. 547,158. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM CRAHAN, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Embossing-Machines, of which the following is a specification.

Referring to the accompanying drawings, which are made a part hereof, and on which similar letters and numerals of reference indicate similar parts, Figure 1 is a front elevation of a machine embodying my said invention; Fig. 2, a side elevation of the same; Fig. 3, a vertical sectional view seen when looking in the direction indicated by the arrows from the dotted line 3 3 in Fig. 1; Fig. 4, a detail vertical sectional view of the upper portion of the machine on an enlarged scale; Fig. 5, a detail sectional view through one of the bearings of the spindle on the dotted line 5 5 in Fig. 4; and Fig. 6 a detail sectional view similar to a portion of Fig. 4, but on a still further enlarged scale.

In said drawings the portions marked A represent the framework of the machine; B, a vertically-adjustable table thereto; C, the piston of a hydraulic lift for said table; D, a feed-roll in said table; E, the spindle of the embossing-roll; F, the heating-core of said embossing-roll, and G a dynamo by an electric current from which said core is heated.

The frame A consists in the main of two heavy castings, which rest on a floor A′ of the building in which the machine is to operate, and a cross-bar uniting said main castings at the top, the several parts being of appropriate size and form to contain and carry bearings for the mechanism.

The table B is operated vertically from the hydraulic lift through strong vertically-arranged rods B′ moving in bearings in the frame A and connected by means of toggle-links b' c' with a rock-shaft C′ carried by said lift. The toggle-links are normally in line, so that the structure operates as a stiff rod, as shown most clearly in Fig. 2. It is sometimes desirable, however, to lower the table temporarily and then restore it to its same position. A lever B^2 connected to the rock-shaft C′ is the means I have devised for this purpose, which is connected to the central pivot, uniting the toggle-links b' and c' by a link b^2, also as shown in Fig. 2. An ordinary segment t', secured to the rod B′, and spring-latch t, attached to the lever, serve to retain the lever B^2 in any desired adjusted position. The operation is, as will be readily understood, that in grasping the top of the lever the latch is raised and the lever swung to the desired point, rocking the shaft C′ and throwing the toggle-links to a position at an angle with each other through the medium of connecting-links b^2, said toggle-links being loosely pivoted at all points, while the lever is rigidly attached to the rock-shaft. When the temporary purpose for which this has been done is accomplished, the lever is thrown back, rocking the shaft C′ and forcing the toggle-links back into their normal position, which restores the table to its normal position and without the necessity of utilizing the hydraulic lift.

The immediate means of union between the rods B′ and the table proper are the slides S, which are bolted firmly to the table, as shown in Figs. 2 and 4, and which are mounted in ways formed therefor in the frame A, and which also contain bearings for the shaft D′ of the feed-roll D, also as shown in said Figs. 2 and 4.

The hydraulic lift is not in itself a novel device, such novelty as there is consisting in its arrangement and combination with the other parts for the purpose described. Its piston C has a head C^2, in which are bearings for the rock-shaft C′, which is operated, as above described, by the lever B^2. Said piston is mounted in a cylinder C^3, to which the fluid is supplied from suitable pumps through pipe C^4. Two pumps are shown, C^5 and C^6, one of which is provided with a small plunger and the other with a larger plunger, and one or the other of these pumps is used in forcing the fluid into the cylinder, according as it is desired to raise it slowly or rapidly. The common method is to first make use of the pump with the large piston, and thus raise the piston C and the parts carried thereby rapidly until the table is at approximately the height desired, and then turn off this pump and turn on the other one, which completes the operation more slowly and gradually. This is facilitated by the use of a three-

way valve C^7, which is operated by a valve-rod c^7, coupled by a universal joint to a continuation-rod c^8 running up through the center of the pump-lever C^8. The latter is pivoted at p to the frame A, and its extensions at the lower end are connected by means of links l with the piston-rods c^5 c^6 of the pumps C^5 C^6, as will be readily understood upon an inspection of the drawing Fig. 2. The pump in use is operated by forcing the lever C^8 back and forth, and either pump can be thrown into operation at will by turning the rod c^7 and its extension c^8 to the proper position, as will be readily understood, or both pumps can be cut off by turning said rods to a still different position. The upper end of the lever C^8 preferably has three notches so arranged that when the handle on the rod c^8 is turned to rest in one of them the valve is brought exactly to one of its positions.

The feed-roll D is carried by a shaft D′, which rests in bearings in slides S attached to the table B. Its upper surface projects through an opening in said table B slightly, just enough to engage with and carry forward the wood being embossed. Obviously said roll and said table move together. Said roll should move very slowly, but with great power. It is therefore driven by a train of reducing speed gears, as shown, from a driving-shaft D^2. This train of gears may be composed of as many or as few gear-wheels as may be necessary to produce any desired variation in speed and power. I have shown a train of seven, 1 2 3 4 5 6 7, as shown most plainly in Fig. 1, the first five of which are on shafts running in fixed bearings in the frame A, while the wheel 7 is on the shaft D′ of the feed-roll D, and the wheel 6 is an intermediate gear-wheel, and is carried by a short idle shaft having its bearings in the ends of links 8 and 9, which links are connected at the other ends to the shaft D′ of the feed-roll and the shaft carrying the gears 4 and 5, respectively. By this means the variation in distance between the feed-roll shaft and the other shaft is provided for without throwing the gears out of or varying the engagement.

The spindle E of the embossing-roll is hollow or cylindrical, as is common in embossing-machines, and carries the embossing-roll E′, which latter is only shown in Fig. 1, being omitted in the other figures for purposes of clearness. This spindle is not in itself of peculiar construction, but is provided with bearings of, as I believe, an entirely new form. As is well known, the spindles of embossing-machines run under heavy pressure and are at the same time subjected to great heat. This has resulted in allowing such spindles to yield or spring somewhat in use, and thus bind or twist in the bearings. Roller-bearings have been commonly provided, and the result has been that, the force being thrown on the ends of the rollers of the bearing at the ends nearest the embossing-roll, such rollers have been worn down more rapidly at that point than at other points, while the spindles themselves have also worn at this point. The rollers becoming of unequal diameter at various points in their length will not run evenly, and the size of the spindle varying at various points of contact aggravates the difficulty, and the consequence has been that these bearings and spindles have been rapidly worn, necessitating their entire replacement. As the spindles and rollers are commonly of steel and finely finished, they are expensive and their replacement has been a matter of considerable expense and has largely added to the cost of maintaining such a machine. To obviate this difficulty, I have provided a bearing consisting of sleeves E^2 surrounding said spindles, the inner surfaces of which taper in each direction toward the center, leaving only a narrow bearing where said surface comes in contact with said spindle, and outer bearings therefor, which are preferably in the form of other sleeves, E^3, secured to the frame A, and rollers e^2 between said two sleeves. This arrangement insures that there shall be no unequal bearing on the rollers e^2 by reason of any yielding or springing of the spindle E, as in such cases the motion is a rocking one over the narrow bearing between said spindle and its surrounding sleeve E^2, while, as said sleeve revolves with said spindle, there is no wearing action between them, and as the bearing is always uniform upon the rollers e^2 they wear, if at all, equally throughout their length, and therefore much less rapidly than when the strain is brought upon them unequally, as in the old construction. This device is of great importance and is a leading feature of my present invention. These sleeves may be made and attached in any desired manner. I have, however, preferred to make flanges integral therewith upon one end, the flange upon the sleeve E^3 serving, together with machine-screws e^3, as the means by which it is attached to the adjacent portion of the frame A, (which is preferably a detachable block A^3, as shown most plainly in Fig. 4,) and the flange on one end of the sleeve E^2 serves to embrace the corresponding end of the flanges E^3 and thus hold said sleeve E^2 in place. A flange is also provided at the other end, and preferably of the following construction: First, an annular ring R is provided, which is followed by a corresponding but screw-threaded ring R′, which serves as a nut to hold the ring R in place. Grooves are turned in the adjacent faces of the parts, as shown, and into these are placed balls e, which serve to reduce the friction between the sleeves E^2 and E^3 as a whole. When these parts are all in place and the ring or nut R′ has been screwed up to the point desired, then small screws r are inserted through holes in the ring or nut R′ and enter screw-threaded perforations in the ring R,

which is thus clamped tightly thereto, and the assemblage of parts is thus completed.

The heating-core F is arranged centrally within the hollow spindle E, preferably is in form a cylinder, and is composed preferably of copper or some other metal of equal high heat-conductive properties. Its exterior surface fits closely against the interior surface of the spindle E, so that the heat generated is communicated directly to said spindle by contact over its entire peripheral surface, this being highly important to secure the most effective and even distribution of such heat to the work. Said core is pierced from end to end with numerous perforations, through which conductor-wires *w w'* are woven back and forth, as indicated, which wires are insulated with asbestos or other similar heat-resisting material, and which are so proportioned and arranged as that great resistance to the passage of the electric current shall be occasioned and high heat thus generated, and the embossing-roll thus sufficiently heated without the employment of flame.

Machines of this character are most commonly employed in the furniture-factories, where there is much combustible material, and where consequently great precautions are taken against fire, and it has been one great objection to machines of this sort that heretofore it was necessary to use a furnace to heat the embossing-roll. By my invention this has now been wholly dispensed with and the necessary heat is produced without the necessity of a furnace or the use of fuel of any sort at or near the place where the machine is used. The wires *w* and *w'* lead in from the dynamo to the bar V, and thus, by brushes *v* and *v'*, to independent insulated disks F' and F², secured to the end of the spindle E, and thence to the heating-core F and through the perforations therein, as above described. The bar V is stationary, except as it is purposely moved, and is supported by a bracket V', secured to the frame A. The spindle E, carrying the embossing-roll, of course revolves, and the contact is maintained by the brushes *v v'* slipping over the disks F² and F', respectively, as will be readily understood.

The dynamo G is of any ordinary or desired construction and is driven by a belt G' from any suitable source of power, (not shown,) and thus generates the current. The wires, switches, and other appliances connected thereto are such as are commonly used with dynamos and as will be readily understood by those skilled in the art, and therefore are not necessary to be described herein.

Having thus fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in an embossing-machine, of the framework, the embossing-roll, a vertically-adjustable table arranged below said embossing-roll, a hydraulic lift for operating said table, a duplex pump for operating said hydraulic lift, the two pump-pistons being of unequal size and arranged to operate alternatively, whereby the hydraulic lift may be operated rapidly when desired, and by shifting the pump connection operated more slowly, and a pump-lever C⁸ common to both adapted to alternatively operate each of said pistons, substantially as set forth.

2. The combination, in an embossing-machine, of the framework, the embossing-roll, a vertically-adjustable table below said roll, a suitable means (as a hydraulic lift) for actuating said table, a connection between said means and said table embodying toggle-links, and a lever for operating said toggle-links, whereby the table, after being raised to a desired position, may be temporarily lowered and again raised to said position without operating the main means for raising said table, substantially as set forth.

3. The combination, in an embossing-machine, with the embossing-roll spindle, of a bearing consisting in part of a sleeve having an interior surface rocker-shaped in longitudinal section which is in contact and revolves with said spindle, and suitable surrounding bearing-surfaces against which said sleeve bears as it revolves, whereby, in case of springing or yielding on the part of said spindle, said last-named surfaces are permitted to retain their equal bearing, substantially as set forth.

4. The combination, in an embossing-machine, with the spindle of the embossing-roll, of bearings consisting of sleeves surrounding and adapted to revolve with said spindle, and provided with an interior rocker-shaped surface, a surrounding fixed bearing, pins or rollers between said sleeves and said surrounding bearing, flanges on said sleeves, grooves in said flanges and in the adjacent faces of the surrounding bearing, and balls in said grooves, substantially as shown and described.

5. The combination, in an embossing-machine, of the embossing-roll, a heating-core within the spindle of said roll consisting of a metal cylinder or roll secured therein and having numerous longitudinal perforations therethrough, wires running back and forth through said perforations, an electric generator for supplying current to said wires, and suitable insulation and connections therefor, whereby said embossing-roll is heated by said electric current, substantially as set forth.

6. The combination, in an embossing-machine, of the embossing-roll, its spindle, the heating-core F within and in close surface contact with said spindle having numerous perforations therein, an electric generator, wires *w* and *w'* running to and from said core to said generator, an arm V supported by the framework and carrying the parts of said wires immediately connected to the generator, and insulated disks F' and F² carried by the

embossing-roll spindle and connected to the parts of said wires immediately connected to the heating-core, and suitable brushes extending from said arm V to said insulated heads, said several parts being arranged and operating substantially as set forth.

In witness whereof I have hereunto set my hand and seal at Indianapolis, Indiana, this 23d day of April, A. D. 1895.

WILLIAM CRAHAN. [L. S.]

Witnesses:
CHESTER BRADFORD,
JAMES A. WALSH.