

No. 669,220.

Patented Mar. 5, 1901.

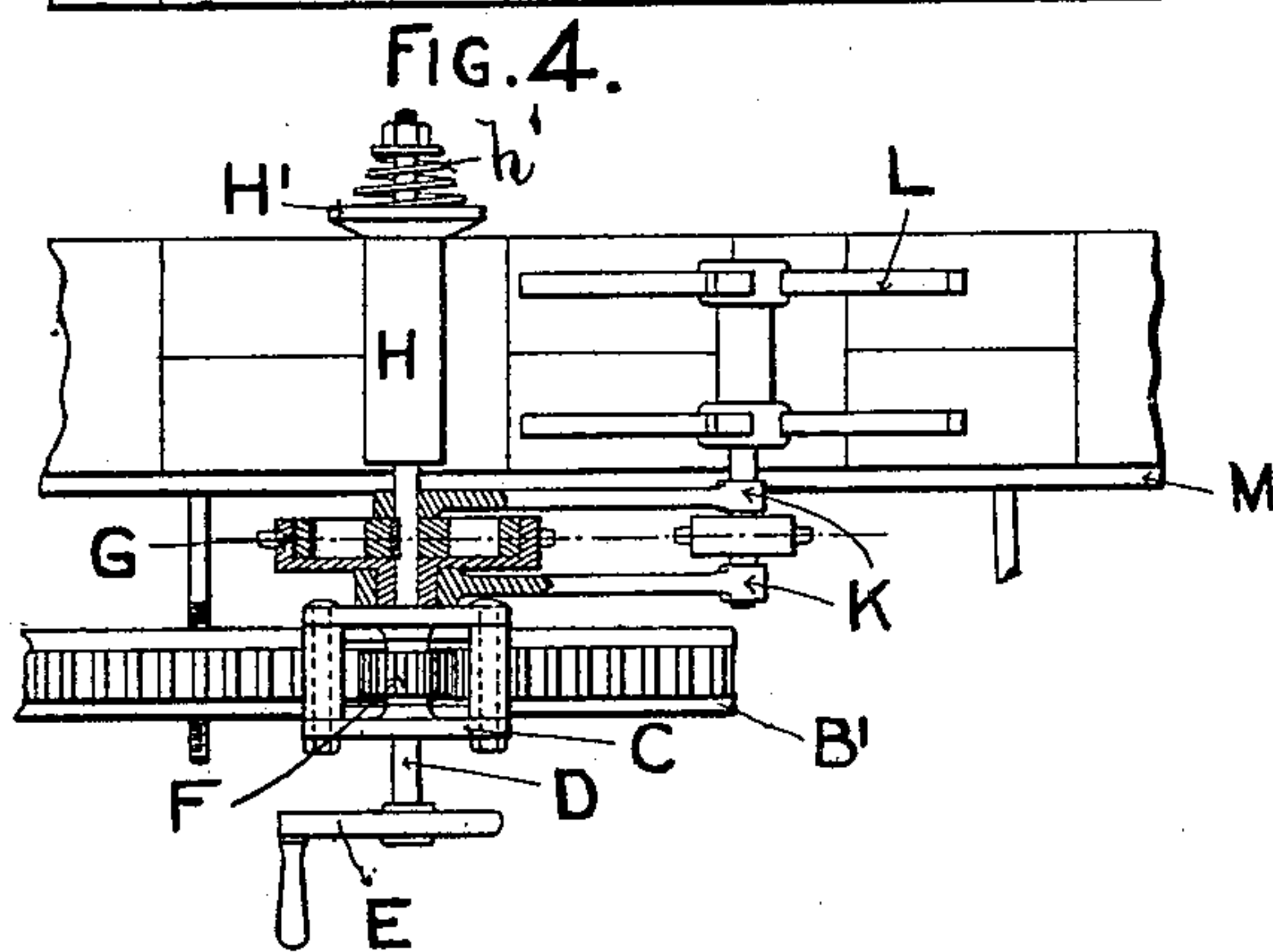
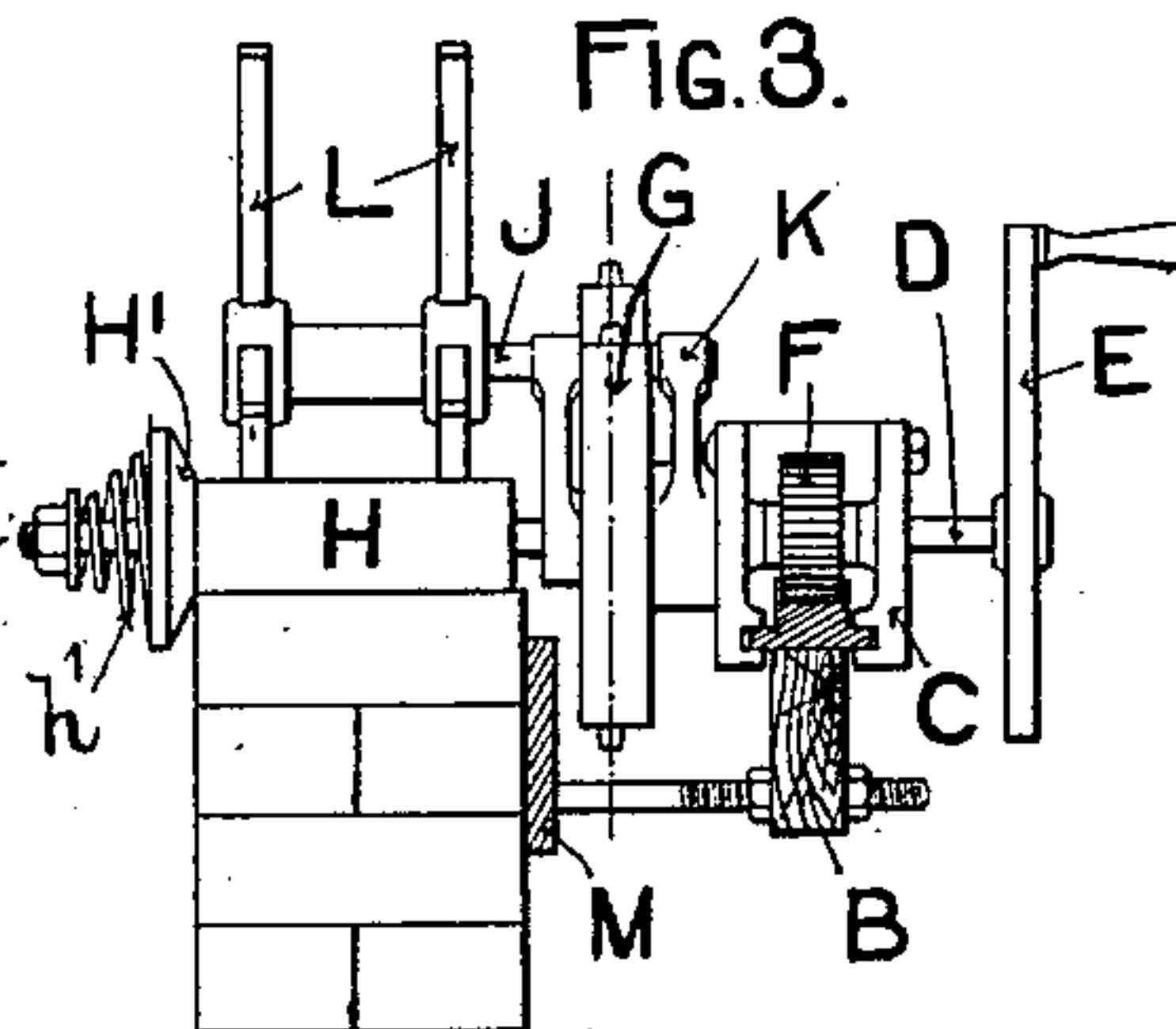
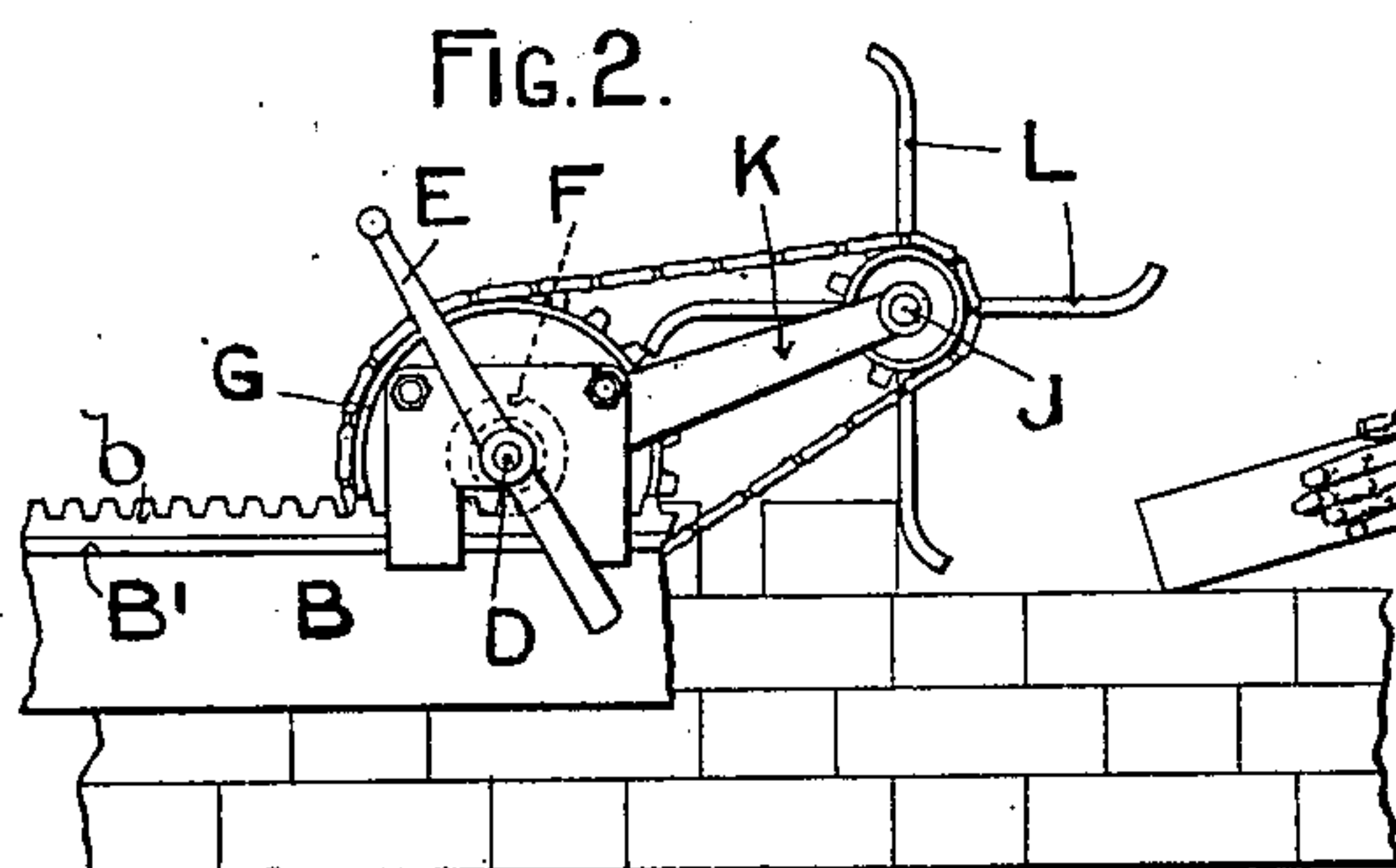
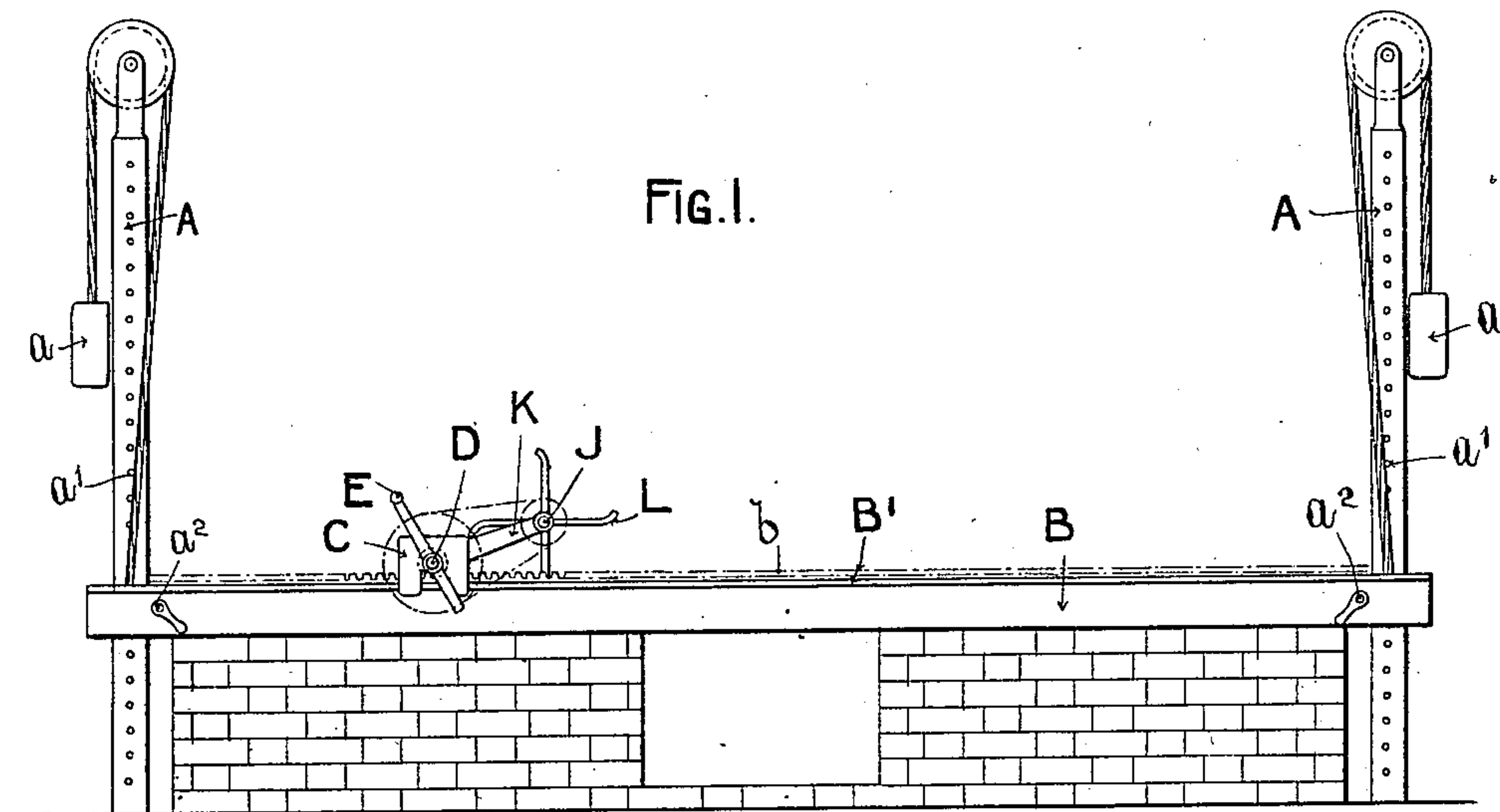
J. H. KNIGHT.

MACHINE FOR LAYING BRICKS FOR BUILDING PURPOSES.

(Application filed May 28, 1900.)

(No Model.)

5 Sheets—Sheet 1.



WITNESSES

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FIG. 5.

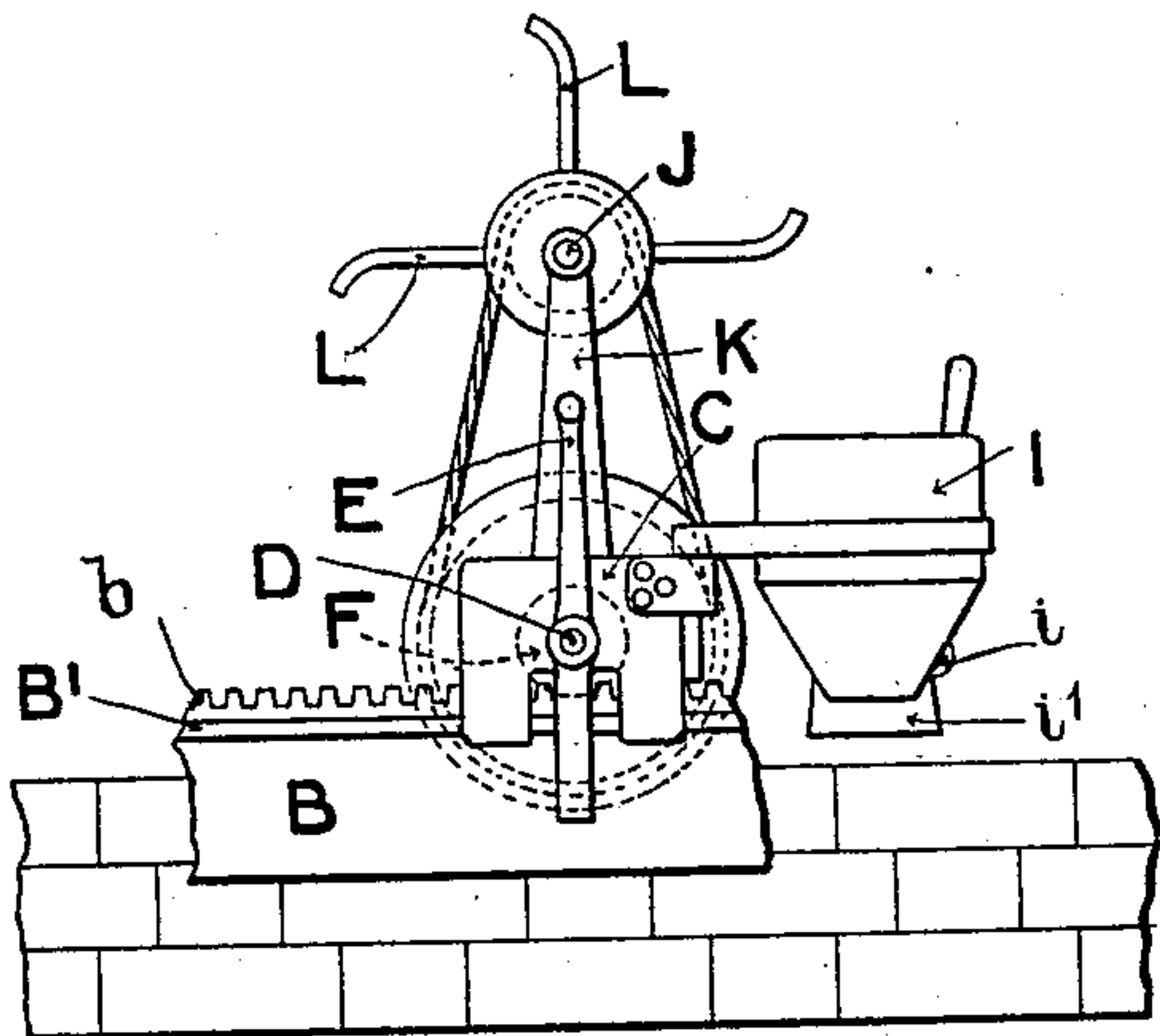


FIG. 6.

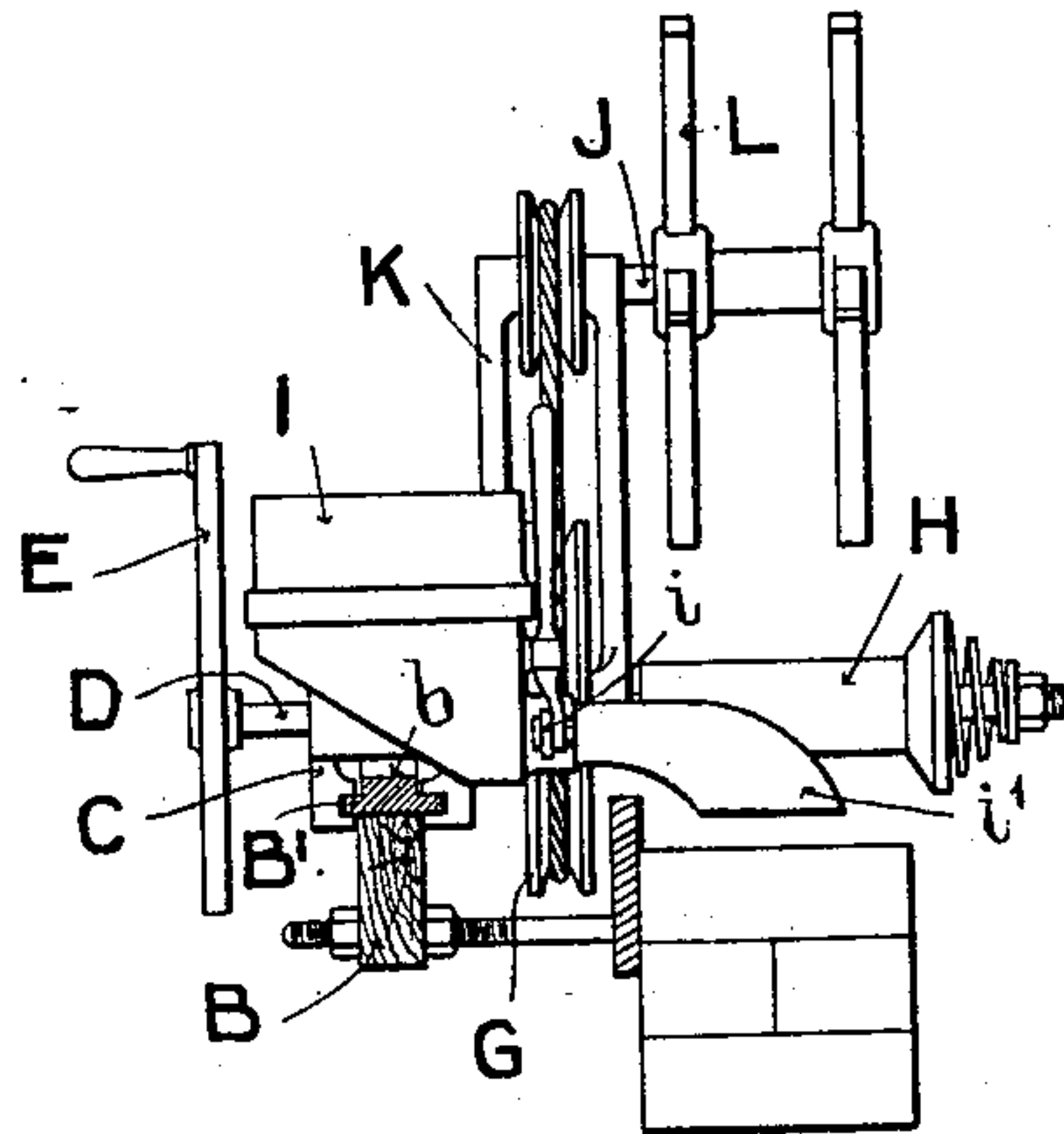


FIG. 8.

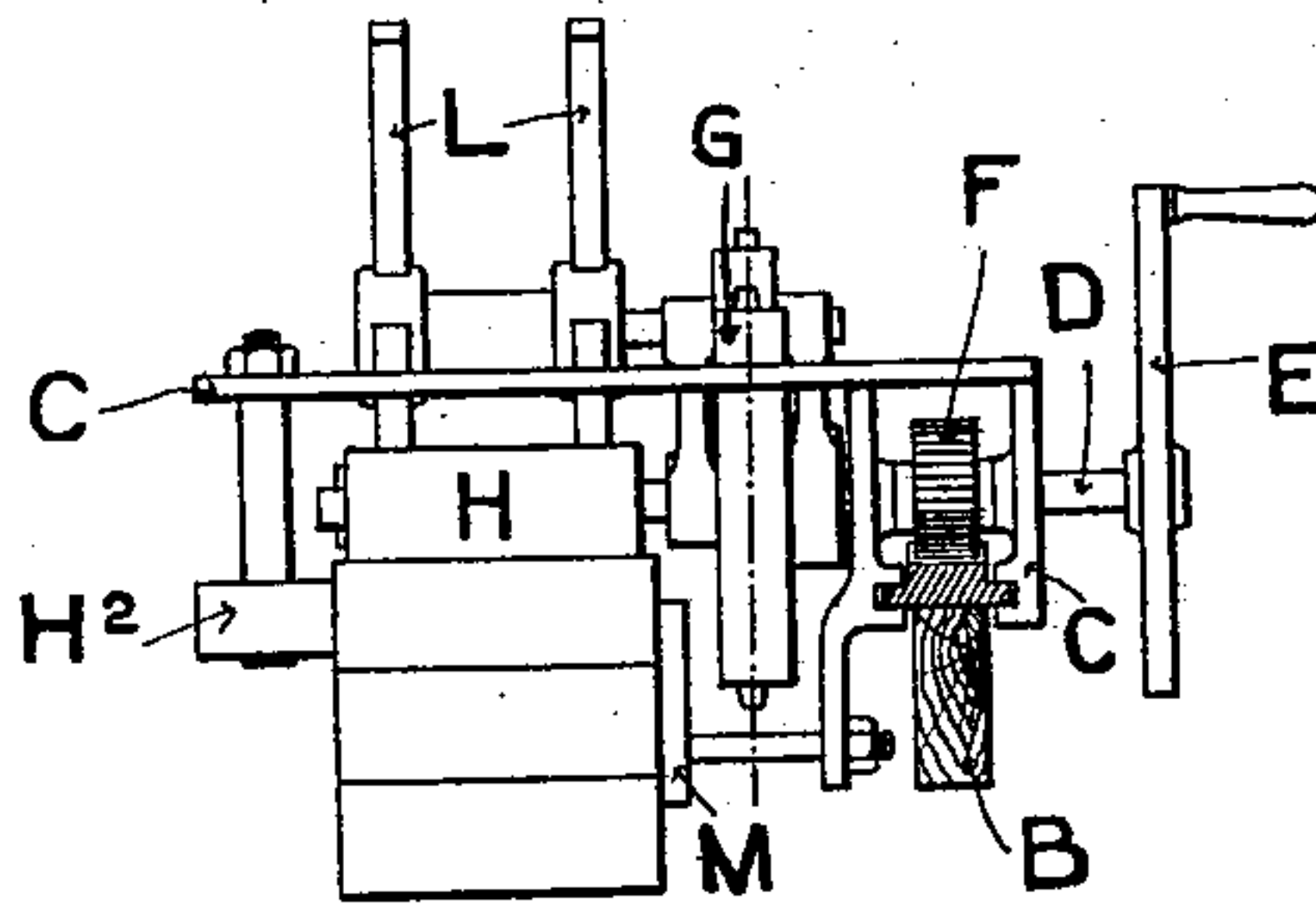
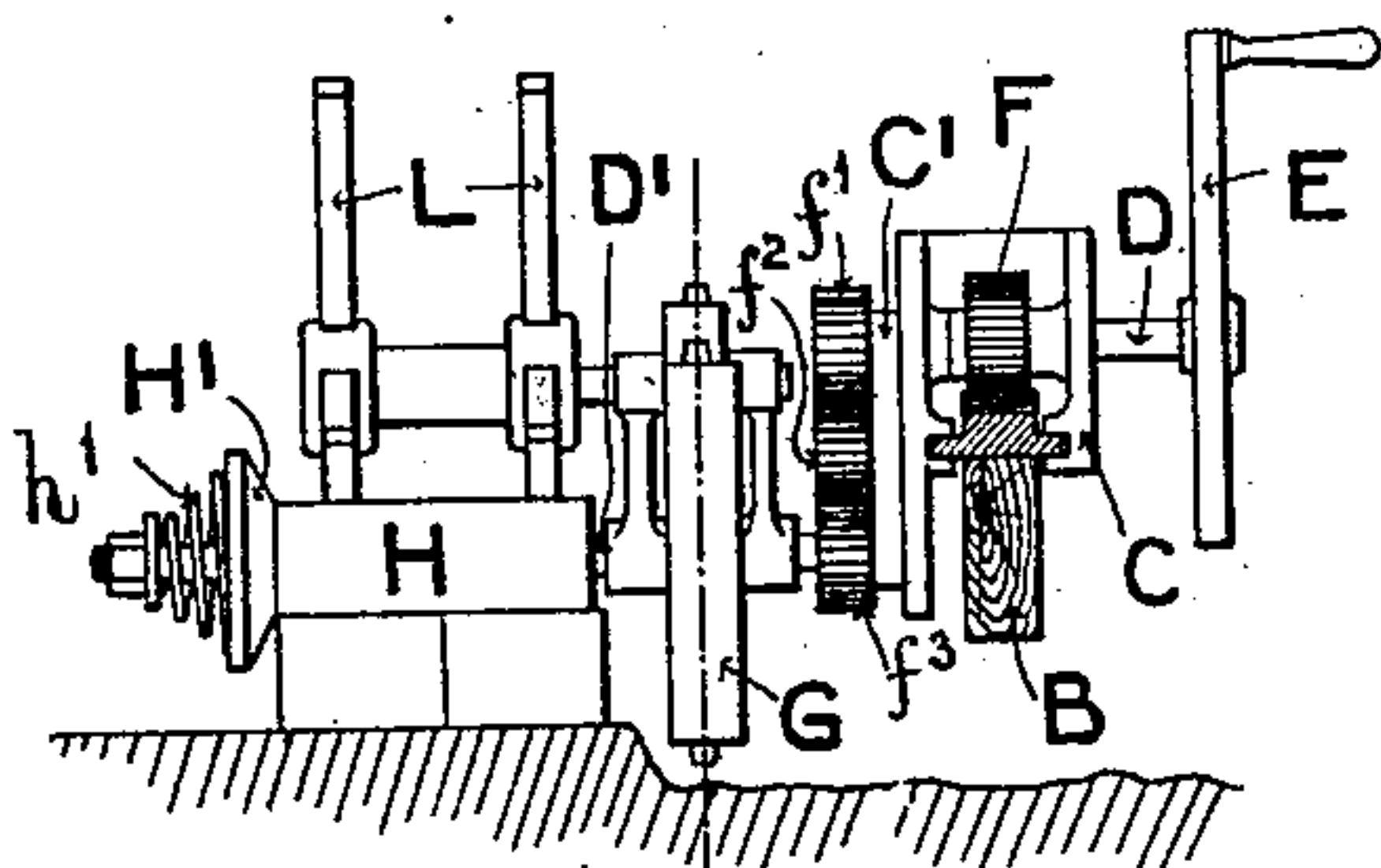


FIG. 7.



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FIG. 9.

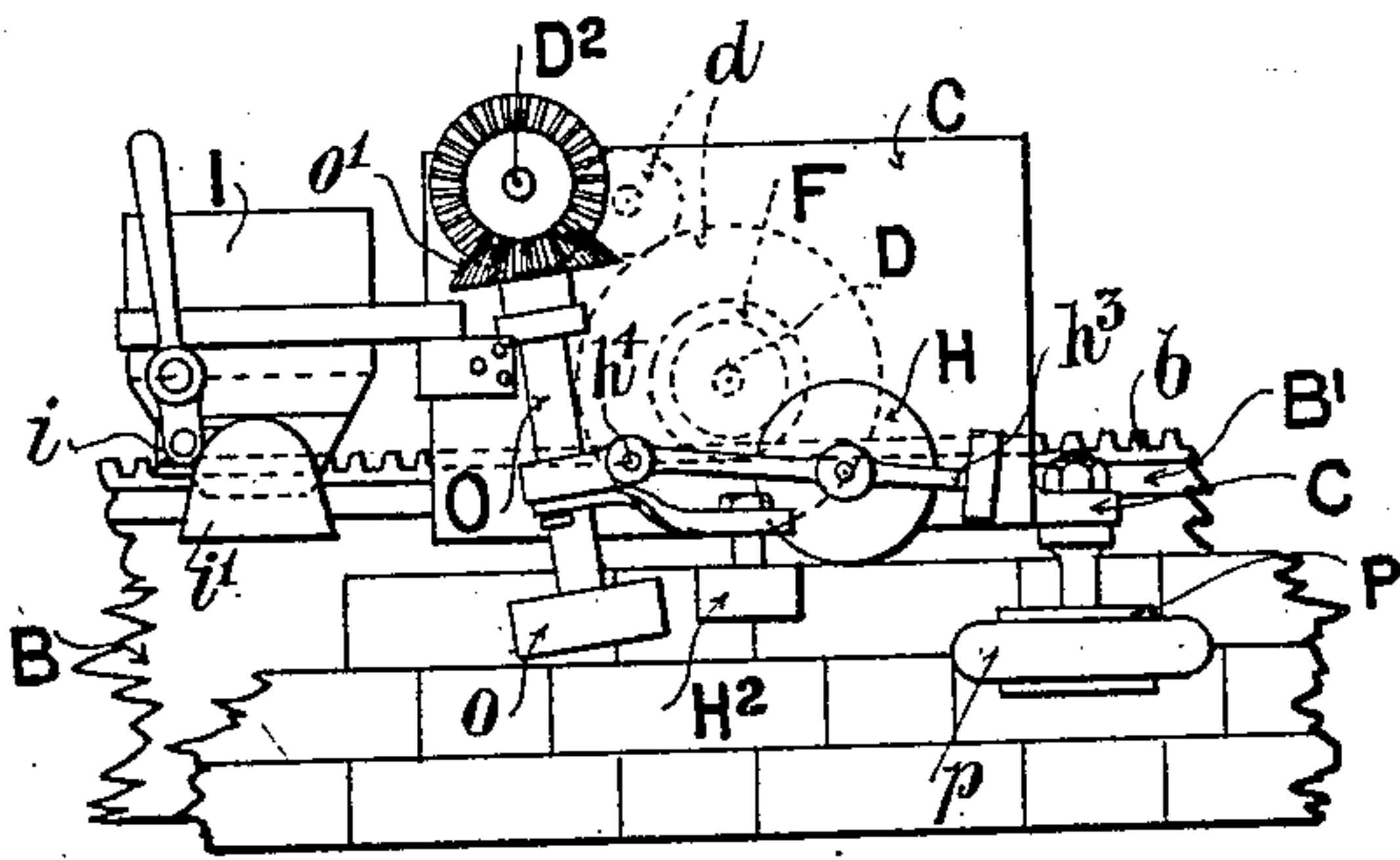


FIG. 10.

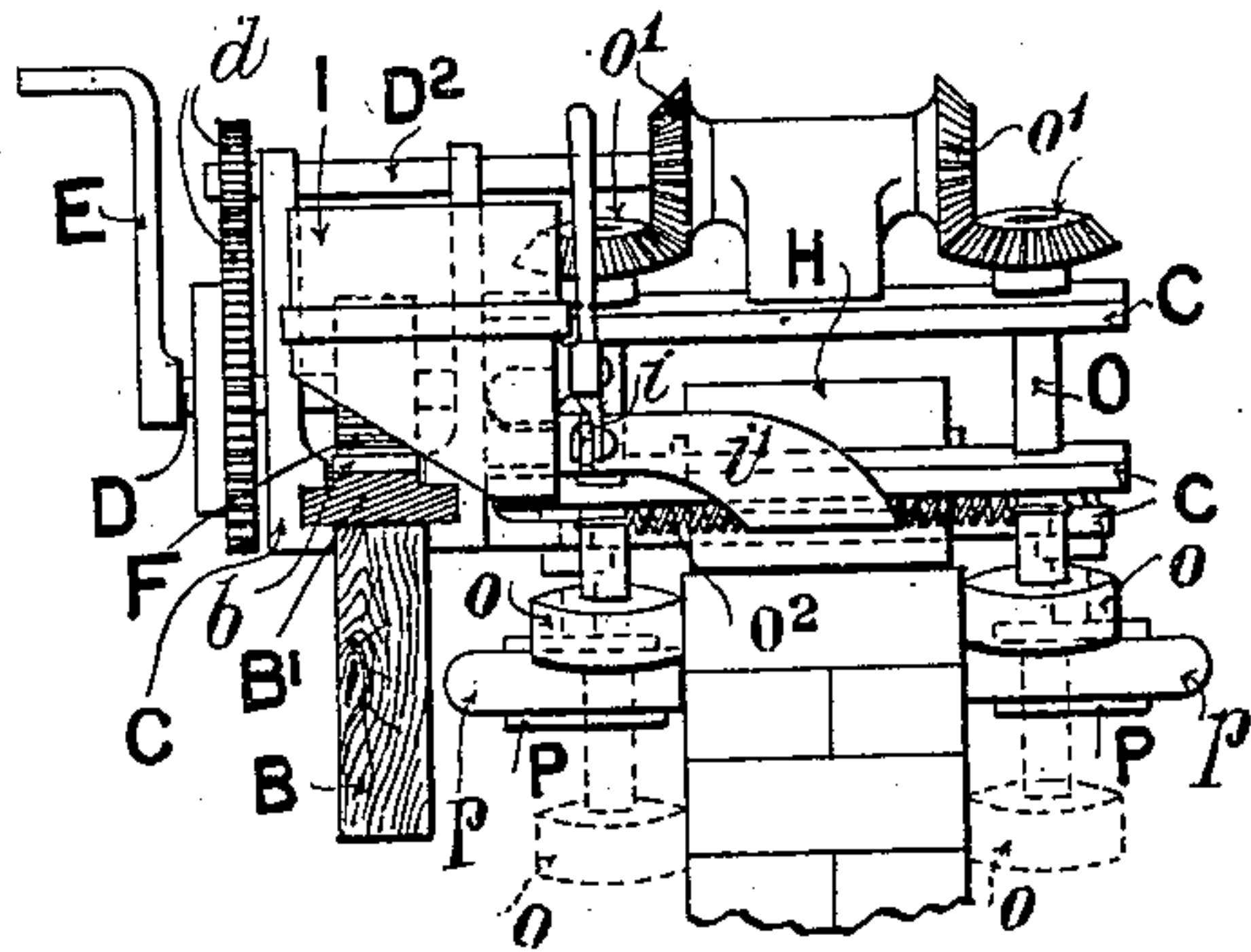


FIG. 11.

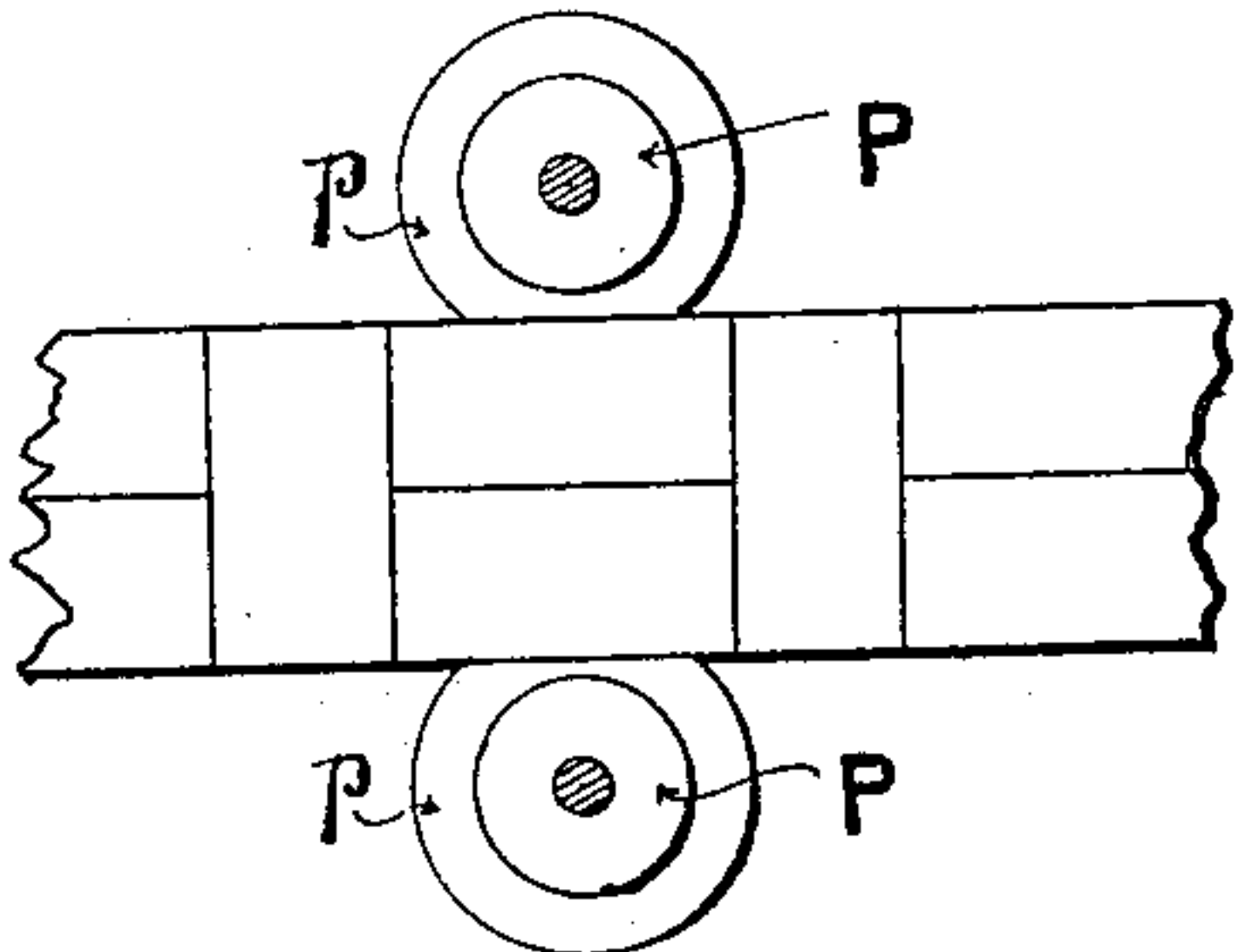


FIG. 13.

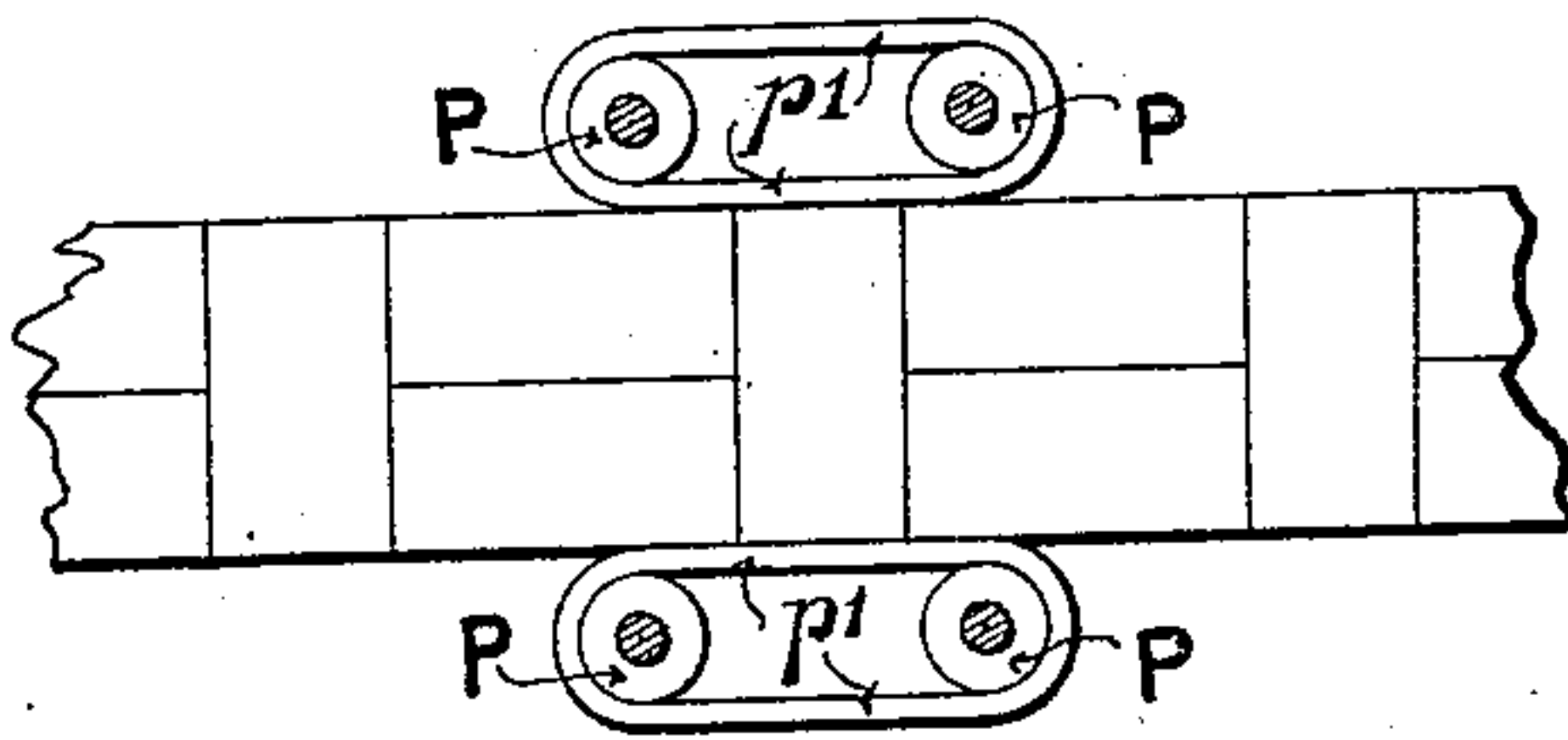


FIG. 12.

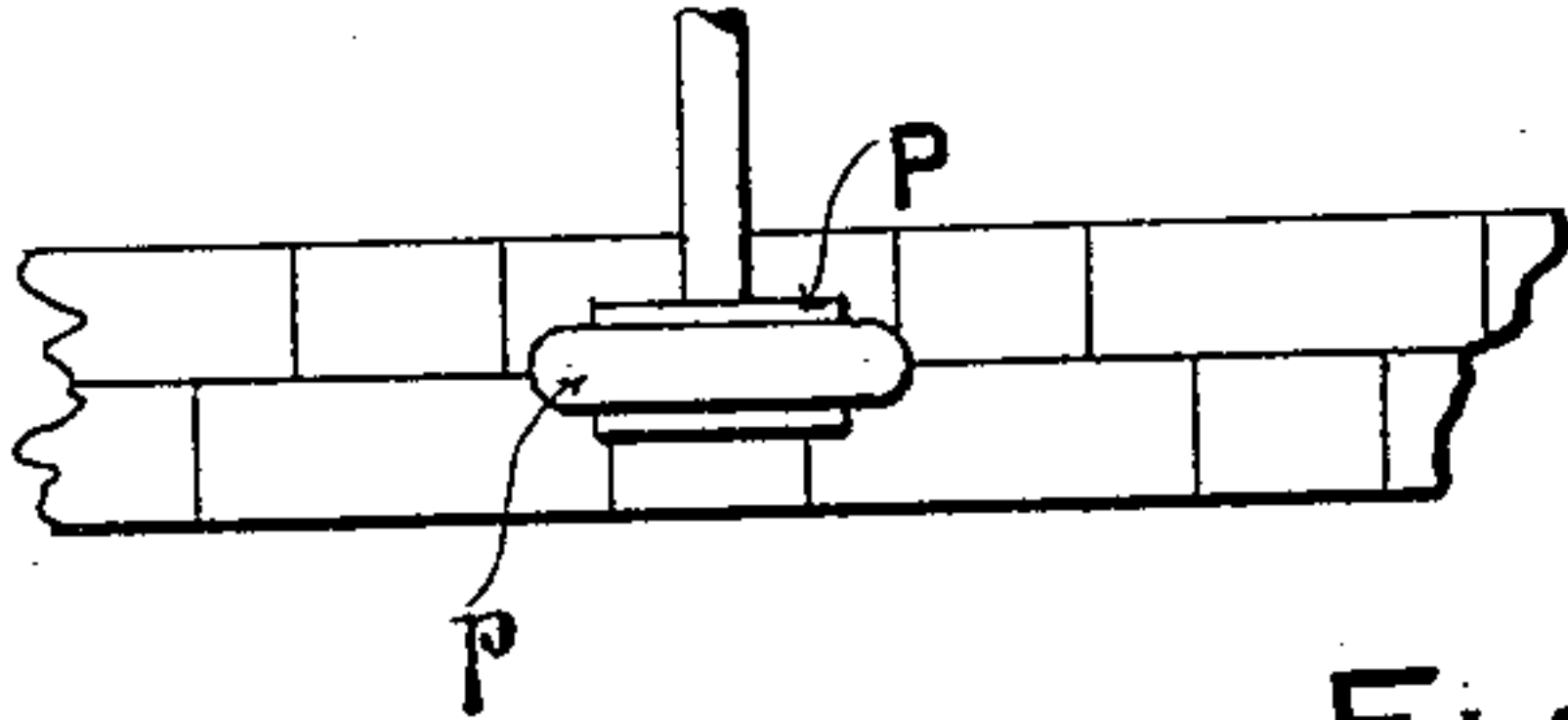


FIG. 14.

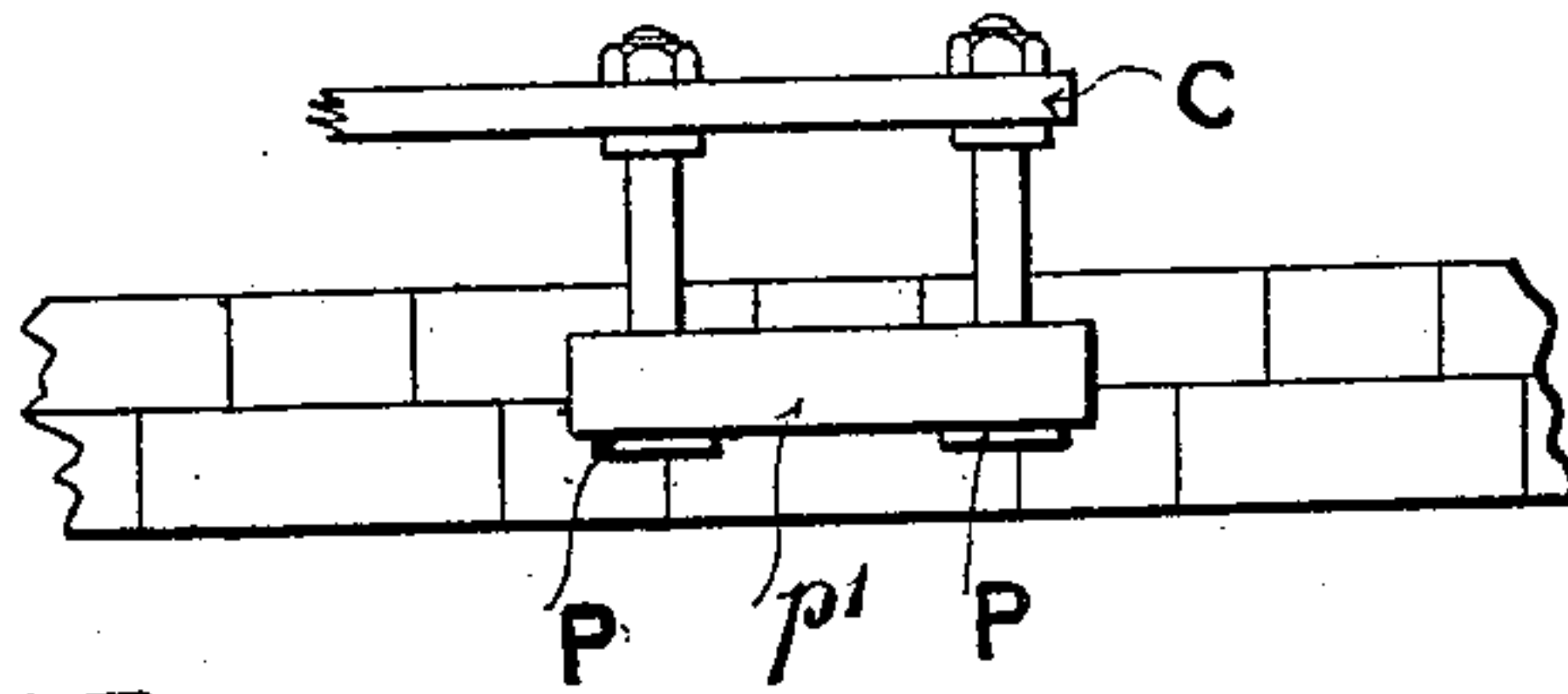
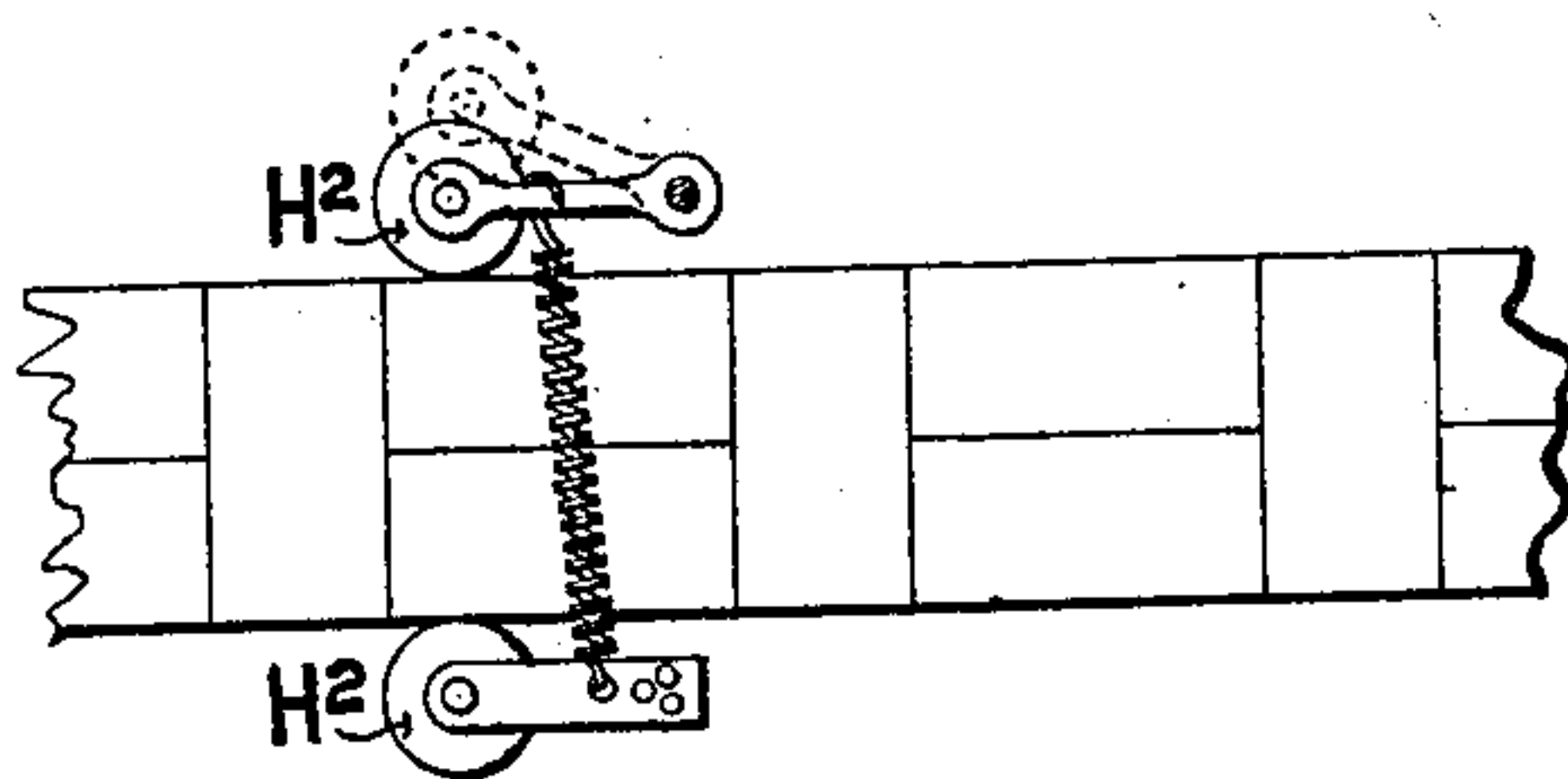


FIG. 15.



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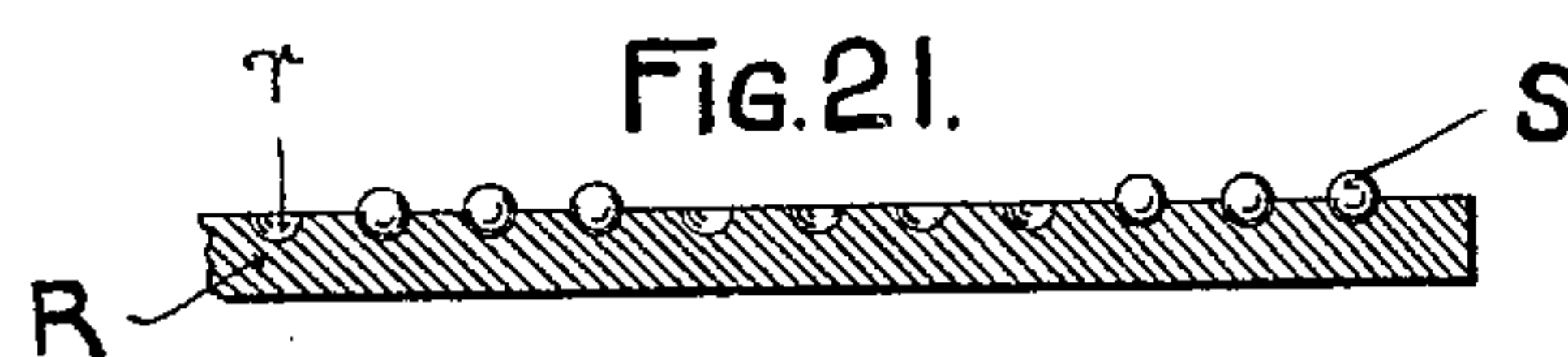
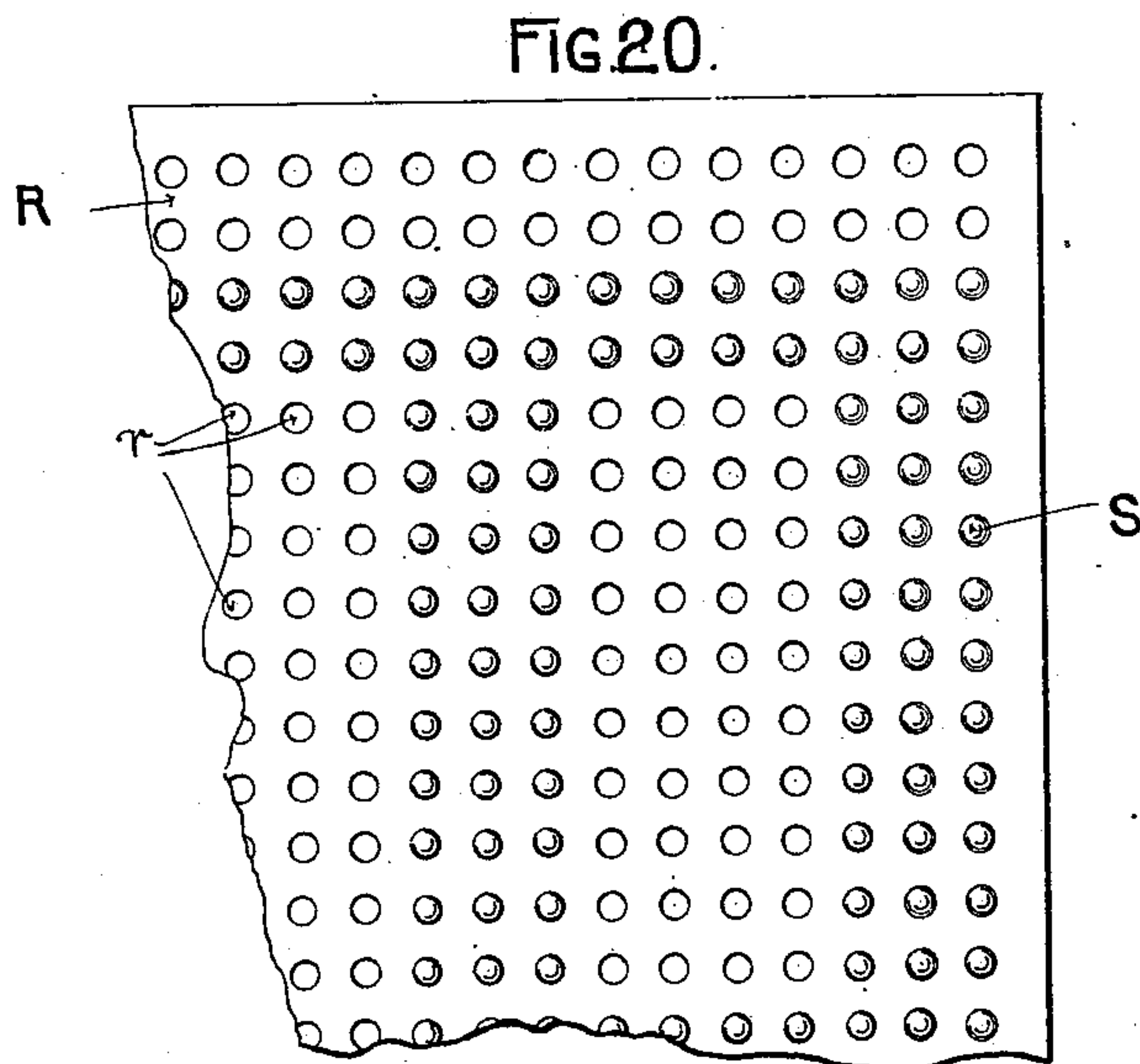
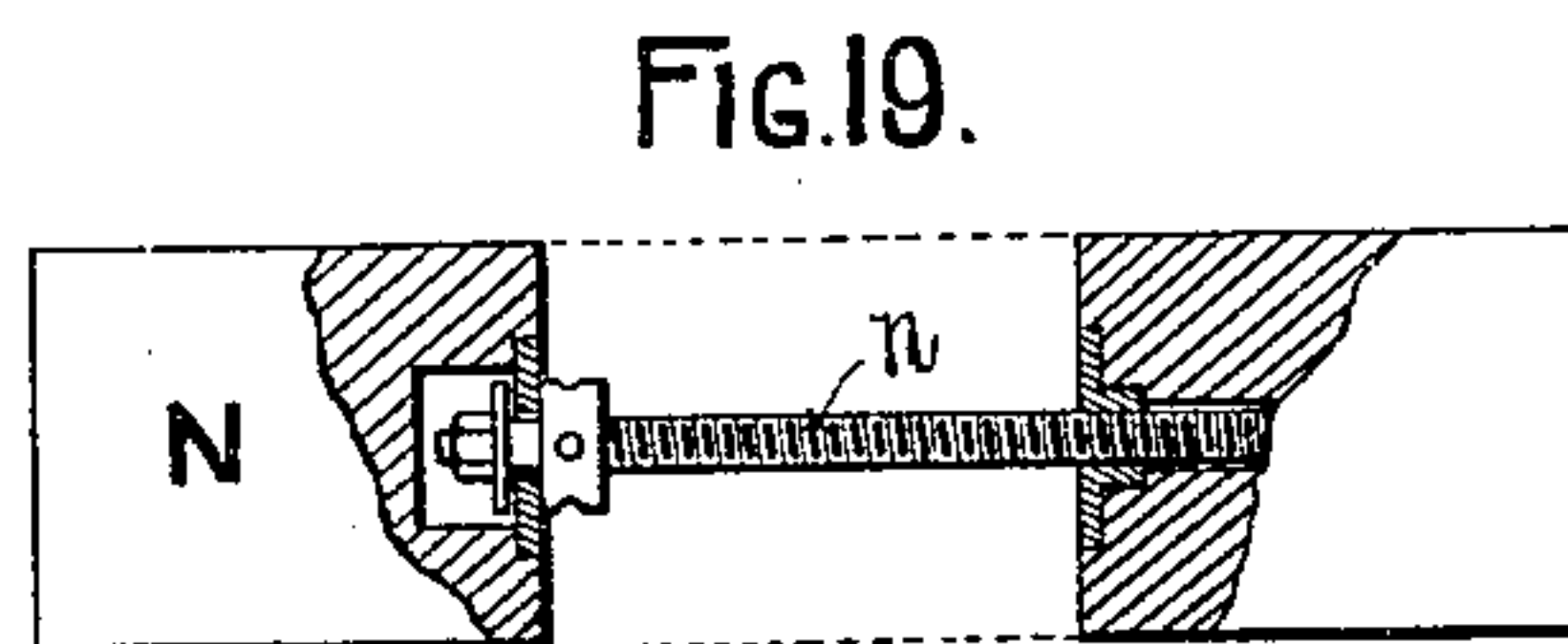
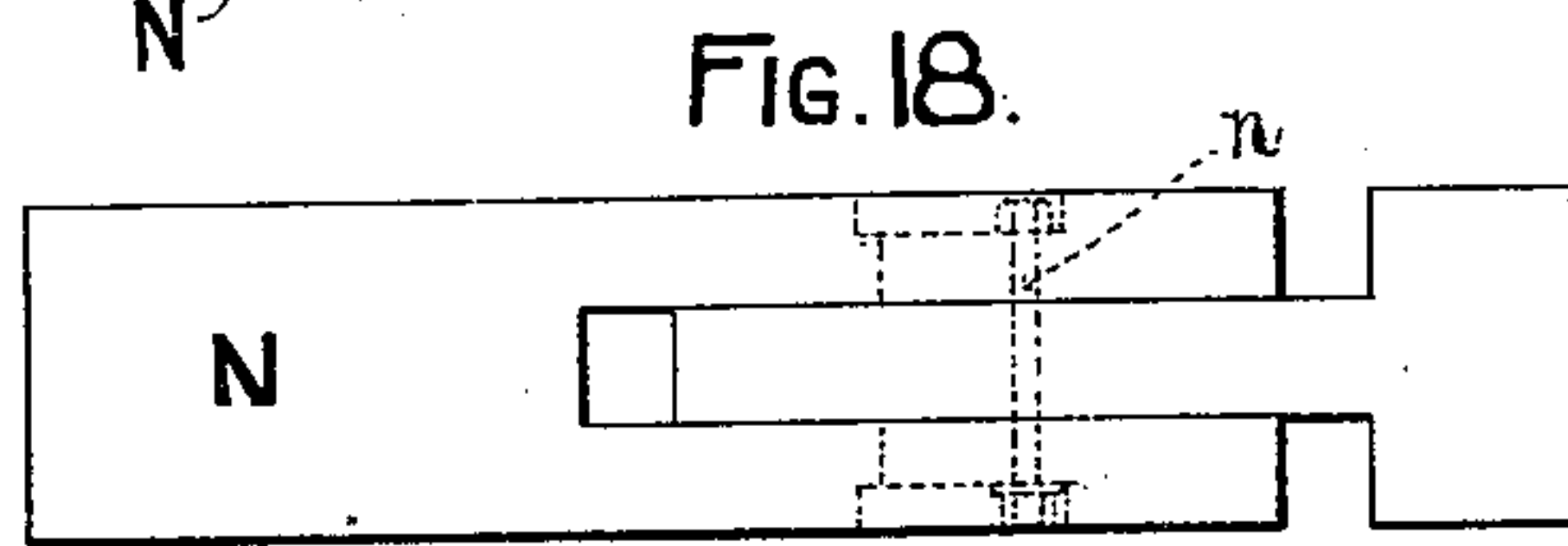
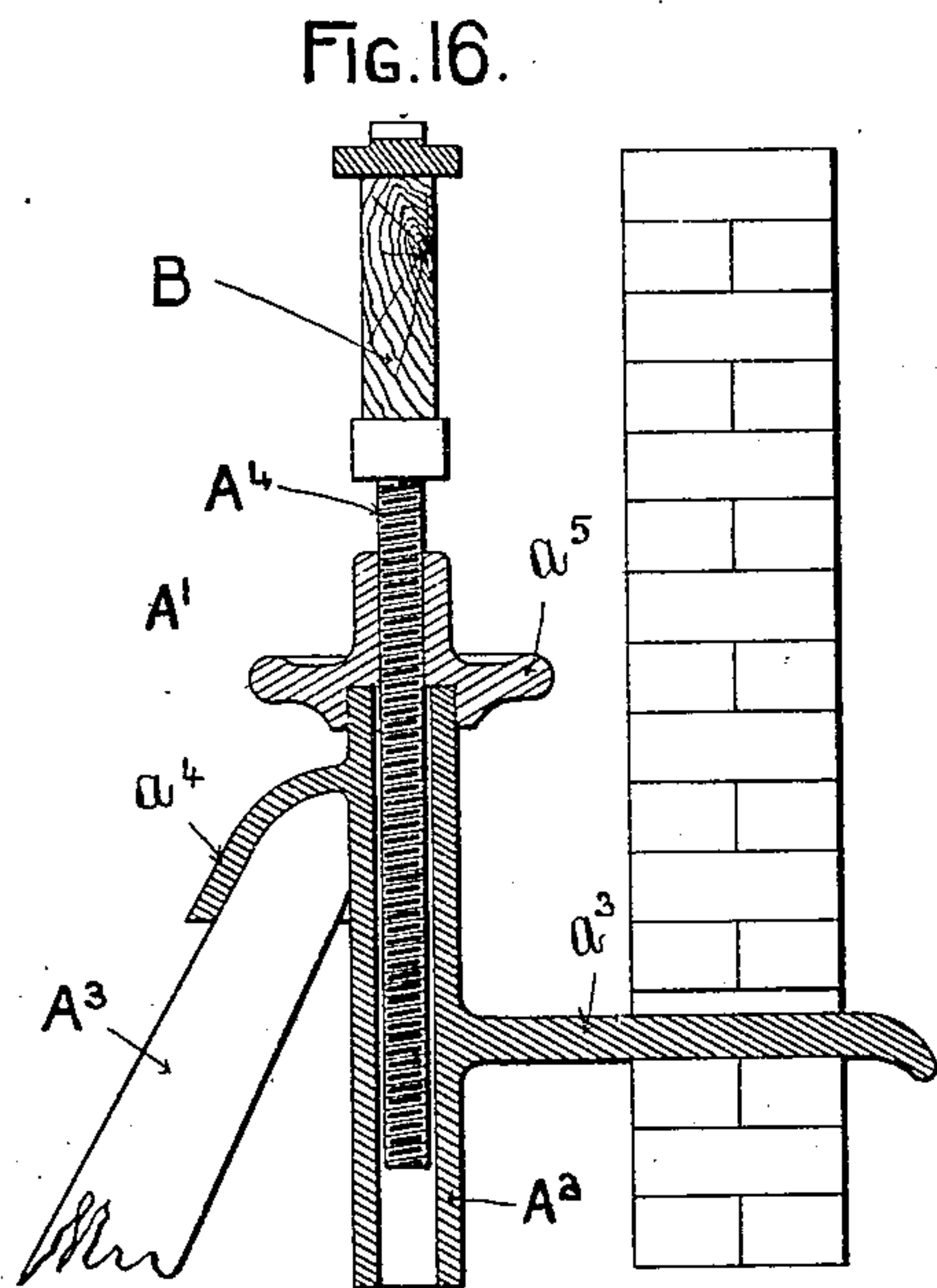
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5 Sheets—Sheet 5.

FIG. 22.

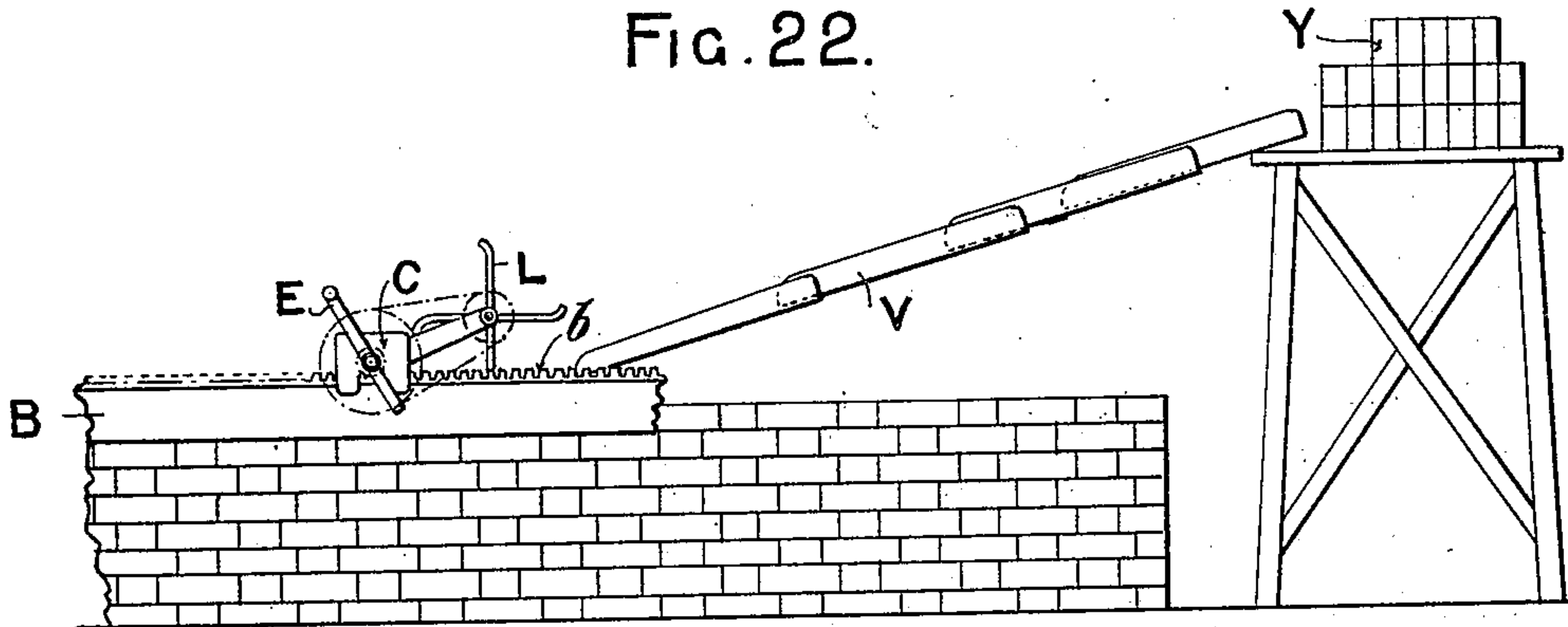
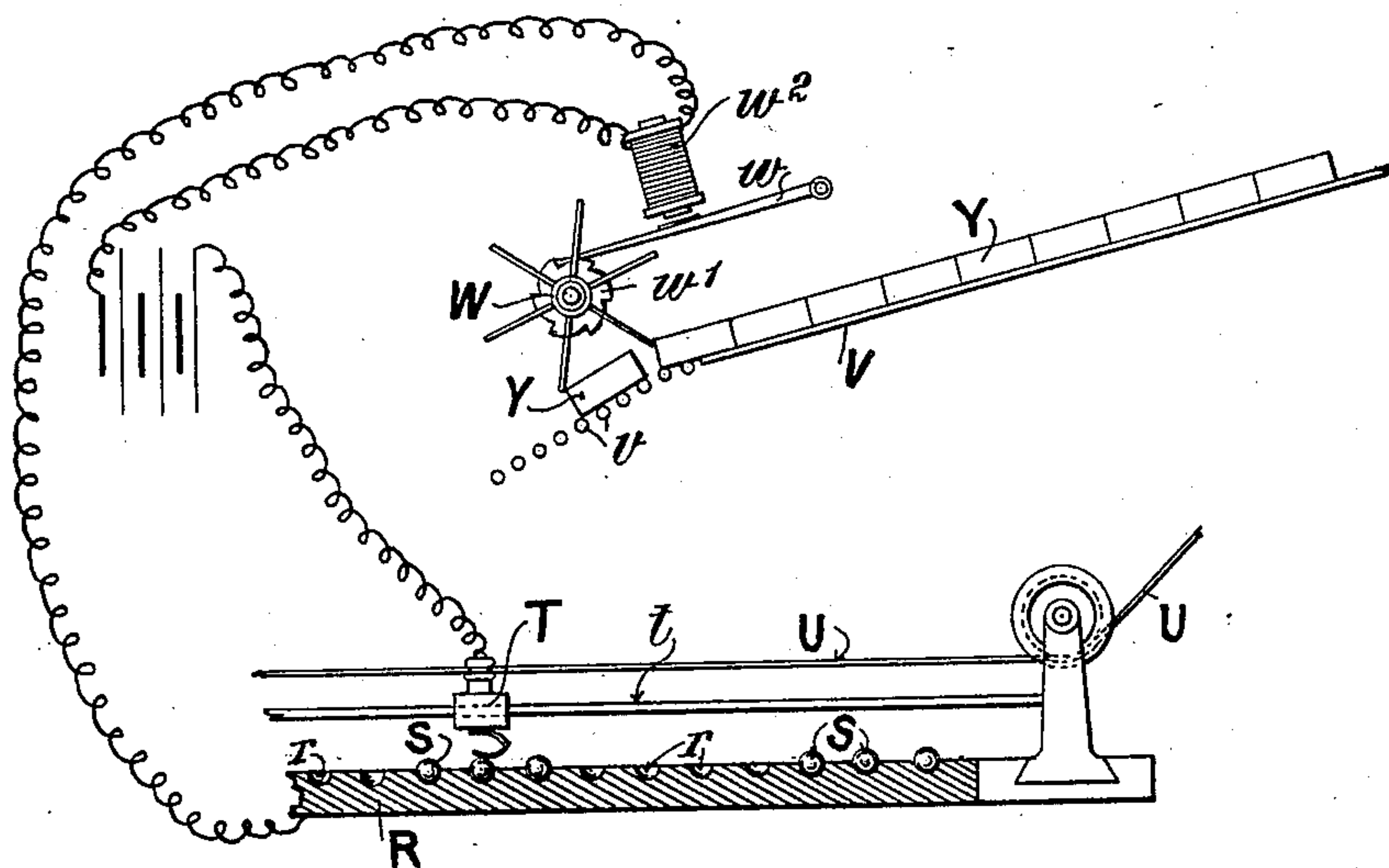


FIG. 23.



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UNITED STATES PATENT OFFICE.

JOHN HENRY KNIGHT, OF BARFIELD, NEAR FARNHAM, ENGLAND.

MACHINE FOR LAYING BRICKS FOR BUILDING PURPOSES.

SPECIFICATION forming part of Letters Patent No. 669,220, dated March 5, 1901.

Application filed May 28, 1900. Serial No. 18,336. (No model.)

To all whom it may concern:

Be it known that I, JOHN HENRY KNIGHT, a subject of the Queen of Great Britain, residing at Barfield, near Farnham, in the county of Surrey, England, have invented a new and useful Improvement in Machines for Laying Bricks for Building Purposes, (for which I have applied for Letters Patent in Great Britain, numbered 21,823, bearing date the 1st day of November, 1899,) of which the following is a full and complete specification.

This invention relates to an apparatus for laying bricks for building purposes; and it consists, essentially, of a guide adapted to be arranged parallel with and in close proximity to the position of the wall it is intended to build and of a machine adapted to travel on the said guide and lay bricks, the object being to build walls of brickwork with unskilled labor.

In the accompanying drawings, which illustrate this invention, Figure 1, Sheet No. 1, is a view in elevation, showing the general construction and arrangement of the apparatus. Figs. 2, 3, and 4, Sheet No. 1, are views in front elevation, end elevation, and plan, partly in section, respectively, of the machine for laying the bricks. Figs. 5 and 6, Sheet No. 2, are views in front and end elevation, respectively, of the machine with a mortar-hopper attached. Fig. 7, Sheet No. 2, is a view in end elevation, showing a modification of the machine for use when commencing work at the foundation. Fig. 8, Sheet No. 2, is a view in end elevation, showing a modification in which a side guide-roller is employed. Figs. 9 and 10, Sheet No. 3, are views in front and end elevation, respectively, showing a modification in which rollers are used for feeding the bricks. Figs. 11 and 12 and 13 and 14, Sheet No. 3, are groups of views in elevation and plan, showing two alternative arrangements for smoothing off the mortar squeezed out of the horizontal joints. Fig. 15, Sheet No. 3, is a view in plan, showing an alternative arrangement of the guide-rollers. Fig. 16, Sheet No. 4, is a view in end elevation of an alternative device for supporting the guide. Figs. 17 and 18, Sheet No. 4, are views in side elevation and plan, respectively, of door or window space blocks. Fig. 19, Sheet No. 4, is a plan view, partly in section, of a

modified form of door or window space block. Figs. 20 and 21, Sheet No. 4, are broken views in plan and side elevation, respectively, of a guide or templet for use with the machine. Fig. 22, Sheet No. 5, is a view in elevation, showing the chute or traveler for feeding the machine; and Fig. 23, Sheet No. 5, is a diagrammatic view of the electrical feeding device.

Similar letters refer to similar parts throughout the several views.

My improved apparatus comprises a beam B, adapted to support and guide the laying apparatus. This beam is supported in the horizontal plane on suitable posts or supports A A, the arrangement being such that the beam can be lifted the thickness of a course of brickwork as the work proceeds. The posts or supports may be arranged in any suitable manner, the arrangements shown in Figs. 1 and 16 being merely given as illustrations. For instance, the posts or supports may be incorporated with or form part of the ordinary scaffolding.

In Fig. 1 I have shown the beam supported by two posts A A by means of pins a^1 , engaging holes in the posts and locked thereto by screw-clamps a^2 , the weight of the beam being balanced by suitably-arranged weights a .

In Fig. 16 I have shown the beam supported on adjustable telescopic supports A' A', adapted to engage the holes in the wall being built as the work advances and to be supported by suitable struts A³. The telescopic supports consist each of a screwed spindle A⁴, a socket A², with which the spindle A⁴ engages and which carries a foot a^3 , adapted to engage the hole in the wall, and a socket a^4 to receive the strut A³, and of a nut a^5 , threaded on the spindle A⁴ and engaging the socket A².

The beam B carries on its upper edge a plate B', carrying a rack b , or in some cases I may substitute a pitch or other chain for the rack. On the plate B' is mounted a frame C, which so engages its edges that it is capable of sliding longitudinally on it. This frame carries bearings in which is mounted a transversely-arranged axle D, on which are mounted a cranked handle E to rotate the axle, a pinion F to engage the rack b or chain, a sprocket-wheel G to drive the laying device, and a roller H, adapted to bed the bricks down

onto the course last laid. The laying device consists of an axle J, carried in bearings formed in or mounted on the ends of links K, fulcrumed on the axle D, of a sprocket-wheel 5 mounted on the said axle, and of a series of arms L, mounted on the said axle, motion being imparted to the axle J from the axle D by means of a chain.

The bricks are fed in between the revolving arms L either by hand, as shown by Fig. 1, or by means of a traveler or chute, as shown by Figs. 22 and 23. The arms on their rotation engage the bricks and press them longitudinally up against the one last laid, while the roller H as the apparatus travels along the guide-beam B exerts a vertical pressure on the bricks, so that the combined operations bed them securely in position.

To allow the arms L to give way after the bricks are pressed up into position, their ends are curved, as shown, so that further pressure causes the links K to lift, thus allowing the arm to pass over the brick, and to prevent shock to the driver of the gear the sprocket-wheel G is preferably connected to the axle D by a friction-clutch, or motion may be transmitted from the axle D to the axle J by means of rope or band driving, as shown in Figs. 5 and 6, which will allow of a certain 30 amount of slip.

To guide the bricks and insure the wall being built square and level, a guide-plate, such as M, carried either by the beam B, as shown by Figs. 1, 2, and 3, or by the frame C, as shown by Fig. 8, may be employed. If the guide-plate M is carried by the beam B, it is required to be as long as the beam; but if it is carried by the frame C it is not required to be longer than the laying apparatus. 40 The bricks are pressed up against this guide-plate M either by means of a flange H' on the roller H, as shown by Figs. 2, 3, 4, and 7, or by means of one or more independent rollers H², as shown by Figs. 8, 9, 10, and 15. The roller H and also the roller H², if such is employed, are either covered with felt, rubber, or other suitable elastic material to avoid crushing the bricks and so allow the rollers to yield to any slight irregularities in the bricks. To the 50 same end, if the roller H is provided with the flange H' it is mounted to slide on its axle and the flange is kept up to its work by a spring, such as h'.

The mortar or grouting may be applied 55 either by hand or mechanically out of a hopper I, as shown by Figs. 5, 6, 9, and 10, in which case the hopper I swings or is made removable on the frame C and is swung or placed into the position shown by Figs. 5, 6, 9, and 10. The links K, carrying the laying device, are swung, on the backward travel of the machine, into a vertical position. The gate or valve i of the hopper I is then opened, allowing the mortar or grouting to escape 65 through the chute or spout i' on the backward travel.

A scraper may in some cases be fixed on the machine to level or take off any excess of mortar.

Door or window spaces are arranged for by substituting for bricks blocks N of wood or other suitable material of the same thickness 70 as the bricks, the same width as the wall, and the length of the required opening for the door or window. These blocks (for the purpose of adjustability in length and for facilitating their removal) are preferably made in two pieces, as shown by Figs. 17, 18, and 19, and held together by screws n. The blocks are fed and laid in their open or extended 80 form and when collapsed or telescoped are easily removable from the finished wall.

To warn the operator when it is necessary to feed space-blocks N to the machine for window or door spaces, pins or projections 85 may be temporarily inserted in the beam B or plate B', so as to engage the operative mechanism of a bell or the like mounted on the frame of the machine and so as to give audible warning when it is necessary to feed 90 space-blocks.

When commencing the first course at the foundation, and the beam B is consequently near the ground, the frame C is so arranged as to be capable of being dropped below the 95 level of the beam. One such arrangement is illustrated by Fig. 7, wherein the axle D, carrying the pinion E, imparts motion to the roller and laying device through a train of three spur-wheels f', f², and f³. The spur-wheel f' is carried by the axle D, and the other wheels f² and f³, the latter fixed to the axle D', carrying the roller H and laying device, are carried by a swinging link or arm C', carried by the frame C. 105

In a modified form of the brick-laying machine as illustrated by Figs. 9 and 10 I use rollers instead of arms for feeding the bricks. In this arrangement the axle D imparts motion to a secondary axle D², carried by suitable bearings in the frame C, through spur-gearing d. Arranged in bearings on the frame C are two vertical or slightly-inclined spindles O, carrying rollers o at their lower ends and so arranged as to engage or grip the sides 115 of the bricks to be fed. The rollers o may be covered with india-rubber or other yielding material and are caused to rotate at a greater speed than the machine travels on the rack or chain. These spindles are preferably 120 slightly inclined, as shown, so that the rollers o have a tendency to slightly raise the bricks instead of dragging them through the mortar or grouting. Motion is imparted from the axle D² to the spindles O by means of bevel 125 or miter gear o'. To cause the rollers o to grip the bricks, the spindles O are drawn toward each other by a spring o², a limited amount of play being provided in their bearings to allow for this movement. 130

The roller H for exerting vertical pressure on the bricks is carried by arms h³, pivoted

at h^4 to the frame C, the pressure being obtained by springs or, preferably, by weighting the free ends of the arms h^3 , as shown.

To enable the first course of bricks to be laid, or when the beam is close to the ground, I either carry the rollers o on extensions of the spindles O, or the spindles O may themselves be made to telescope, so that the rollers o may assume the position shown in dotted lines in Fig. 10.

Instead of using a guide-plate such as M in conjunction with a roller or a flange thereon I may use two guide-rollers H^2 , carried by the frame C. One of these rollers is preferably carried by an arm fixed rigidly to the frame, while the other is carried by a spring-controlled swinging arm having a limited movement, as shown by Fig. 15, by which means a better face is given to the work and play is allowed for the varying thicknesses or inequalities of the bricks.

To prevent the mortar squeezing out and to finish the joint, I arrange vertical rollers P (see Figs. 9, 10, 11, and 12) on the frame, so disposed as to engage and roll on the joint on each side of the wall. These rollers may be covered with india-rubber or other elastic material or may be provided with pneumatic tires p , which will flatten on the joint. Instead of using one roller P on each side I may use two, as shown by Figs. 13 and 14, and having an endless band p' passing around them.

To render the machine more automatic in use and to avoid errors in feeding the machine at the door or window spaces, I make use of a guiding or templet arrangement illustrated by Figs. 20, 21, and 23. A plate R, preferably of metal, is provided with a number of holes or depressions r . Each hole or depression represents the space of a brick or series of bricks. A representation of the wall to be erected is made by filling up these holes or depression r with balls S. These balls S only rest for about half their diameter in the holes or depressions, as shown, so that whenever bricks are to be laid a ball S projects above the surface of the indented or perforated plate. A wire or contact-piece T, sliding on a guide t , is caused by means of a cord U or the like in gear with the machine to traverse the plate R simultaneously with the machine, and passing over each course of balls in succession, control the discharge of the bricks from the feeding chute or traveler V in the following manner: The delivery end of the chute V is preferably formed with rollers v , set at a greater inclination than that of the chute. Arranged above these rollers is a wheel W, provided with arms so arranged as to be engaged and caused to rotate by the bricks Y moving down the chute by gravity. To prevent the bricks from continuously moving down the chute, the wheel W is prevented from rotating by means of a lever w engaging a ratchet or stop wheel w' ,

mounted on the axle of said wheel. The lever w is controlled by an electromagnet w^2 in circuit with a battery or other source of electricity and with the contact-piece T, the arrangement being such that as the wire or contact-piece passes over each ball a brick or bricks is or are deposited and presented to the laying apparatus. Where spaces, such as doors or windows, are in the design, there are of course no balls in the holes or depressions and no contact is made, so that no brick or bricks is or are discharged. Pegs may be used in some cases instead of the balls. Instead of electricity compressed air may be used or even an arrangement of punched cardboard or metal and wires and cords, similar to a jacquard apparatus.

What I claim, and desire to secure by Letters Patent, is—

1. A machine for laying bricks consisting of an adjustable guide arranged parallel with and in close proximity to the position of the wall to be built, of a frame mounted on the said guide, of means to cause it to positively traverse the same including an axle carried by the frame and rotated by a handle, of a brick-feeding device carried by the frame and operated from the axle through gearing of side guides to keep the bricks square and level, and of a roller carried by the frame to exert vertical pressure on the bricks, as set forth.

2. A machine for laying bricks consisting of an adjustable guide arranged parallel with and in close proximity to the position of wall to be built, of a frame mounted on the said guide, of means to cause it to positively traverse the same including an axle carried by the frame and rotated by a handle, of a brick-feeding device carried by the frame and operated from the axle through gearing, of side guides to keep the bricks square and level, of a roller carried by the frame to exert vertical pressure on the bricks, and of a mortar or grouting hopper or container carried by the frame, as set forth.

3. A machine for laying bricks consisting of an adjustable guide arranged parallel with and in close proximity to the position of the wall to be built, of a frame mounted on the said guide, of means to cause it to positively traverse the same including an axle carried by the frame and rotated by a handle, of a brick-feeding device carried by the frame and operated from the axle through gearing, of side guides to keep the bricks square and level, of a roller carried by the frame to exert vertical pressure on the bricks, and of means to cause the mortar-joint to be smoothed on each side of the wall, as set forth.

4. In a machine for laying bricks the combination of a frame carrying the brick laying and feeding devices, of means to cause the frame to positively traverse a guide arranged parallel with and in close proximity to the position of the wall to be built, of posts or

supports for carrying said guide, and of means for adjusting the vertical position of the said guide, as set forth.

5 5. The combination with a machine for laying bricks, of a guiding or templet device for regulating the feed of bricks to such a machine comprising a metallic plate R, holes or depressions *r* therein (each hole representing the space of a brick or series of bricks),
10 metallic balls *s* partially filling said holes, a traveling contact T caused to traverse the plate simultaneously with the brick-laying machine and to contact with the balls *s*, and
15 an electrically-operated brick-feed control device included in an electrical circuit together with the contact T and the plate R, as set forth.

6. A machine for laying bricks consisting of a beam or guide B carried by suitable posts
20 or supports and adjustable in height thereon, of a plate B' carried by the beam, of a rack *b* formed on the plate B', of a frame C sliding longitudinally on the plate, of an axle D rotated by a handle E, of a pinion F carried by said
25 axle and engaging the rack, of a sprocket-wheel G frictionally fixed or clutched to the axle D to allow of slip, of an axle J carried by links K pivoted to the axle D, of a sprocket-wheel on the axle J, of a chain connecting said
30 sprocket-wheel with the sprocket-wheel carried by the axle D, of arms L carried by the axle J, of a guide-plate M carried by the

beam, of a roller H mounted on the axle D to exert a vertical pressure on the laid bricks and of a spring-controlled flange H' to press
35 the bricks against the guide-plate M, as set forth.

7. A machine for laying bricks consisting of a beam or guide B carried by suitable posts or supports, and adjustable in height thereon,
40 of a plate B' carried by the beam, of a rack *b* formed on the plate B', of a frame C sliding longitudinally on the plate, of an axle D rotated by a handle E, of a pinion F carried by said axle and engaging the rack, of a sprocket-wheel G frictionally fixed or clutched to the
45 axle D to allow of slip, of an axle J carried by links K pivoted to the axle D, of a chain connecting the sprocket-wheel carried by the axle D with the sprocket-wheel carried by the
50 axle J, of arms L carried by the axle J, of a guide-plate M carried by the beam, of a roller H mounted on the axle D to exert a vertical pressure on the laid bricks, of a spring-controlled flange H' to press the bricks against
55 the guide-plate M, and of a mortar or grouting hopper or container I carried by the frame C to discharge the mortar on the backward travel of the frame C, as set forth.

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Witnesses:

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