

No. 724,876.

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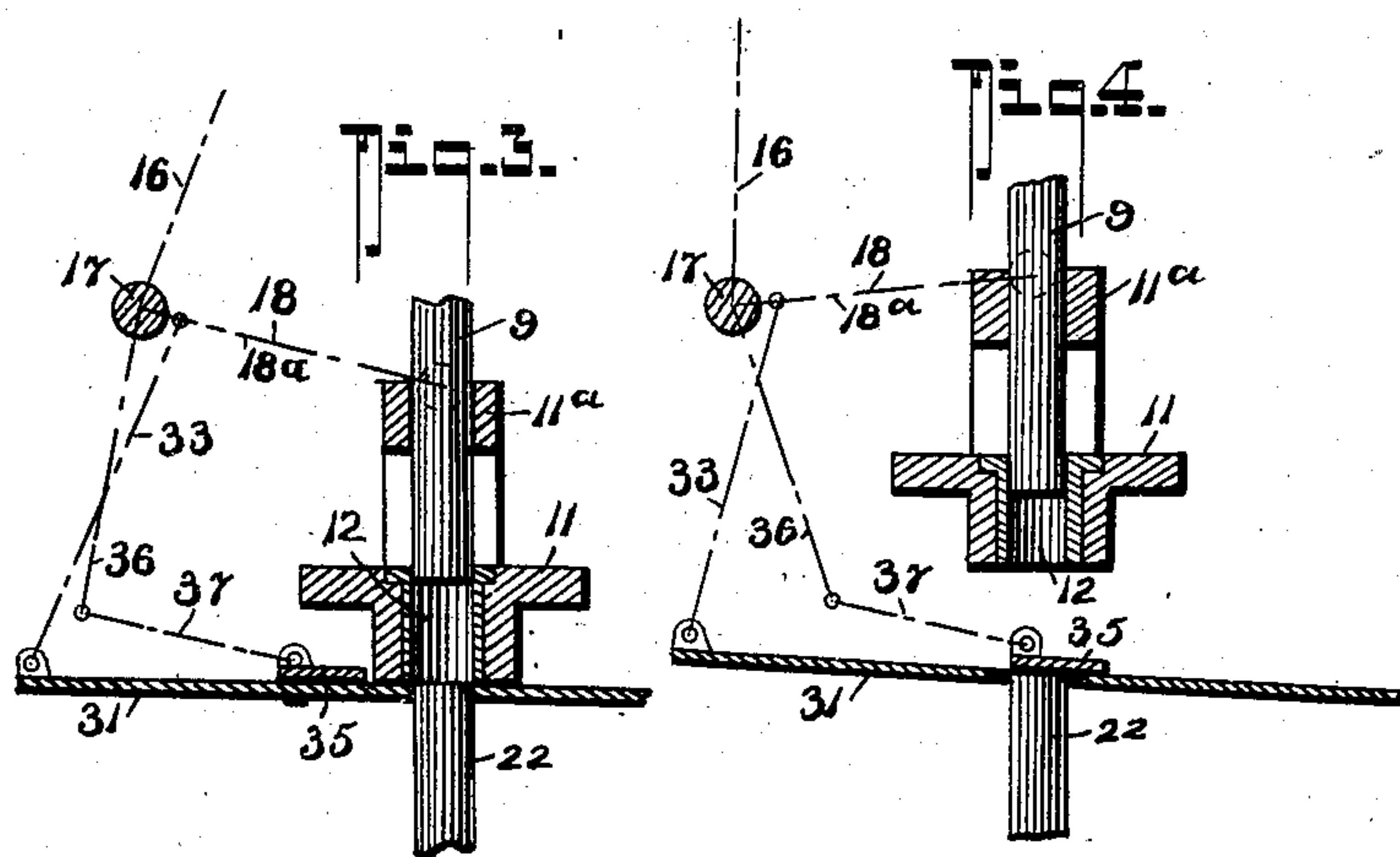
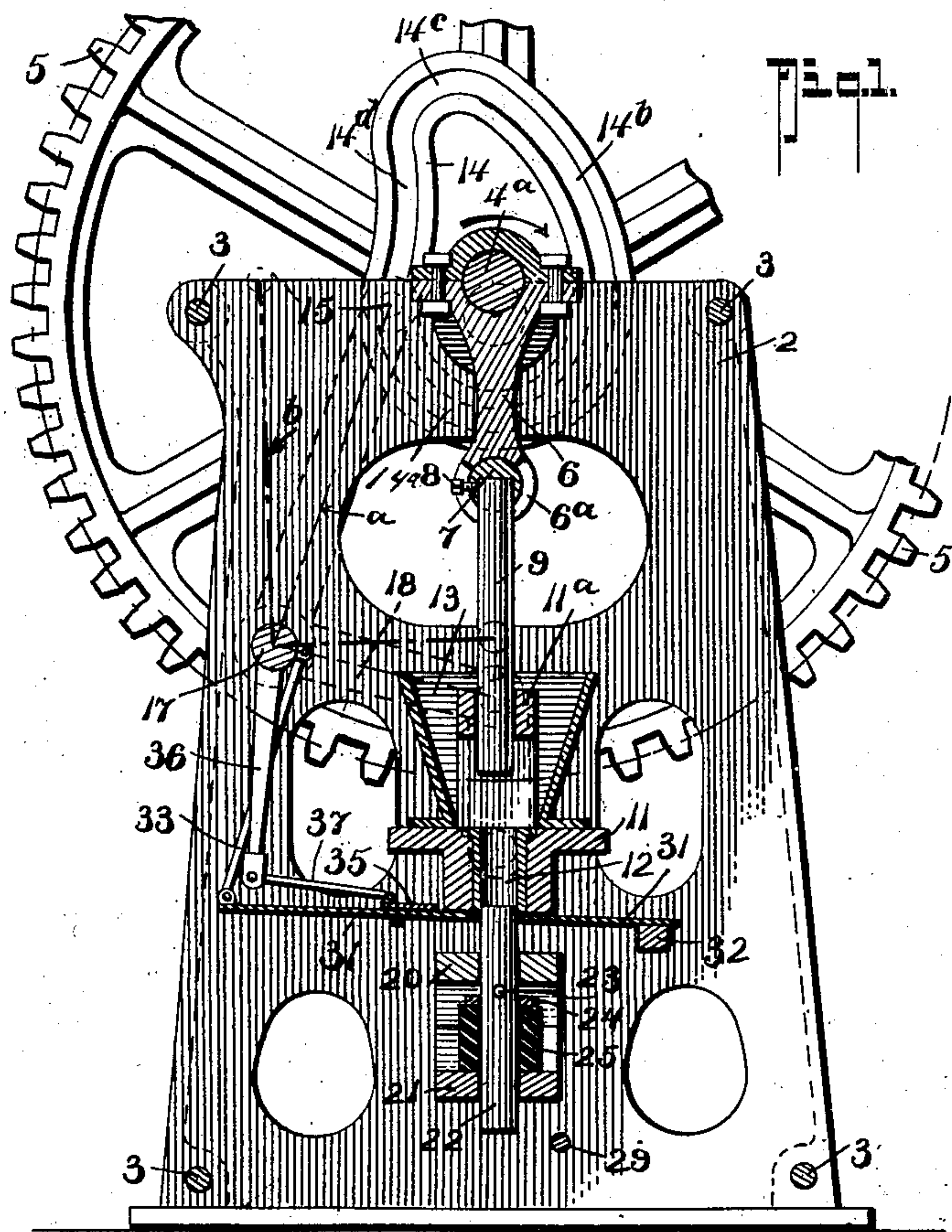
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BRIQUETING MACHINE.

APPLICATION FILED APR. 1, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

*A. E. Dieterich*  
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INVENTORS

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ATTORNEY

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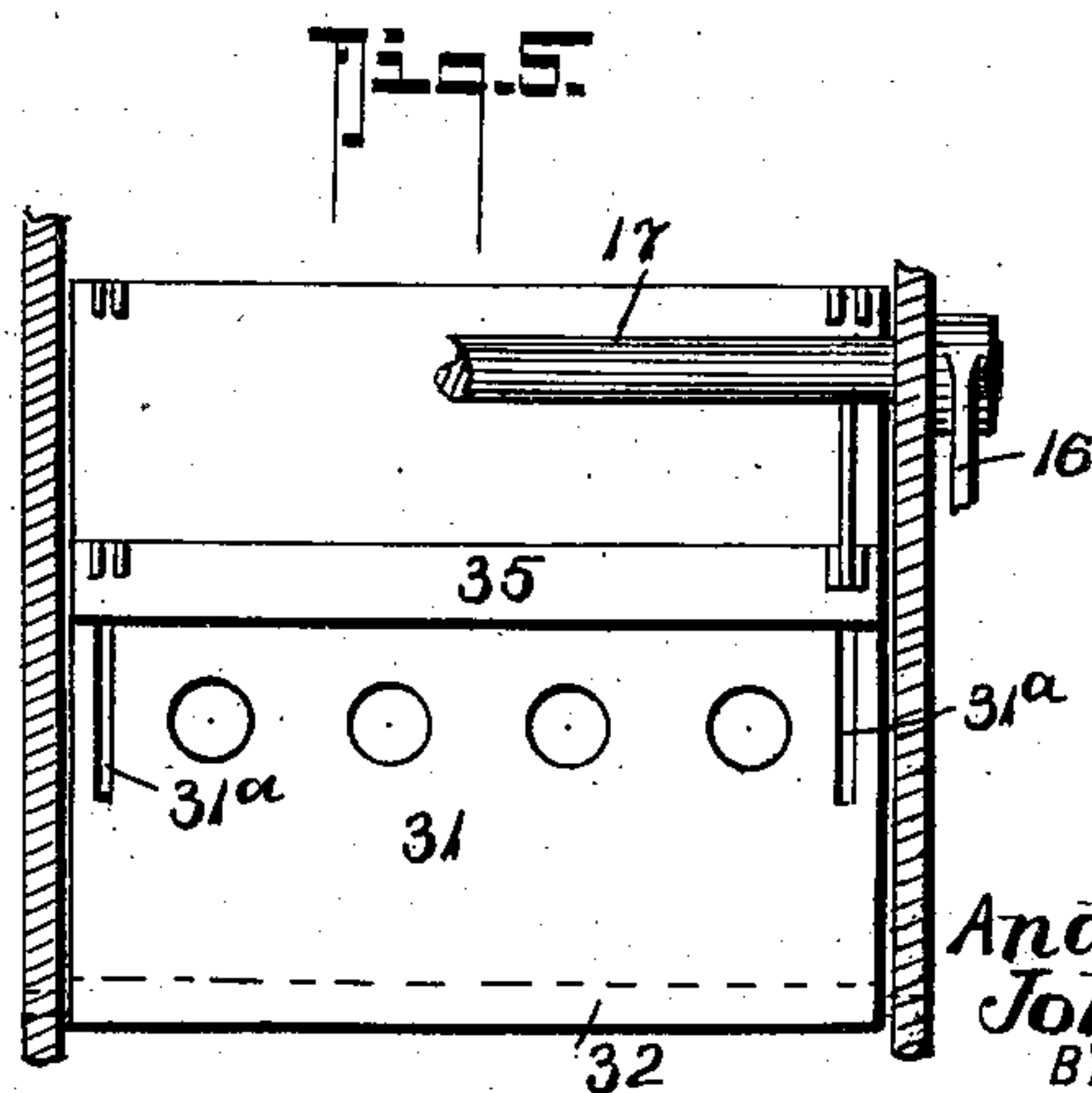
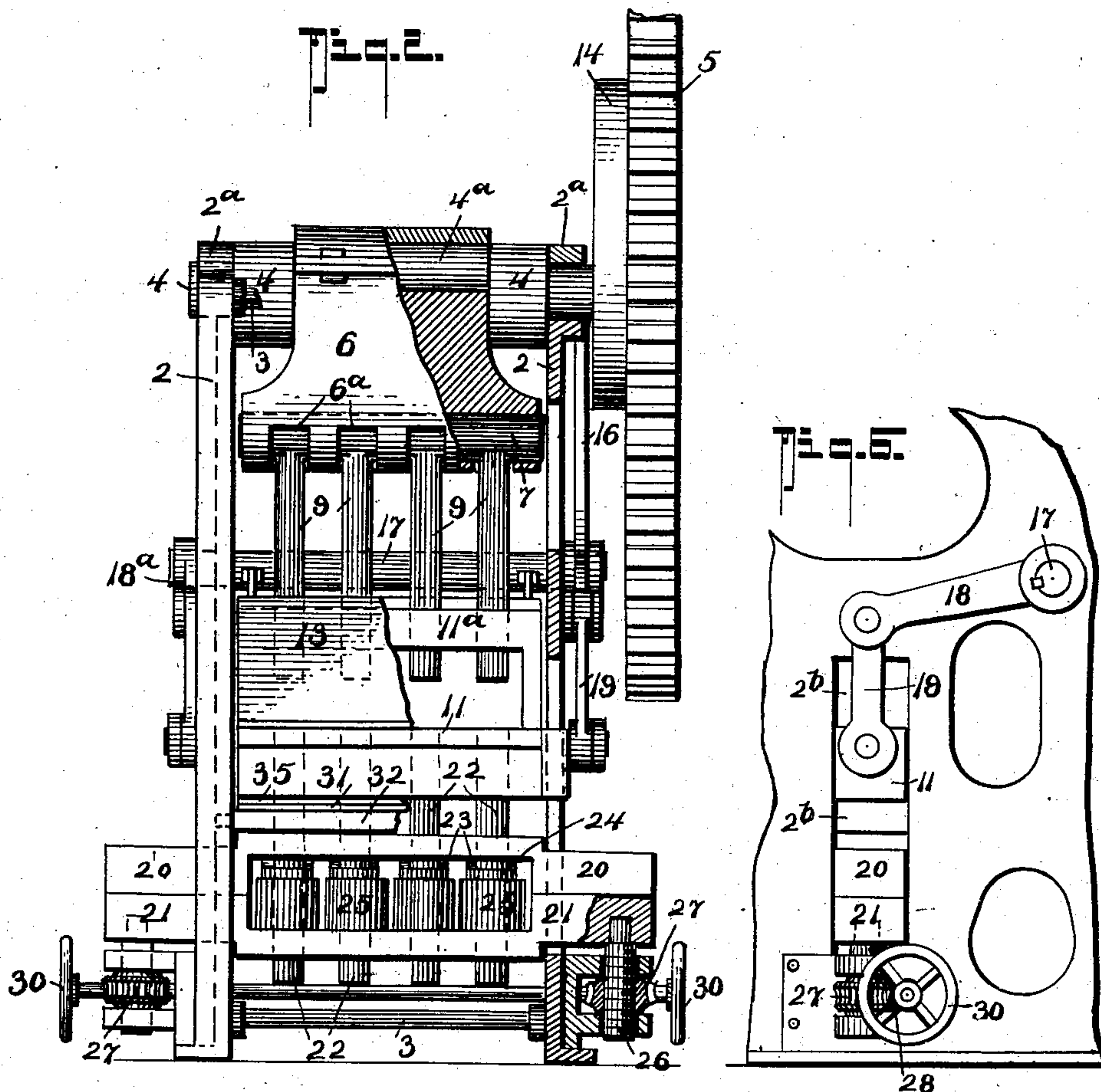
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# UNITED STATES PATENT OFFICE.

ANDRU JOHNSON AND JOHN CHARLES CROFTS, OF NELSON, CANADA.

## BRIQUETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 724,876, dated April 7, 1903.

Application filed April 1, 1902. Serial No. 100,932. (No model.)

*To all whom it may concern:*

Be it known that we, ANDRU JOHNSON and JOHN CHARLES CROFTS, citizens of the Dominion of Canada, residing at Nelson, in the Province of British Columbia, Canada, have invented a new and useful Briqueting-Machine, of which the following is a specification.

Our invention relates to a briqueting-machine of the class used for the purpose of compressing the finer ore concentrates in association with suitable fluxes in preparing the same for smelting; and our object has been to design a machine that will perform the work of compression in a uniform manner and that will permit the use of a series of briquet-molds in one frame with one operating mechanism, thereby considerably multiplying the output of the machine.

The machine has also several novel features of operation and construction which are fully set forth and illustrated in the following specification and its accompanying drawings, in which—

Figure 1 illustrates the machine in vertical cross-section. Fig. 2 is a front elevation and part section. Figs. 3 and 4 show the correlation of plunger, mold-frame, sweep-bar, &c., with the crank-pin in the positions *a* and *b* in Fig. 1; and Fig. 5 is a plan of the receiving-plate. Fig. 6 is a side elevation of a portion of the machine.

From the drawings it will be seen that the machine consists of side frames 2, suitably stayed and braced the required distance apart by the rods 3. Rotatable in bearings 2<sup>a</sup> of these frames is the crank-shaft 4, driven by the gear-wheel 5, secured at one end thereof. The pin 4<sup>a</sup> of this shaft is between the frames 2 and is of ample length, affording good wearing-surface, and is provided with the connecting-rod member 6, the lower end of which is increased in width to approximately that of the distance between the side frames. In this lower end is mounted so as to be free to oscillate the connecting-pin 7, and into the under side of the pin are secured, by set-screws 8, the plungers 9, openings 6<sup>a</sup> being provided in the lower side of 6 to permit the passage of the plungers 9 and allow them such rock-

ing movement with the pin 7 as the angularity of the connecting-rod may require.

Slidable in guideways 2<sup>b</sup> in the side frames at a suitable distance in a vertical plane below the axis of rotation of the shaft 4 is the stout frame 11, in which are the briquet-molds 12, of tempered steel, and forming part of the same casting is the member 11<sup>a</sup>, which receives and guides the end of the plungers.

Attached to the upper side of the mold-frame 11 is the ore or dust hopper 13, designed to shed the ore into the molds when the plungers are withdrawn.

A reciprocating vertical motion is imparted to the frame 11, carrying the briquet-molds and ore-hopper, by means of a pin or roller 15, projecting laterally from one arm 16 of a bell-crank lever secured to one outer end of a rocking shaft 17, supported in bearings in the side frames 2. This pin or roller 15 is adapted to be engaged in the groove of a cam 14, secured to the shaft 4 or its driving-wheel 5, and the motion thus derived from the cam-groove is communicated to the mold-frame 11 by the other arm 18 of the bell-crank on one side and a corresponding lever 18<sup>a</sup> at the other end of the rocking shaft 17, these levers being connected to outwardly-projecting pins on the ends of the mold-frame 11 by the links 19.

Situated immediately beneath the mold-frame 11 and slidable vertically in the lower part of the guideway 2<sup>b</sup>, in which 11 slides, is a frame composed of the upper and lower members 20 and 21. These support the anvil-pins 22, which form the bottoms of the briquet-molds and against which the material is compressed. The pins are an easy fit through both top and bottom bar, and a cross-pin 23 through each anvil-pin just below the upper bar 20 bears on a washer 24, surmounting a rubber cushion or spring 25. The shock of the crushing effort is thus reduced and a more uniform degree of compression is imparted to the briquet, irrespective of the quantity or grade of the ore material which falls into the mold.

The anvil-pins frame 20 21 is adjustable vertically in the guideway 2<sup>b</sup> by means of screws 26 in the outwardly-projecting ends of



21, which screws are turned to raise or lower the frame by the worm-wheels 27, operated by the worm 28 on the shaft 29, turned by means of hand-wheels 30 at either side of the machine.

Situated just below the briquet-mold frame 11 is the clearing and receiving plate 31, secured in front to the bar 32, pivotally mounted in the side frames 2 and at the back suspended to the rocking shaft 17 by the connecting-links 33. This plate has a slight downward slope toward the front of the machine and is provided with openings enabling it to move freely on the anvil or bottom-forming pins 22 and by its mode of connection and support has a slight vertical vibratory movement imparted to it from the rocker-shaft.

To remove the pressed briquets off the pins 22, we provide a sweep-bar 35, slidable across the upper surface of the plate 31, to which it is held by engagement in slots 31<sup>a</sup> and actuated by levers 36 at each side, secured to the rocking shaft 17 and connecting-links 37, the finished briquets being removed from the machine by a conveyer-belt. (Not shown, as it forms no part of our device.)

Having in the foregoing fully described the construction of our machine, the manner of its operation may be readily followed.

The fine ore concentrate and the powdered fluxes with which it is mixed when required is deposited in the hopper 13, from which it falls by gravity into the briquet-molds 12 when the plungers are withdrawn, as shown in the drawings, that being the initial or starting point in the cycle of operation which we are about to describe. The crank-shaft being rotated in the direction of the arrow, the plungers 9 are forced down through the ore in the hopper 13 and compress the underlying portion of it against the cushioned resistance of the anvil-pins 22, which form the bottom closure of the molds. (See Fig. 3.) During this downward stroke of the crank-pin and the connected plungers the mold-frame 11 and plate are stationary, as the arc 14<sup>a</sup> of the cam 14, which during the downward stroke of the plungers has moved past in engagement with the rollers or pin 15 of the bell-crank arm, is concentric with the bearings of the crank-shaft; but as soon as the crank-pin commences to move up the curve 14<sup>b</sup> of the cam-groove is so shaped as to lift with a greater movement the mold-frame and its attached hopper and with its lower end above the compressed briquet, thus leaving the compressed briquets on the anvil-pins. Simultaneously with this upward movement of the mold-frame 11 the receiving-plate is slightly lifted to bring it flush with the tops of the anvil-pins, and the sweep-bar 35 is moved across and carries the finished briquets clear of the mold-frame. (See Fig. 4.) At the completion of this movement—i. e., when the mold-frame is at its extreme upward position and the sweep-bar also at its farthest outward stroke—the crank-pin and its connected plungers is a little over its half-

upward movement, so that the plungers are still in the molds and the dust cannot fall from the hopper. Further movement of the shaft, however, carries the bend 14<sup>c</sup> of the cam-groove past the pin, and the outwardly-concave curve 14<sup>d</sup> of the cam effects the quick dropping of the mold-frame and the simultaneous lowering of the plate over the anvil-pins and the return of the sweep-bar, while the plungers are fully withdrawn to their extreme upward position, which completes the cycle. This quick drop of the mold-frame not only prevents the dust falling through the molds before they reach the anvil ends, which effect their closure, but the shock of its arrested movement shakes the dust from the hopper effectually into the molds ready for the succeeding stroke and compression.

By the construction of our machine with a vertical movement of the plungers we secure a uniform flow of the dust into the molds and a simple and convenient mechanism.

The cushioning of the anvil-pins lessens jar on the machine and provides a more uniformly-compressed briquet, and the movement of the mold-frame enables the compressed briquet to be removed and the mold to be closed by the plungers while such is being done, while its rapid downward fall, as before mentioned, shakes the dust well into the mold, while not allowing any to escape, while the mold is not closed by the anvil-pin ends.

The movements of the various parts are simple and effectual, and, while we do not desire to be confined to the specific construction of frame as revealed in the drawings,

What we claim as new, and desire to be protected in by Letters Patent, is—

1. A machine for the purposes described, comprising a movable mold having a bore extended therethrough, a closure member adapted to project into one end of the bore and form an abutment, a plunger operating in the other end of the bore to oppose the said abutment, a drive-shaft, connections joining the drive-shaft, the plunger and the mold, adapted to sustain the mold in a stationary position during the compressing operation of the plunger, and to move the said mold away from the abutment and the compressed article as the plunger recedes, and a pusher device independent of the mold for engaging the compressed body and discharging it, as the mold moves from engagement therewith, substantially as shown and for the purposes described.

2. In a machine of the class described, having a compressing plunger or plungers slidable vertically through an ore-hopper surrounding the upper ends of the mold or molds; a vertically-slidable frame carrying the ore-hopper and containing the molds; a series of anvil-pins in alinement with the molds and their compressing-plungers, and forming the bottom closure of the former; a frame sustaining such anvil-pins; a spring-cushion to



each anvil-pin adapted to resist the downward shock of compression; and a means whereby the anvil-pin frame may be raised or lowered to oppose a greater or less resistance of the springs to the compressing effort.

3. In a machine for the purpose specified, having vertically-slidable compression-plungers slidable into corresponding molds in a vertically-slidable frame, and spring-cushioned anvil-pins forming the bottom closure of the molds; a cam secured to the operating-shaft of the machine adapted to maintain the mold-frame stationary during the downward stroke of the compressing-plungers, raise such frame during the early portion of the plunger upstroke and allow it to fall quickly before the completion of such upstroke; means for connecting such cam action to the mold-frame; and means operative therewith for sweeping the compressed briquets from off the anvil-pins when the mold-frame is lifted.

4. In a machine for the purpose specified, having compressing-plungers slidable vertically into molds in a similarly-slidable frame, and spring-cushioned anvil-pins against which the briquets are compressed; a receiving-plate across the tops of the anvil-pins, such plate being pivotally mounted to the frame of the machine at the front and suspended at the back in such a manner as to be susceptible of being raised slightly during the upward lift of the mold-frame; a sweep-bar

slidable on the upper surface of the receiving-plate; and means whereby such bar may be moved across the tops of the anvil-pins during the upward movement of the mold-frame and returned to its normal position before its fall.

5. In a briqueting-machine having a vertically-slidable series of compressing-plungers 9; a mold-frame 11; a hopper 13 surrounding its upper side, and a corresponding series of anvil-pins 22 in alinement with the plungers and molds; the crank-shaft 4, 4<sup>a</sup>, connecting member 6 and junction-pin 7 to which the plungers 9 are secured; a cam 14 having a special-contour groove 14<sup>a</sup>, 14<sup>b</sup>, 14<sup>c</sup>, 14<sup>d</sup>, adapted to receive a pin or roller 15 at the end of a lever 16 secured to a shaft 17; the levers 18 18<sup>a</sup> and links 19, the plate 31, supports 32, 33, sweep-bar 35 actuated by levers 36 and links 37, the anvil-pin frames 20, 21, pins 23, and springs 25, the adjusting-screws 26, worm-wheels 27 and worms and shaft 28, and hand-wheels 30.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ANDRU JOHNSON.  
JOHN CHARLES CROFTS.

Witnesses:

ALLAN H. MACDONALD,  
FRANCIS O'REILLY.