

No. 685,536.

Patented Oct. 29, 1901.

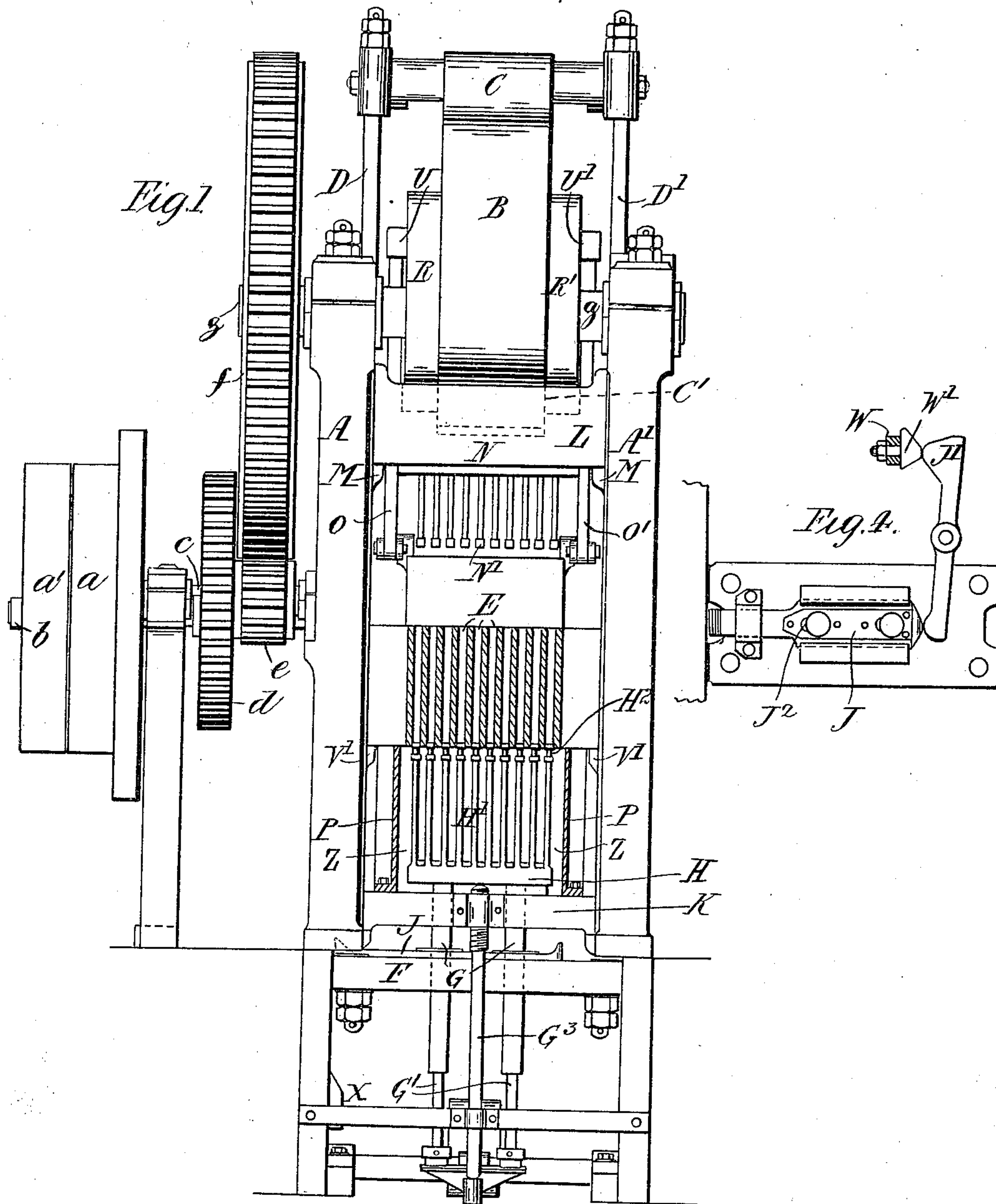
R. STANLEY.

MANUFACTURE OF TILES, QUARRIES, &c.

(Application filed Apr. 22, 1901.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses

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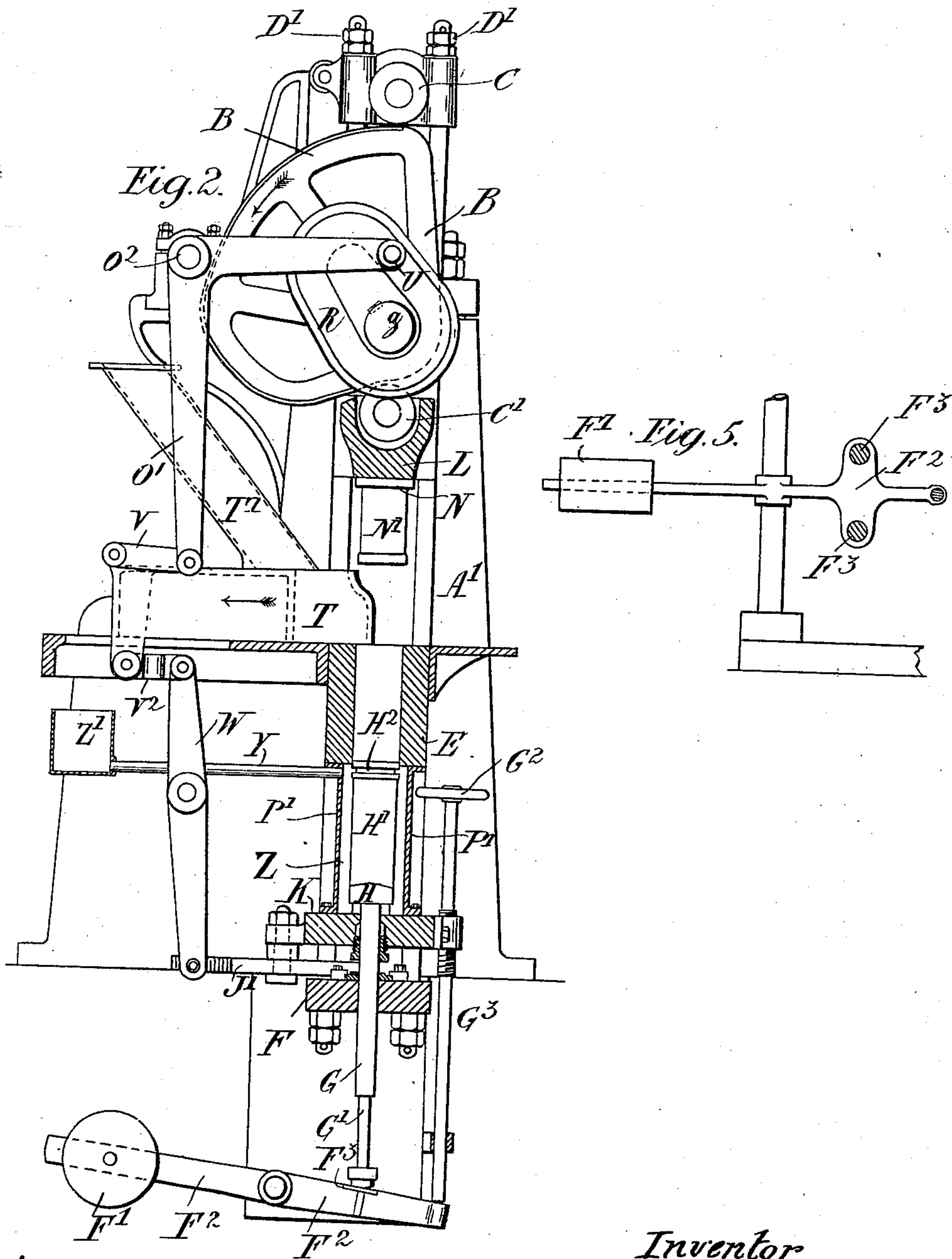
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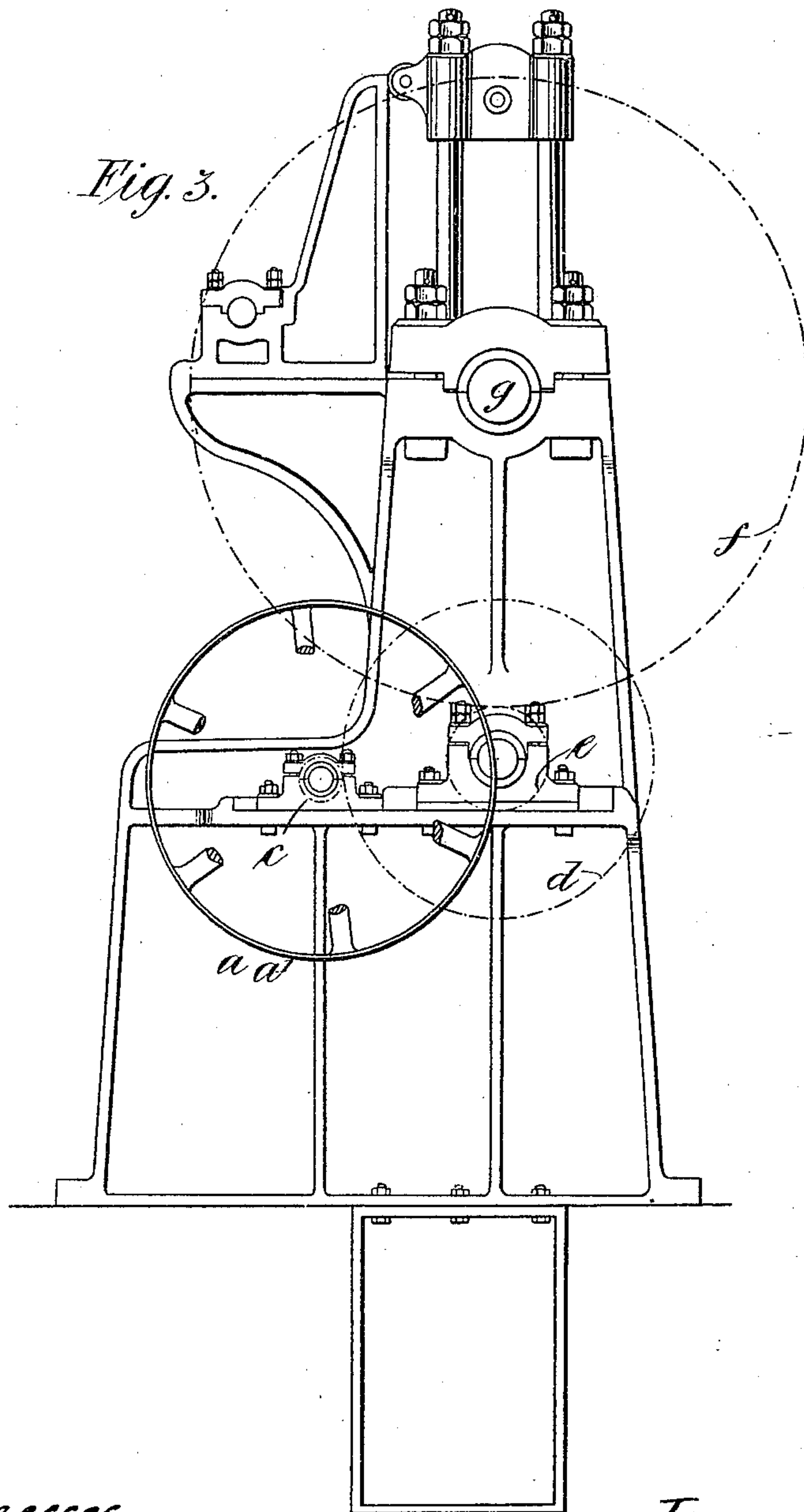
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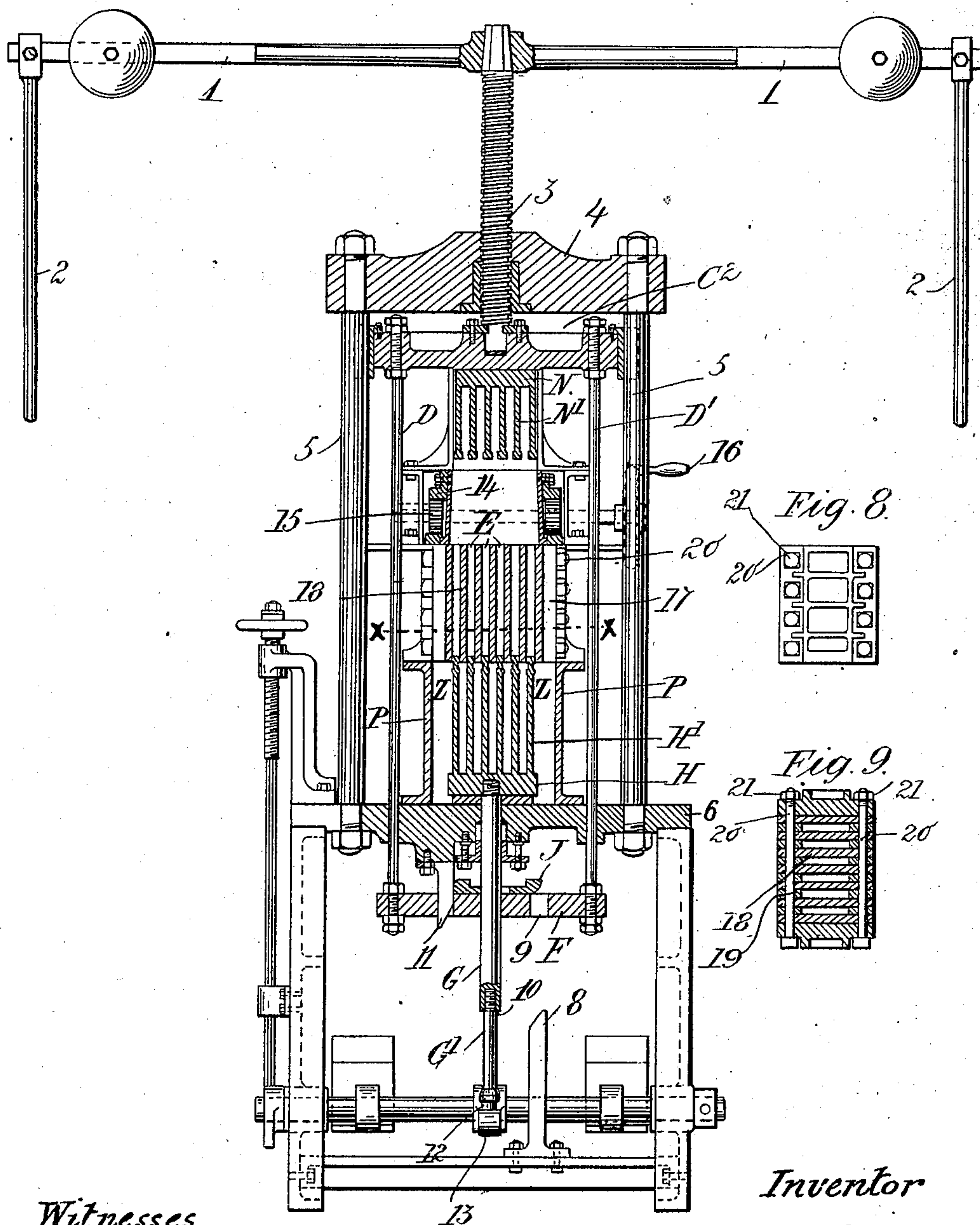
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Fig. 6.



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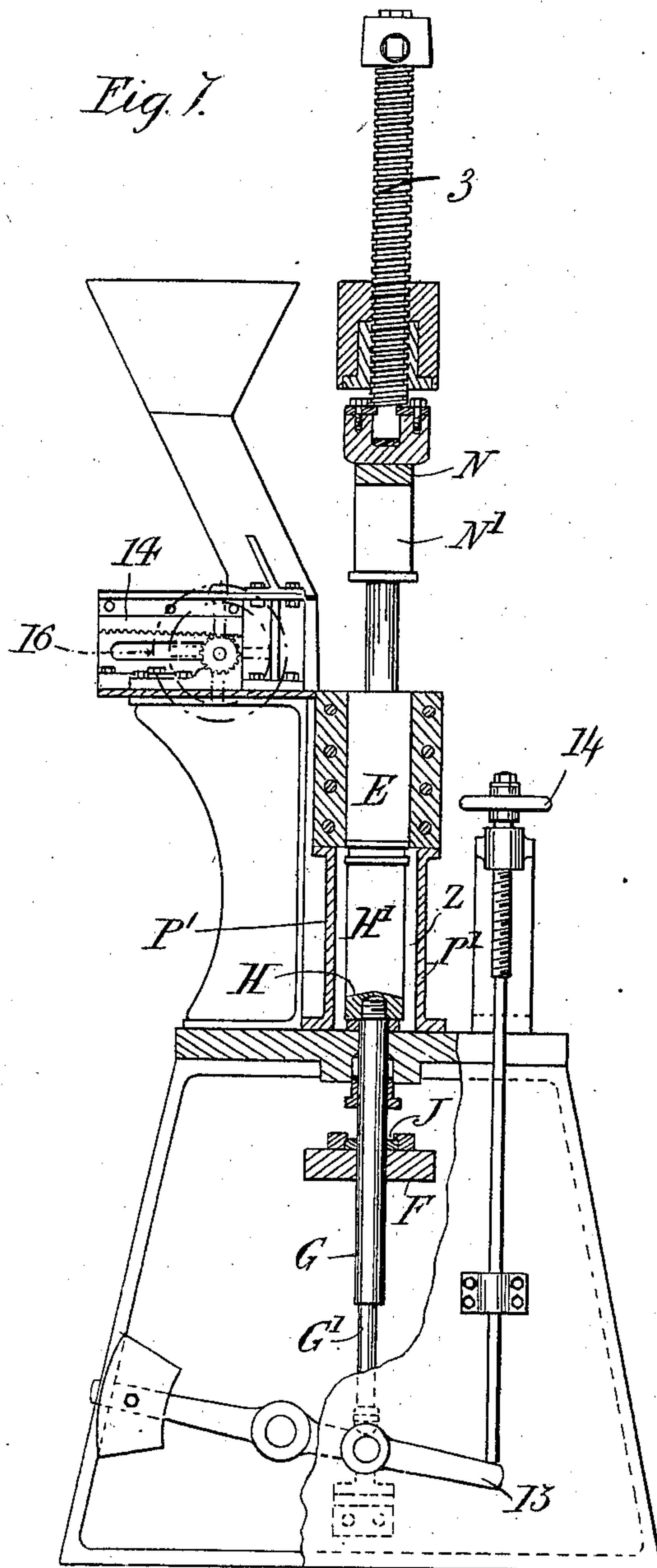
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5 Sheets—Sheet 5.



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UNITED STATES PATENT OFFICE.

REGINALD STANLEY, OF NUNEATON, ENGLAND.

MANUFACTURE OF TILES, QUARRIES, &c.

SPECIFICATION forming part of Letters Patent No. 685,536, dated October 29, 1901.

Application filed April 22, 1901. Serial No. 56,987. (No model.)

To all whom it may concern:

Be it known that I, REGINALD STANLEY, a subject of the King of Great Britain, residing at Manor Court, Nuneaton, in the county of Warwick, England, have invented certain new and useful Improvements in the Manufacture of Tiles, Quarries, and Such Like Articles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the manufacture of tiles, quarries, and such like articles, and particularly to the machinery employed for pressing the same; and the objects of the said improvements are, first, to enable a number of tiles, quarries, or the like, especially roofing and paving tiles or quarries, to be pressed at one operation of the machine, and, second, to obtain by the pressing and withdrawing of the tiles, quarries, or the like a perfectly smooth and hard face or faces, little or no more power being required than has been hitherto necessary for pressing a single tile or the like at each operation of the pressing-machine. According to the system heretofore employed such articles have been pressed by means of dies acting at right angles to the face and back, the pressure being dispersed over the area of the face, and the result has never given entire satisfaction, there always being a difficulty in producing a perfectly smooth and hard face even under enormous pressure, probably due to the absence of any sliding or polishing motion of the pressure-plunger against the face of the material under pressure, a direct pressing impact without any such motion tending to prevent the material that lies under and comes in contact with the plunger from spreading evenly, this method also frequently permitting slight inequalities to remain, to the deterioration of the face of the article pressed. It is found from experience that in the case of such goods made from clay-dust on the application of extreme pressure flatwise the article has a tendency to crack or shell, which is not so much the case when the pressure is applied in the manner hereinafter described and by which system of pressing the difficulties before alluded to are overcome and

perfectly sound hard tiles or quarries or the like produced under a pressure applied endwise which may reach any practicable limit. The goods produced by means of my invention are better able to stand weight while burning, and therefore straighter and truer after leaving the kiln, and so more durable under wear when in use.

The machine is constructed as follows: The dies, die-boxes, and lifting-plungers are all arranged so as to mold and press the flat articles edgewise or endwise, the power being transmitted through the material to the larger areas of the face and back, resulting in a greatly-increased pressure thereon and therefore making hard and sharp arrises, and this invention affords particular facility for forming a number of tiles, quarries, or the like simultaneously. A number of die-plates or small plungers are fitted to one common plunger or plunger-head and employed in conjunction with a corresponding series of die-boxes and opposite die-plates or small plungers attached to a similar and opposite common plunger or plunger-head for the purpose of compressing upwardly and pushing the completed article out from the die-box. The pressure exerted on the article pressed is so multiplied over the larger area of the face and back that in the case of thin articles the friction against the walls of the mold or die-box can only be overcome by pressure of the lifting die-plates or plungers, which is often much greater than that upon the downward-pressing plungers, and so the lower portion of the substance under pressure has a tendency to become pressed to a harder degree than the upper portion. To avoid this, the die-boxes or molds may be made to taper very slightly, widening toward the top, which enables the articles to be lifted up in the die-boxes with the application of less bottom or upward pressure than would otherwise be required, the taper, however, not being sufficient to materially affect the shape of the article pressed. In order to obtain a brighter polish on the faces of the articles pressed, both the upward and downward pressing and lifting plungers may be adapted to receive a double action, so that the article after a first pressure is lifted or pushed upwardly in the die-box and again forced down and then lifted

up a second time, the friction on the face of the articles produced by these means, in conjunction with oiled die, giving a very bright smooth finish.

5 A feature of this invention consists in oil being introduced during the lifting action between the pressed material and the walls of the dies, as shown by the drawings hereinafter described.

10 Pressure may be applied by cams mounted on a shaft connected by suitable gearing, other cams on the same shaft giving the necessary motion to the feed-box and other moving parts, thus rendering the machine auto-
15 matic; or instead of cams a screwed shaft may be employed, revolved in either direction by means of steam or other power acting through friction-gearing or otherwise.

A hand-machine may be employed, constructed in accordance with this invention, as hereinafter indicated.

The invention will now be more fully described with reference to the accompanying drawings.

25 Figure 1, Sheet 1, is a front elevation of the press, the die-box shown in section. Fig. 2, Sheet 2, is a sectional side elevation. Fig. 3, Sheet 3, is a side elevation of frame, showing gearing. Fig. 4, Sheet 1, is a plan showing
30 arrangement for releasing-plungers, and Fig. 5, Sheet 2, a plan of balance-weight lever. Fig. 6, Sheet 4, is a sectional elevation of a hand-press constructed according to this invention. Fig. 7, Sheet 5, is a transverse sectional elevation of the same. Fig. 8, Sheet 4,
35 is a side elevation of a form of die. Fig. 9 is a sectional plan of same on line $x x$, Fig. 6.

In Figs. 1 and 3, a and a' are fast and loose pulleys for transmitting power through shaft
40 b to the main shaft g by means of the gearing-wheels c , d , e , and f . The shaft g , Figs. 1, 2, and 3, is mounted upon two strong standards A and A' , Figs. 1 and 2, placed a short distance apart, an external cam B being
45 situated between them. Above and below the cam B are the two rollers C and C' , respectively, the upper roller C controlling the lower plunger-head H and the lower roller C' the upper plunger-head N . The upper roller
50 C is mounted upon a strong bar connected to four vertical rods $D D D' D'$, which are free to move in a vertical direction between suitable guides in the frames of the machine and which are carried downwardly to some distance below the die-box E . The lower ends
55 of the rods $D D D' D'$ are united by the "raising-plate" F , its function being to raise up the lower plunger-spindles $G G$, with their plunger-head H , for the purpose of delivering the molded tiles from the die-box E . The
60 raising-plate F has two holes in it to allow the plunger-spindles $G G$ to pass through and is provided with the sliding catch-plate J , (shown in detail in Fig. 4,) which is shifted
65 by contact with projecting wedge-piece X on the side of the frame across the said holes in the raising-plate F when it descends, said

holes having each a narrow extension or slot J^2 , Fig. 4, engaging under shoulders of spindles G (formed by reducing thickness of said
70 spindles at lower ends $G' G'$) and lifting said spindles as the raising-plate ascends. As soon as the plungers are raised to the top of their stroke the sliding catch-plate J is shifted
75 back by the horizontal lever J' , operated by a swivel wedge-piece W' at end of the vertical hinged lever W , Figs. 2 and 4, and the plunger-spindles $G G$ are thus released, permitting the plunger-head H to fall and come to rest on a bridge-piece K , which is securely
80 and rigidly bolted to the side frames or standards $A A'$. The lower roller C' is carried within a hollowed-out block L , supported upon lugs M , Fig. 1, on the side rods $D D D' D'$ or otherwise attached to said rods and
85 guided by suitable vertical guides in the framing or standards $A A'$. The cavity in the block L is conveniently shaped so as to form a bearing to receive the roller, and is sufficiently deep to serve as an oil-box. The
90 upper plunger-head N is secured to the sliding block L and carries a number of individual minor plungers $N' N'$, which may be filled with renewable plates or heads. The lower plunger-head H similarly carries a
95 number of minor plungers $H' H'$.

The die-box E , which is of multiplex character, rests on projecting lugs $V' V'$ on the sides of frames or standards $A A'$ and is also
100 bolted or held to the said side frames. The main external cam B is made of the requisite shape to enable it to perform the necessary series of pressing and lifting operations in one revolution.

The internal side cams $R R'$ are keyed on
105 shaft g in the proper positions relative to cam B , and in their rotation they give the requisite forward-and-backward travel to the dust-feed box T (fed by a feed-chute T') by means of two rollers $U U'$, carried upon the upper
110 ends of bell-crank levers O' , keyed on axle-bar O^2 , mounted upon the frame, the other ends being connected by link V to the feed-box T . The forward motion of the feed-box (about to feed the dies) may be also utilized
115 for moving back the sliding catch-plate J , before mentioned. This is effected by means of lever W , linked at one end to the feed-box T by a link V^2 , Fig. 2, and provided at the other end with a loose cone W' , Figs. 2 and
120 4, free to turn slightly, so as to adapt itself to the surface of the horizontal lever J' , which it strikes in its travel, causing it to push back the catch-plate J , as previously described.

The depth of material delivered into the
125 dies E is regulated by means of the screwed shaft G^3 and hand-wheel G^2 , Figs. 1 and 2, in conjunction with a balance-weight which gives useful pressure to the bottom of dust under pressure and lever $F' F^2$, Figs. 1, 2, and
130 3. If the hand-wheel G^2 is screwed up, the bottom plunger-head H is prevented from falling to its full extent by reason of the spindles G (which are provided at the end of their re-

duced extension G' with rubber buffers) coming in contact with cross-plate F³ on lever F², thus regulating the space in the dies E and breaking the shock of the fall of bottom plunger-head and spindles.

Figs. 6 and 7 show a hand-press which may be actuated by means of weighted arms I I, having depending hand-bars 2 2, revolving a screw 3, passing through a cross-head 4, mounted on and connected by standards or rods 5 with the bed-frame 6. In this arrangement the cross-bar C² and the top plunger-head N, carrying minor plungers N' N', is connected by side rods D D' to a raising-plate F, said rods D D' passing through holes in bed-frame or table 6. The lower plunger-head H, carrying minor plungers H' H', is mounted on a spindle G, having, as already mentioned, a thinner extension or lower end G', provided with a rubber buffer. The slide catch-plate J, provided with a hole, as previously described in reference to the power-machine, is carried on the raising-plate F, through which the spindle G passes to and fro up and down. On the descent of the top plunger N and raising-plate F, connected together, the beveled face of a fixed stud 8 passes through hole 9 in raising-plate F and pushes the catch-plate J forward, so that it engages under the shoulder 10 of spindle G, thereby enabling said spindle and plungers mounted thereon to be raised together and said plungers to enter the dies E and so push up the tiles. On the arrival of the raising-plate at a certain point of its upward travel a beveled stud 11, projecting down from the bed-plate, comes in contact with the opposite end of the catch-plate J and pushes it backward, so allowing the lower plunger-head and spindle to drop with their rubber-covered ends upon the block 12 on balance-weighted lever 13, the length of fall being slightly controlled by means of screw and hand wheel 14, regulating the normal position of the heads of minor plungers in the dies. The travel of the feed-box is effected by rack and pinion 14 15, worked by hand-wheel 16.

The multiplex die-boxes, as shown on 6, 7, 8, and 9, may be built up in sections consisting of strong end plates 17, wall-plates 18, and spacing-blocks 19, all held together by long threaded bolts 20, fitted with locking-nuts 21.

Referring now to the method of oiling applicable to a power and hand machine, the walls of the dies are oiled automatically at each ascent and descent of the lower plunger-head H, as follows: The space between the dies E and the fixed plate K, Fig. 1, or bed-plate 6, Fig. 6, is inclosed by plates P P' P', so as to form an oil-chamber Z. The minor plungers H' H' are grooved near the top for holding the lubricant and may be fitted with padding of absorbent material or brushes H² H², &c., which becomes saturated with oil when the plungers descend, and so oil the walls of the dies. A small vessel or tank Z',

Fig. 2, open to the atmosphere, is connected to the chamber Z by pipe Y, so that any overflow of oil caused by the sudden descent of the plungers may escape into it, and it is also used to convey the oil for replenishing the chamber Z. The system of oiling thus described is equally applicable to the hand-press.

The cycle of operations of the power-press, Figs. 1 to 5, is as follows: The die-box E is supplied with material to be compressed and molded by means of the feed-box T, (which is shown as traveling back in the direction shown by arrow, Fig. 2,) and the main shaft g being rotated by the motive power through the gear-wheels c, d, e, and f causes the cam B to revolve in the direction shown by arrow, in which rotation it bears upon the lower roller C', which then depresses the sliding block L, so causing the plunger-head N and minor plungers N' N' to enter the dies E E, &c., thus compressing the material. While this pressure is proceeding the upper roller C is descending on the opposite surface of the cam B, thereby lowering the raising-plate F, which eventually travels below the shoulders of the spindle G of the bottom plunger-head H, so as to enable the catch-plate J to pass across underneath the spindle or to lock underneath the same by coming in contact with the wedge-shaped projection X on standard A. During this period the feed-box T has traveled back and is being refilled by feed-chute T'. The raising-plate F now ascends by action of cam and roller C, carrying with it the plunger-head H and small plungers H' H', which enter the dies and force the molded material upward, and at the same time the oiled heads lubricate the walls of the die-box. Before the end of the upward stroke a slight temporary downward motion is caused by the cam B, after which the raising-plate F continues its upward motion, and at the end of its travel the sliding catch-plate J is pushed back by the horizontal lever J', operated by the cone W', and the plungers are thus released and fall until arrested by lever F² and pad F³, which break the shock of the fall of bottom plunger and spindles. The slight downward movement and subsequent continuation of upward course described causes extra friction of tiles against walls of dies, and consequently polish to the surface of said tiles. The dies are now ready to receive a new charge of material, and the process is repeated.

I claim--

1. In the manufacture of tiles, quarries and such like articles, the combination in a pressing-machine of a plurality of plungers upon a common plunger-head, a plurality of molding-chambers constituting a multiplex die-box, and a plurality of plungers upon a common lower plunger-head, the open ends of the molding-chambers being of the same shape and area as the edges or ends of the tiles or like articles to be produced, and the said combination operating to press, mold and

deliver said articles edgewise or endwise, so that the pressure which is applied upon such comparatively small areas becomes transmitted to the larger areas corresponding to the faces and backs of the articles resulting in a multiplied pressure thereon, the faces of said articles moreover not only becoming highly compressed but acquiring a smoothed and polished effect by their friction upon the walls of the molding-chambers, the whole substantially as described.

2. In the manufacture of tiles, quarries and such like articles, the combination in a pressing-machine of a plurality of plungers upon a common plunger-head, a plurality of molding-chambers constituting a multiplex die-box, and a plurality of plungers upon a common lower plunger-head, the open ends of the molding-chambers being of the same shape and area as the edges or ends of the tiles or like articles to be produced, and the said combination operating to press, mold and deliver said articles, edgewise or endwise, so that the pressure which is applied upon such comparatively small areas becomes transmitted to the larger areas corresponding to the faces and backs of the articles, resulting in a multiplied pressure thereon together with means for mechanically lubricating the interiors of said molding-chambers for the purpose of imparting a bright smooth finish to the faces of the articles aided by their friction upon the walls of the molding-chambers, the whole substantially as described.

3. In the manufacture of tiles, quarries and such like articles the combination in a press-

ing-machine of a die-box, an upper plunger, a lower plunger, and a chamber or inclosed space into and within which said lower plunger is adapted to descend in its downward course, said chamber containing lubricating substance, a small quantity of which upon the ascent of said lower plunger becomes carried upward upon the head or upper part of the same and so distributed over the inner walls of the die-box, together with feeding, pressing, and delivering mechanism, the whole substantially as described.

4. In the manufacture of tiles, quarries, and such like articles the combination in a pressing-machine of a plurality of plungers carried upon an upper common plunger-head, a multiplex die-box, a plurality of plungers mounted upon a lower common plunger-head, and a chamber or inclosed space into and within which said lower plungers are adapted to descend in their downward course, said chamber containing lubricating substance a small quantity of which upon the ascent of said lower plungers becomes carried upward upon the heads or upper parts of the same and so distributed over the inner walls of the said multiplex die-box, together with feeding, pressing and delivering mechanism, the whole substantially as described.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

REGINALD STANLEY.

Witnesses:

THOS. DAVIS,
SYDNEY E. HARRIS.