

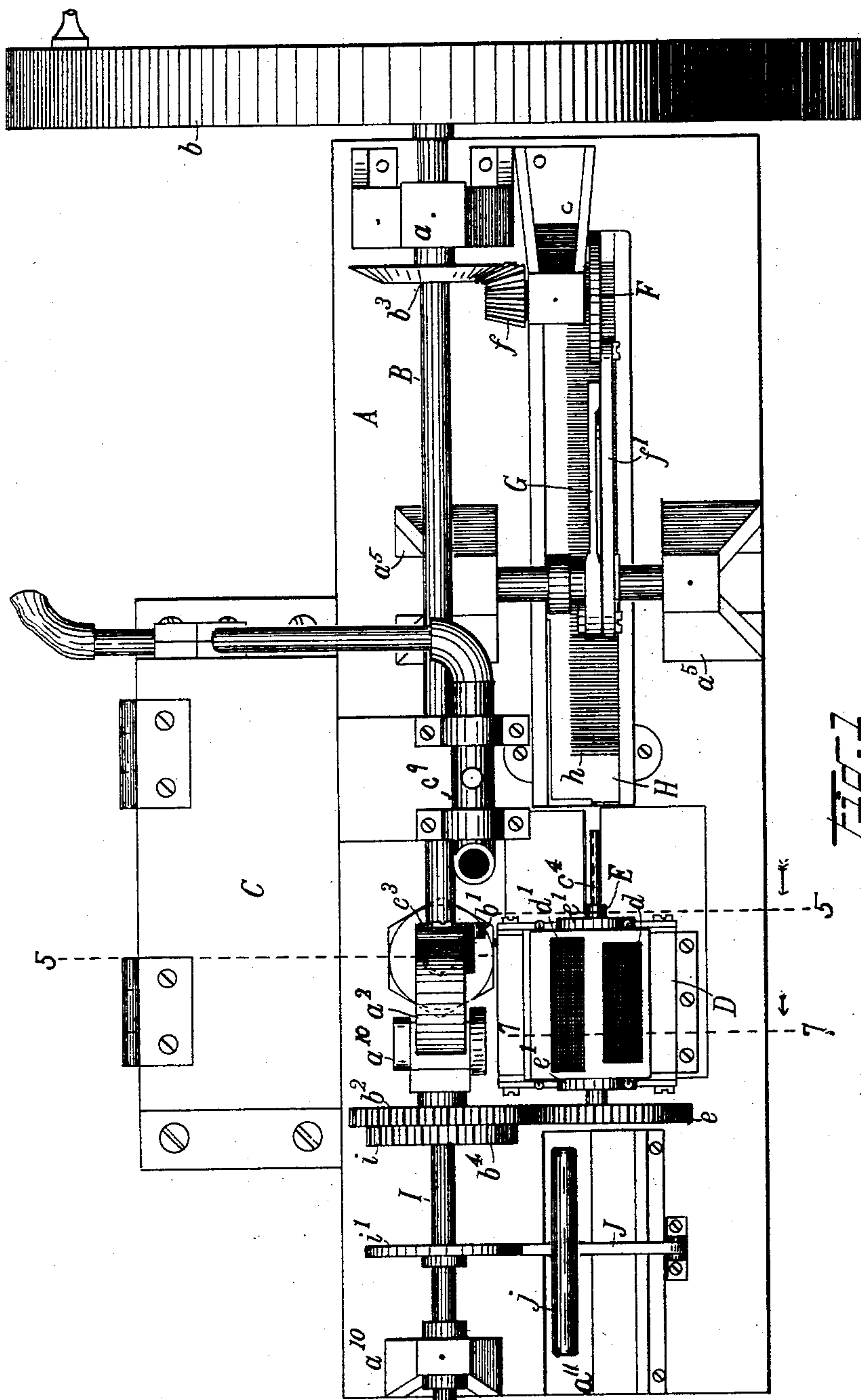
(No Model.)

5 Sheets—Sheet 1.

C. SEARS.
MACHINE FOR MAKING TYPE BARS.

No. 591,777.

Patented Oct. 12, 1897.



WITNESSES.

H. Graywold
Stellie M. Wood.

INVENTOR.

Charles Sears
By Edwin L. Thurston
his attorney

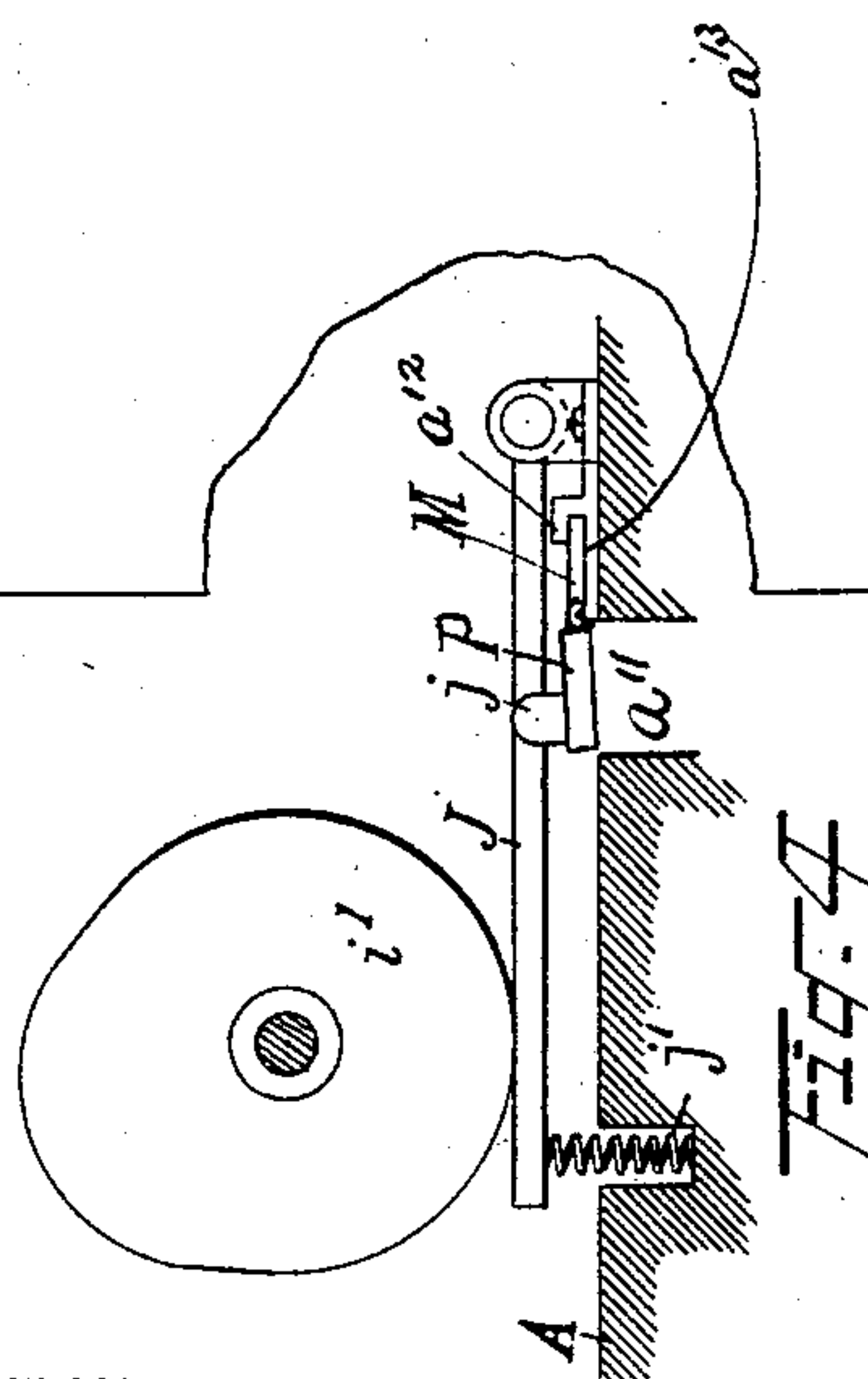
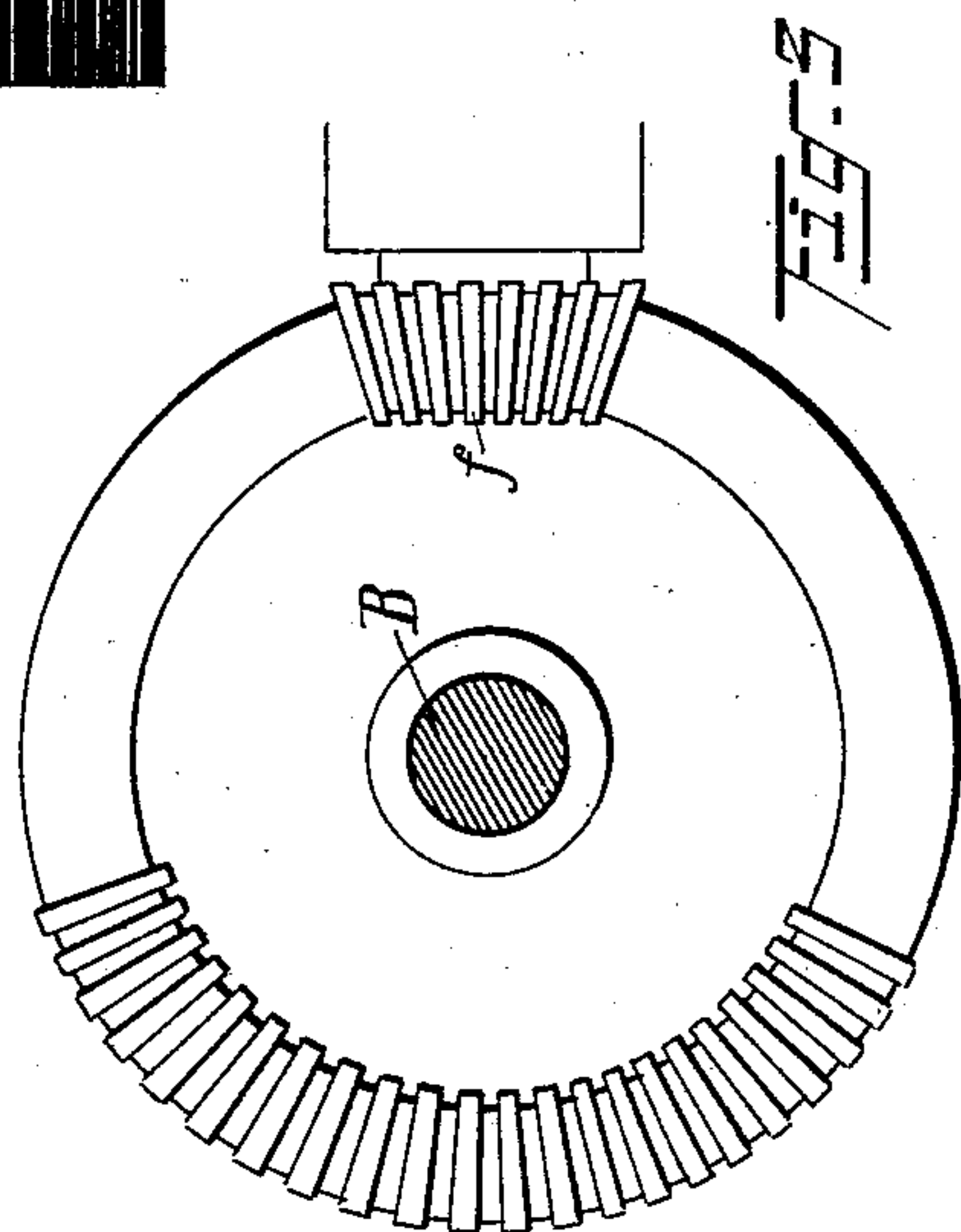
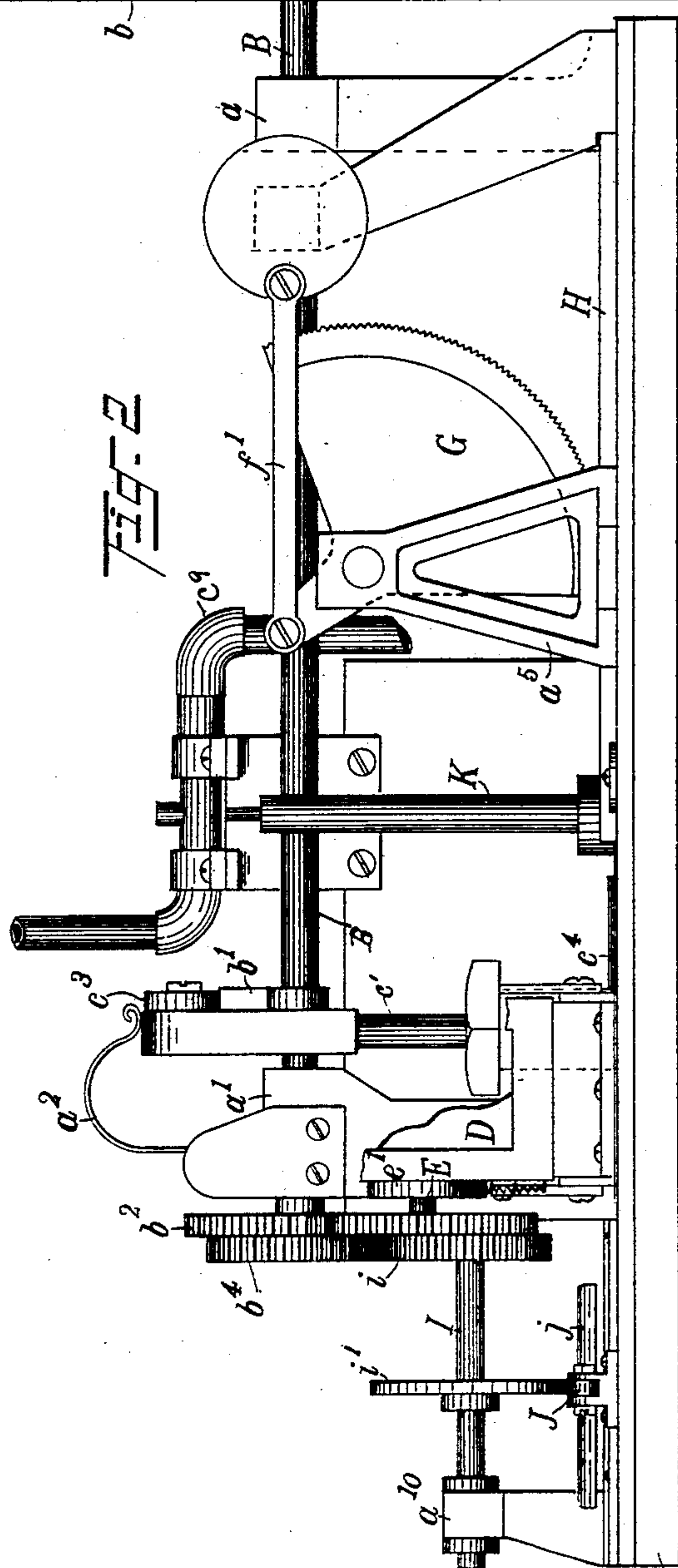
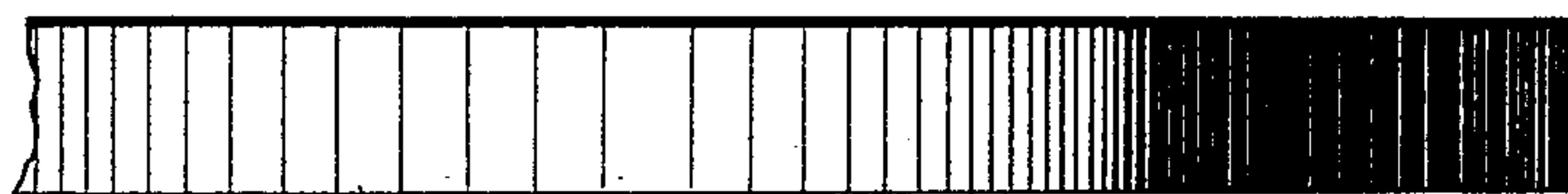
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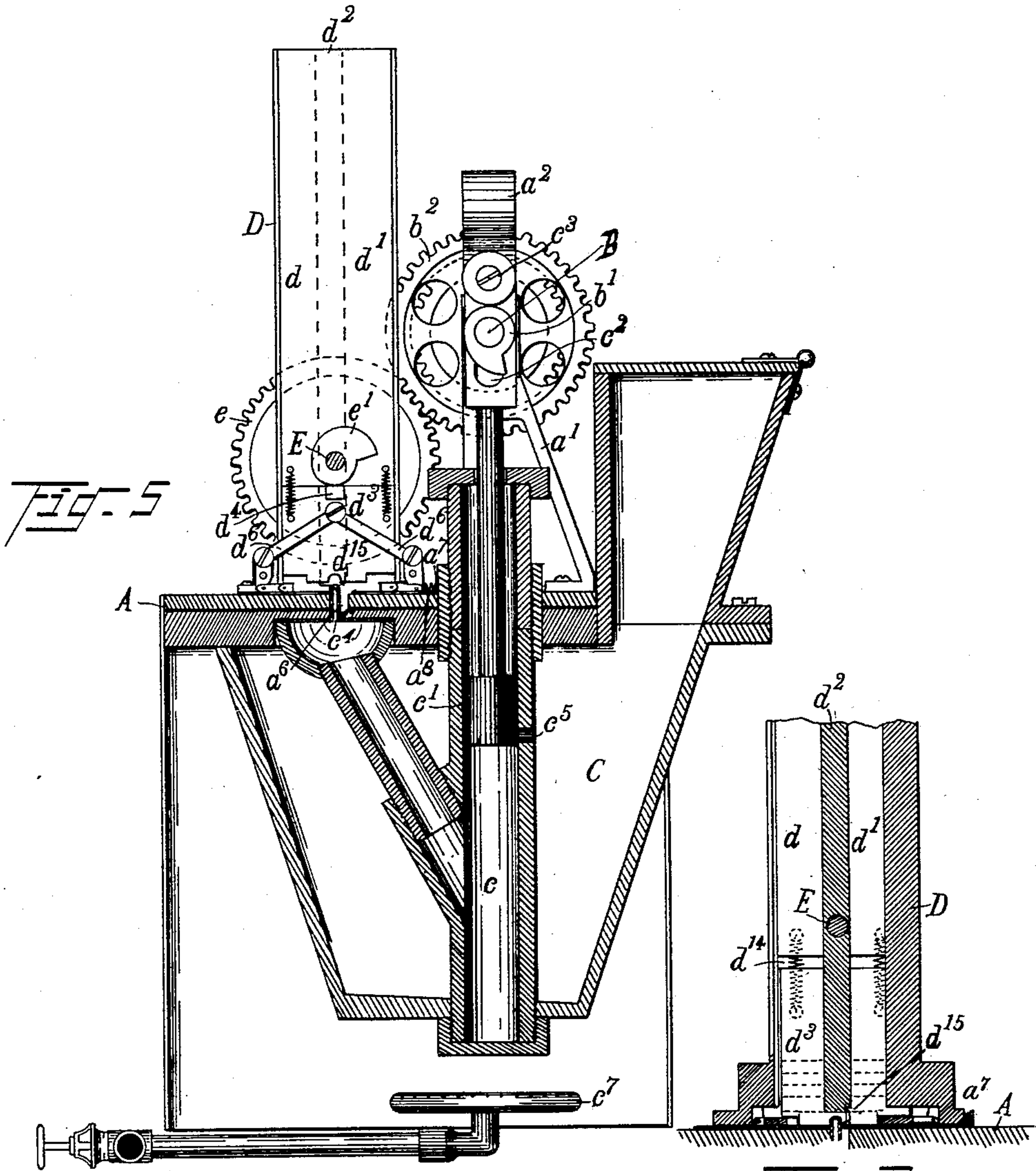
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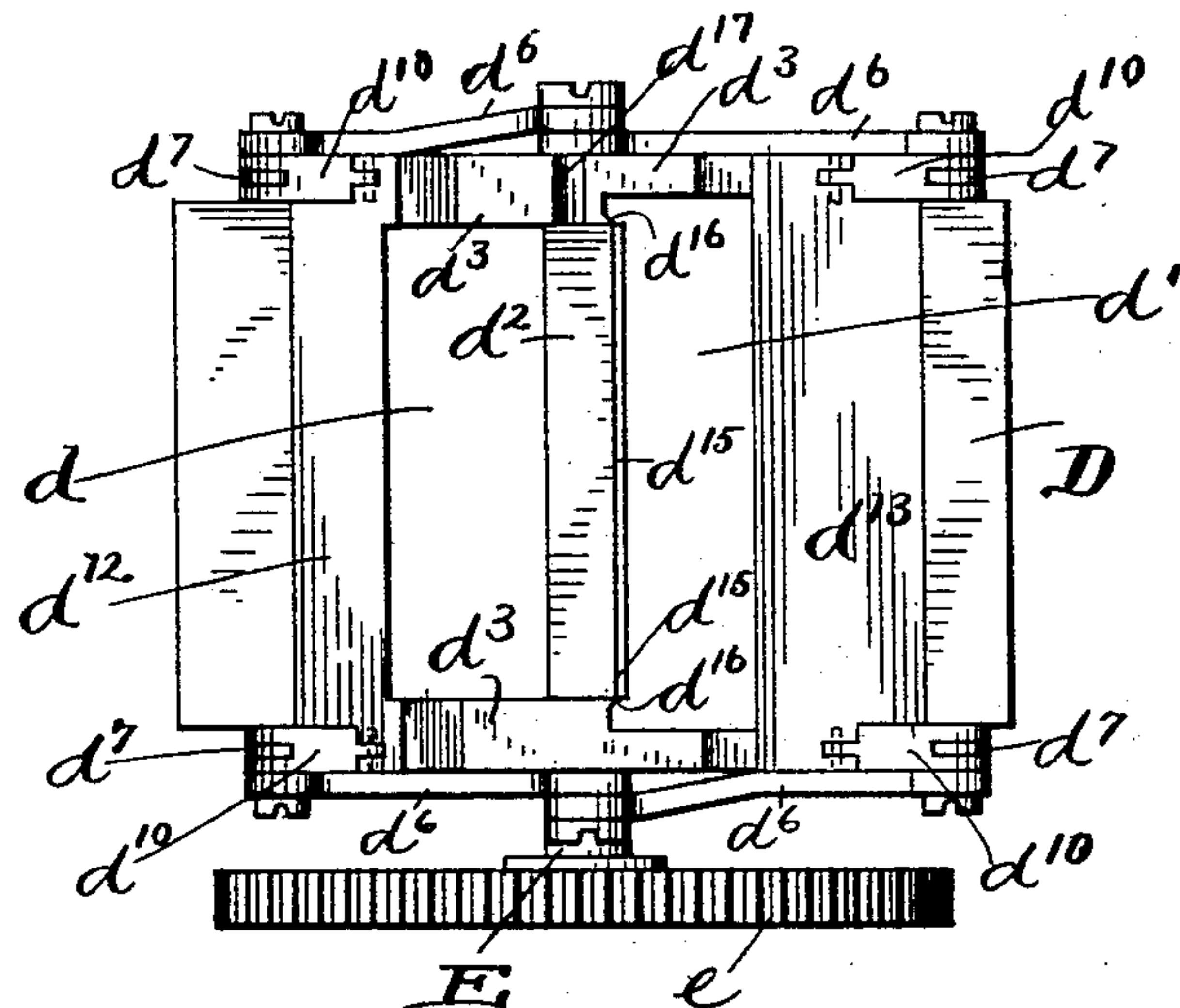


Fig. 6.

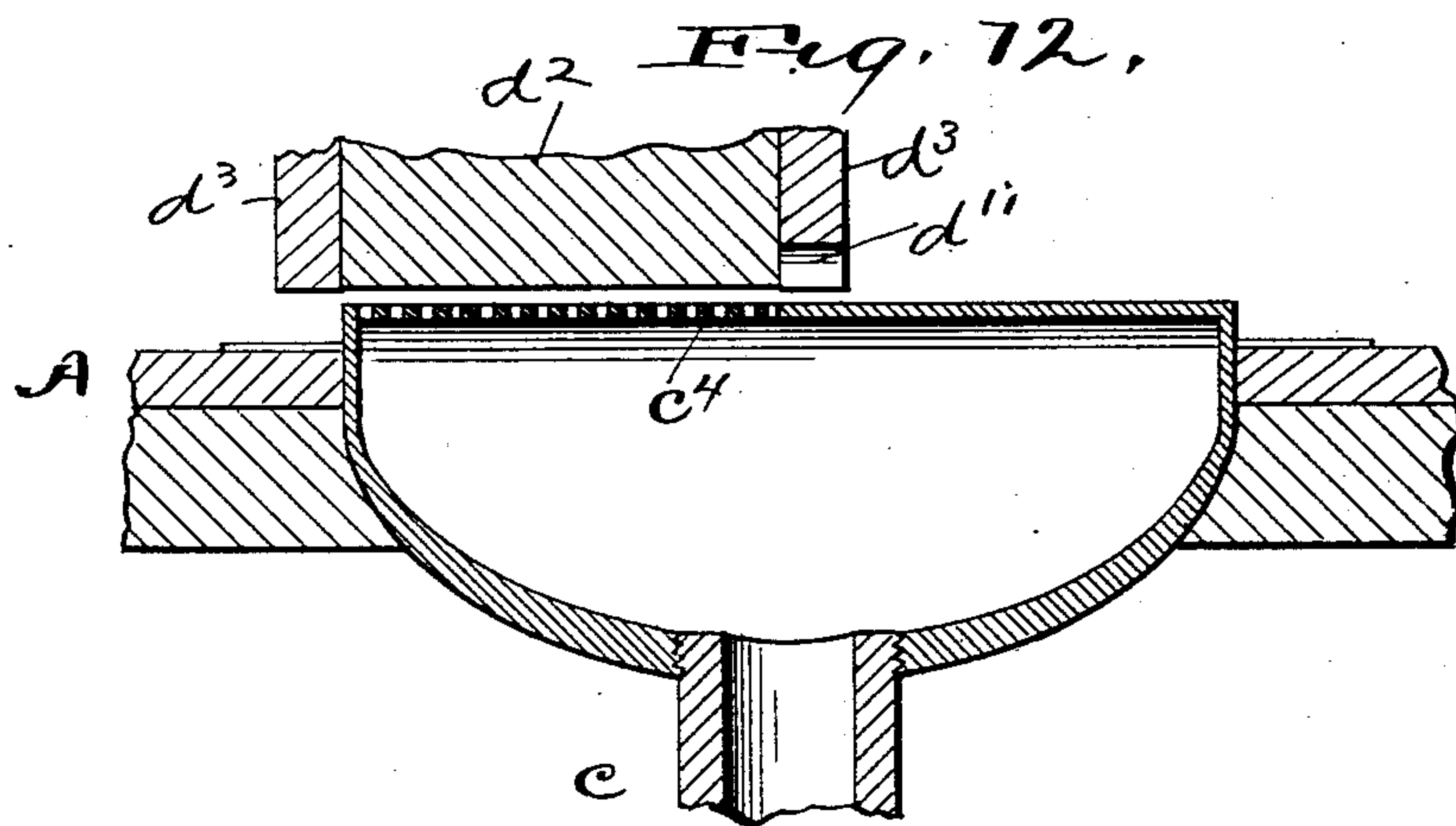


Fig. 12.

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Albert H. Bates.

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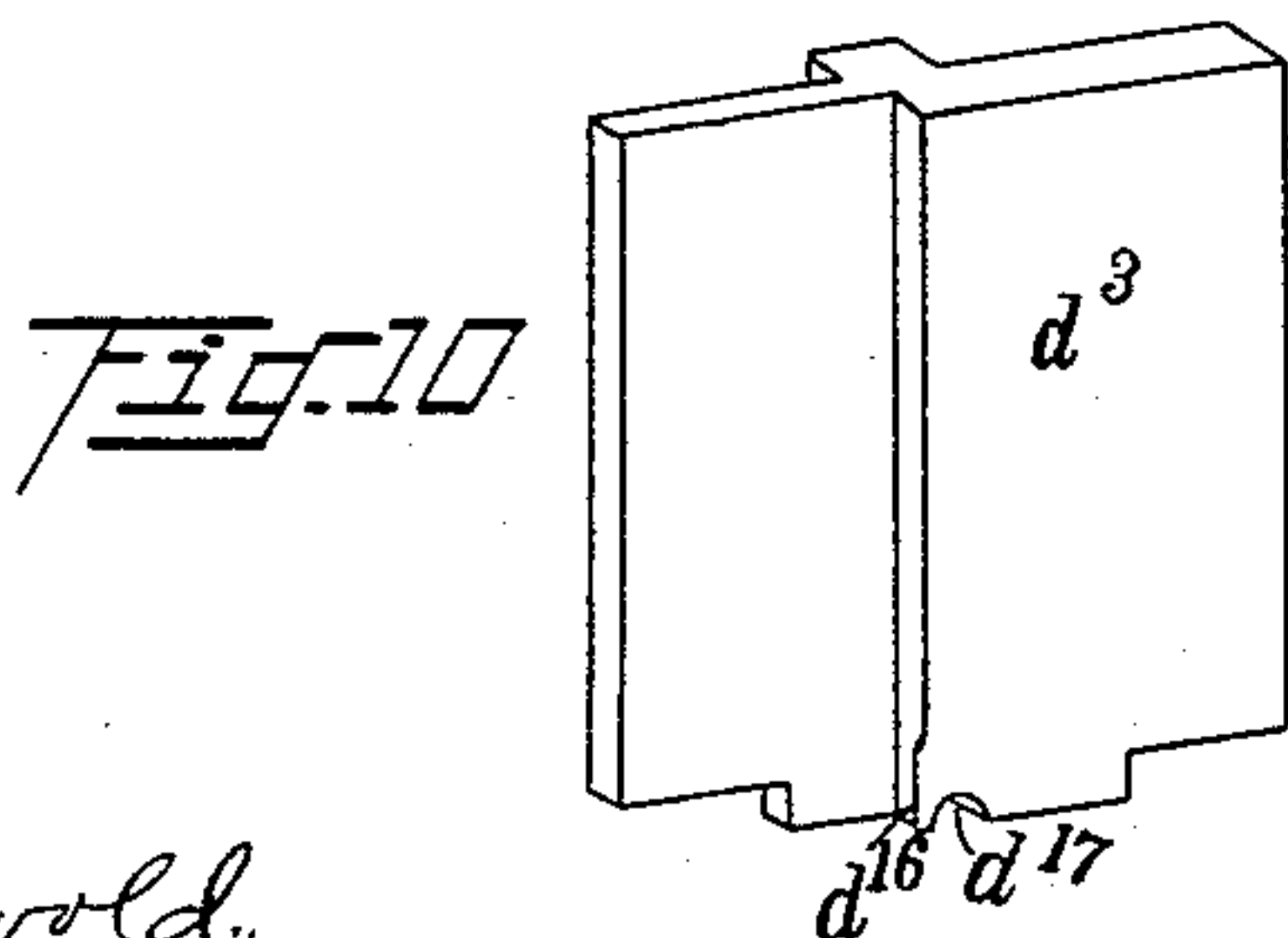
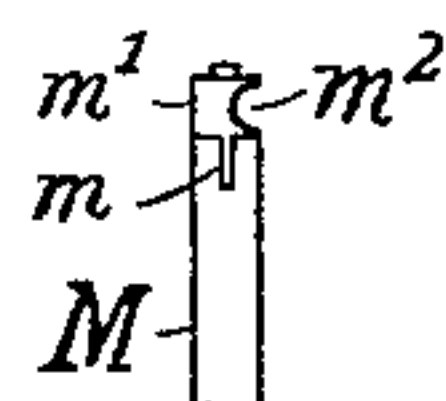
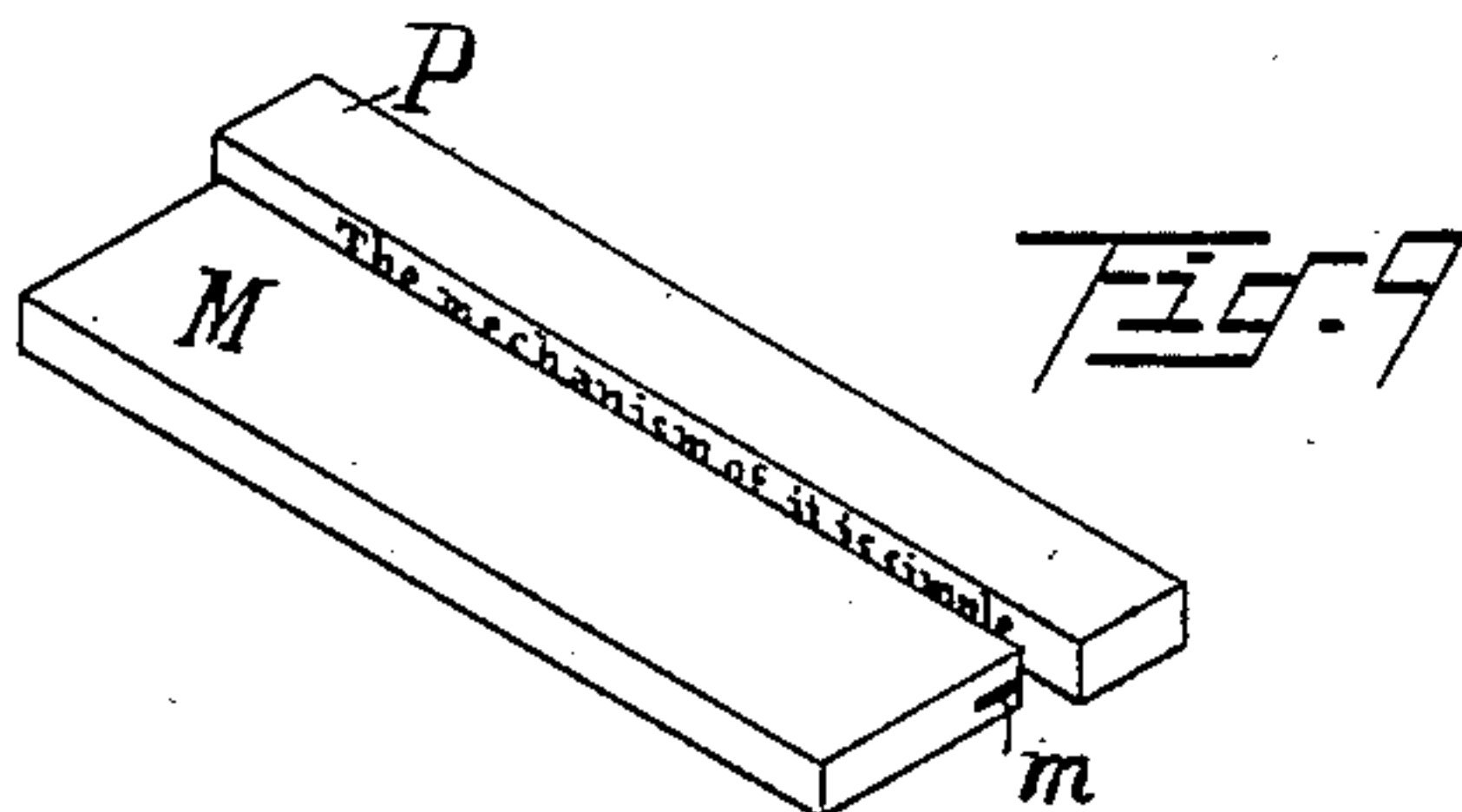
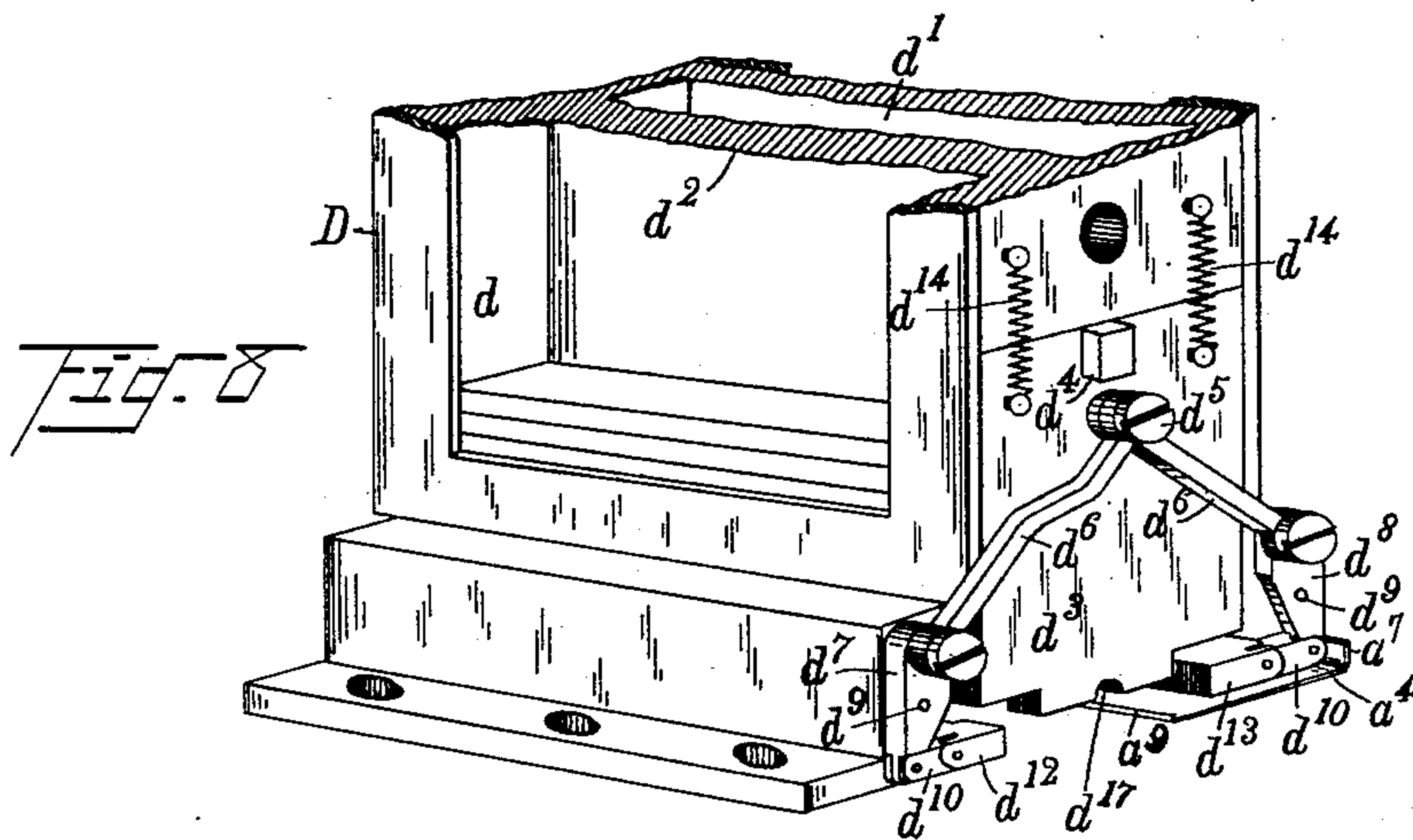
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Patented Oct. 12, 1897.



WITNESSES.

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UNITED STATES PATENT OFFICE.

CHARLES SEARS, OF CLEVELAND, OHIO.

MACHINE FOR MAKING TYPE-BARS.

SPECIFICATION forming part of Letters Patent No. 591,777, dated October 12, 1897.

Application filed October 10, 1894. Serial No. 525,505. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SEARS, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Machines for Making Type-Bars; 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.

The invention relates to machines for casting type-bars or "linotypes," as they are sometimes called.

The object of the invention is to provide a machine simple in construction and rapid in operation, which is adapted to automatically form type-bars from a supply of previously-prepared matrix-blocks.

The machine shown in the drawings, in which my improvements are contained, is adapted to form the type-bar by casting in the several matrices thin strips of type-metal bearing the printing-characters and veneering each of said strips as it is formed onto the edge of a previously-prepared hard body or slug. The improvements relate to the mechanism whereby the matrix-blocks and slugs are automatically moved into position near and parallel to each other, to the means for inclosing the space between them, to the construction of the nozzle and its arrangement with respect to said inclosed space, to the means for ejecting from the mold the matrix-block and type-bar, and to the means for separating said matrix-block and type-bar, all of which will be hereinafter described, and definitely pointed out in the claims.

In the drawings, Figure 1 is a plan view of my improved machine. Fig. 2 is a front elevation thereof. Fig. 3 is an enlarged detached view of two bevel-gears employed in the construction. Fig. 4 is a detached view of the mechanism for separating the matrix from the bar which has been cast therein. Fig. 5 is a vertical section on line 5 5 of Fig. 1. Fig. 6 is an under side view, on an enlarged scale, of the hopper or double reservoir hereinafter described. Fig. 7 is a partial vertical sectional view of said hopper on the line 7 7 of Fig. 1. Fig. 8 is an enlarged perspective view of the hopper with the upper portion broken away. Fig. 9 is a perspective

view of one of the matrices and the slug upon the edge of which the linotype is to be cast and veneered, and this drawing shows the relative position of a matrix and type-plate when a linotype is about to be cast. Fig. 10 is a perspective view of the inside of one of the hopper-doors. Fig. 11 is an end view of a completed type-bar, and Fig. 12 is a vertical longitudinal section of the nozzle and lower part of the hopper.

Referring to the parts by letters, A represents the bed of the machine.

The main driving-shaft B is mounted in the brackets a' , which are attached to the bed, and the driving-wheel b is attached to the main shaft.

The melting-pot C is fixed in suitable relation to the other parts of the machine, and as a matter of convenience it lies mainly beneath and is secured to the bed-plate. A pump is provided for forcing the molten metal out of the melting-pot to and through the nozzle c^4 .

The pump-cylinder c is located beneath the driving-shaft B, and the piston-rod c' extends upward out of said cylinder, and it is provided with a slot c^2 , through which the main shaft B passes. Secured to the inner side of the plunger-rod above the slot c^2 is a small projection c^3 , (on which preferably a friction-roller is mounted,) which is in contact with a cam b' , which is keyed to the main shaft. A spring a^2 , which is attached to the bracket a' , bears upon the upper end of the piston-rod, thereby tending to force it downward.

The hopper D is rigidly secured to the bed A over the nozzle c^4 . It is provided with two compartments $d d'$. The front compartment or reservoir is adapted to contain the slugs or metal plates from which the type-bars are formed in the manner to be presently described, and the rear compartment d' is adapted to contain the matrix-blocks. These two reservoirs are separated by the partition d^2 , through which passes the shaft E, having the gear-wheel e keyed onto its outer end, said gear e being in mesh with a gear b^2 on the main shaft B. Keyed to the shaft E on each side of the hopper are the cams $e' e'$, the purpose of which will be presently explained. Two vertically-sliding doors $d^3 d^3$ are set into the two sides of the hopper below the shaft

E, and these doors are adapted to be moved downward against the bed-plate A by the pressure of the cams e' upon lugs d^4 , which project outward from the upper ends of the sliding doors d^3 . The doors are raised above the bed-plate by means of the springs d^{14} , which are attached to said doors and to the sides of the hopper. Two arms d^5 d^6 are pivoted to each of the doors d^3 at a point d^5 . One of the arms extends rearward and the other forward from this pivotal point. These arms are pivoted at their opposite ends to levers d^7 d^8 , said levers being pivoted to the base of the hopper at d^9 . The lower ends of these levers are pivoted to the links d^{10} , which links are also pivotally connected with the two laterally-moving plates d^{12} d^{13} , which lie normally in recesses underneath the front and back walls of the hopper. The front plate d^{12} rests upon the bed, and the back plate d^{13} rests upon the thin sheet-metal plate a^4 , which in turn rests upon the bed.

From the above-described description of the construction of the hopper and the parts connected therewith it will be understood that by revolving the shaft E the action of the cam e' on the lug d^4 will force the doors d^3 downward. The downward movement of these doors causes the sliding plates d^{12} d^{13} to move toward each other into the reservoirs d d' through the medium of the arms d^6 , levers d^7 d^8 , the links d^{10} , and their pivotal connection with each other and the base of the hopper, as described. The perforated nozzle c^4 protrudes through the bed of the machine directly beneath the partition d^2 , which separates the two reservoirs contained in said hopper, and said nozzle extends the entire distance between the two sides of the hopper. As shown in the drawings, the nozzle extends out beneath the right side of the hopper, although the part which so extends beyond the hopper is imperforate. This construction is preferred, so that larger type-bars may be made in the same machine by substituting a larger hopper for that herein shown. The partition d^2 does not touch the nozzle, but lies a short distance above it, and at a distance above the bed-plate equal to the thickness of one of the slugs M.

When the machine is in its normal position, the hopper contains a supply of slugs and matrix-blocks in the reservoirs d d' , respectively. The lowest slug rests upon the bed-plate between the laterally-moving plate d^{12} and the nozzle c^4 , while the lowest matrix-block will rest on the sheet-metal plate a^4 between the laterally-moving plate d^{13} and the nozzle. The sheet-metal plate a^4 is movable toward and from the nozzle. On its front edge is an upwardly and rearwardly turned knife-edge a^9 , against which the matrix-block is pressed as it is forced forward by the laterally-moving plate d^{13} . A spring a^8 , which lies between the hopper and an upwardly-turned arm a^7 on the rear edge of said plate a^8 , draws said plate backward when it can.

Keyed to the main shaft B is a bevel-wheel b^3 , a portion of which only is provided with teeth which mesh with the bevel-gear f on the crank-shaft F. This construction gives the crank-shaft an intermittent motion, while the shaft B revolves constantly.

A gear-segment G is secured to a rock-shaft g , which is mounted in suitable brackets a^5 , and it engages with a rack h on a slide H, which is adapted to move into the hopper D when the doors are raised, and to push out from said hopper the lowest matrix and the type-bar which has just been formed therefrom. This gear-segment is connected with the crank-shaft B by a connecting-rod f' .

I will now proceed to describe the operation of the machine.

When the machine is in its normal position, the piston c' covers the opening through which the molten metal flows from the melting-pot to the pump-cylinder, as shown in Fig. 5. The melting-pot is heated by a burner c^7 , which is supplied with gas by the pipe c^9 . When the driving-wheel b is turned, the gear b^2 , being in mesh with the gear e , causes the shaft E to revolve, which, through the action of the cams e' e' , forces the doors d^3 downward. At the same time the laterally-sliding plates d^{12} d^{13} are moved toward the nozzle. A slug and a matrix-block being in their path are necessarily moved toward each other until they lie close and parallel with each other. The space between the slug, which constitutes the mold into which the molten metal is injected, is inclosed by the parts and in the manner as follows, to wit: The slug, in being moved as described, is forced beneath the lower end of the partition d^2 , and said slug fits so snugly between the bed-plate and partition as to prevent the escape of the molten metal over or under it. The slugs are also of a length which is exactly equal to the distance between the two doors d^3 , so that when said doors are closed they prevent the escape of molten metal around the ends of said slugs. The front edge of the matrix-block engages with the knife-edge a^9 on the sheet-metal plate a^4 , thereby causing said plate to slide forward until it strikes the nozzle and closes over a depression a^6 in the bed A. The said matrix-block also engages with a horizontal knife-edge d^{15} , which is on the lower edge of the partition d^2 , and with vertical knife-edges d^{16} , which are formed on the inner side of the sliding doors. (See Figs. 6 and 10.) These knife-edges a^9 d^{15} and d^{16} d^{16} cut into the matrix-block and form a tight joint with it, whereby the escape of molten metal around said matrix-block is prevented. As shown in the drawings, the nozzle c^4 extends out of one side of the hopper, and when it does so extend a groove d^{17} in the under side of the door d^3 is formed, which groove fits closely upon the nozzle when the door is closed. It will be understood that there is now between the matrix-block and the slug a narrow inclosed space which serves as the

mold, and the nozzle projects into this space or mold through one side thereof, and it lies parallel to the proximate face of the matrix and slug. The matrix-depressions are in the edge of the matrix-block which faces the slug, and in that edge of the slug which faces the matrix-block there is a groove m , into which the molten metal enters, and by means of which the strip on which the letters and characters are cast fastens itself to said slug. While the slugs and matrices are being moved into the relative positions described and the space between them is being closed in the manner also described, the cam b' on the shaft B, by pressing against the friction-roller on projection c^3 , has raised the pump-piston above the inlet c^5 and molten metal has flown through said inlet into the pump-cylinder. The continued revolution of the cam permits the spring a^2 to act suddenly to force the piston down and thus force the molten metal through the nozzle c^4 into the space between the slug and matrix, and this makes a cast of the letters and characters upon the matrix, which cast is veneered onto the edge of the slug. The continued revolution of the cam e' permits the springs d^{14} to raise the doors d^3 , and as these doors are raised the laterally-moving plates d^{12} d^{13} are returned to their normal position. At this point in the operation of the machine the toothed portion of the bevel-wheel b^3 meshes with the bevel-gear f on the crank-shaft F and revolves said crank-shaft once. This, through the connecting-rod f' , rocks the gear-segment G, thereby moving forward the slide H into the hopper, during which movement it comes in contact with the matrix-block and type-bar which has just been completed and forces said type-bar and matrix-block out of the left-hand side of the hopper, and then said slide is drawn back out of the hopper to its normal position. The nozzle, which extends into the mold through the side thereof, forms, necessarily, a groove m^2 in the newly-cast part m' of the resulting type-bar. As the bar is ejected from the hopper by the slide H this grooved part thereof slides in contact with the nozzle, and by this movement the connection between the type-bar and the metal remaining in perforations of the nozzle is clearly severed. Moreover, the groove m^2 , formed by the linotype, serves as a guide for the compositor who assembles the type-bars and renders it unlikely that any of said type-bars will be inverted. A shaft I is mounted in the brackets a^{10} a^{10} , and to it are secured, first, a gear i , which is in mesh with the gear b^4 on the main shaft, and, second, a cam i' , which is in contact with the lever J. This lever is pivoted to the bed, its rear end being upheld by a spring J', and near its middle a bar j is attached at right angles to it and above an opening a^{11} through the bed-plate. When the matrix-block and type-bar are pushed out of the mold, the type-bar slides onto a shelf a^{13} , Fig. 4, (which is a part of the bed-plate A,) and under a finger

a^{12} . The matrix-block lies over a hole in the bed-plate and under the cross-bar j of the lever J. When the matrix-block and type-bar are entirely clear of the hopper and mold, the cam i' presses the lever J down and the cross-bar j strikes the matrix-block P and bends it down, breaking it loose from the type-bar. This completes one entire operation of the various parts of the machine, and these operations are automatically repeated, with the result of producing type-bars so long as the reservoirs are supplied with matrix-blocks and slugs.

Having described my invention, I claim—

1. In a machine for making type-bars, the combination of a mold adapted to be opened at one end to permit the removal of the type-bar cast therein, with a perforated nozzle which projects into said mold through one side thereof and forms a recess in one side only of the type-bar, substantially as and for the purpose specified.

2 In a machine for making type-bars, in combination, mechanism for moving a slug and a matrix close and parallel to each other, and for inclosing the space between them, with a perforated nozzle which projects into said space and lies parallel to the proximate faces of said matrix and slug and forms a recess in only one side of the type-bar, and a melting-pot and pump, substantially as and for the purpose specified.

3. In a machine for making type-bars, in combination, two parallel hoppers secured to a bed-plate and adapted to contain respectively matrix-blocks and slugs, a partition between said hoppers which does not descend to the bed-plate, doors closing the ends of said hoppers, laterally-movable plates for forcing the lowest matrix-block and slug toward each other and into engagement with said partition, a nozzle entering the space below said partition, and a melting-pot and pump, substantially as and for the purpose specified.

4. In a machine for making type-bars, in combination, two parallel hoppers, a vertical dividing-partition which does not descend to the bottom of said hopper, sliding doors at the ends of said hoppers, laterally-movable plates adapted to enter said hoppers respectively through the front and rear sides thereof, mechanism for moving said doors, mechanism intermediate of said doors and plates for transmitting motion from one to the other, a nozzle entering the space below the partition, a melting-pot and pump, substantially as and for the purpose specified.

5. In a machine for making type-bars, in combination, two parallel hoppers adapted to contain supplies of matrix-blocks and slugs, a vertical dividing-partition which does not descend to the bottom of the hoppers, a horizontal knife-edge on the lower edge of said partition, the sliding plate a^4 having an up-turned knife-edge a^9 , the vertically-sliding doors having the vertical knife-edges d^{16} , the

laterally-sliding plates entering the hoppers from the front and rear sides respectively, and a nozzle for injecting molten metal between said matrix-block and slug, substantially as and for the purpose specified.

5 6. In a machine for making type-bars, in combination, two parallel hoppers adapted to contain respectively matrix-blocks and slugs, the dividing-partition which coöperates with
10 the matrix-blocks and slugs to form one side of the mold, mechanism for moving said matrix-blocks and slugs laterally in pairs toward each other until their edges are beneath said
15 partition, sliding doors for closing the sides of said hoppers, a slide adapted to enter one side of said hoppers and to push the matrix-block and type-bar out through the other side of said hoppers, substantially as and for the purpose specified.

20 7. In a machine for making type-bars, in combination, a mold, a perforated nozzle projecting through the side of said mold, a recess in said side adjacent to said nozzle, and a sliding plate movable toward and from said
25 nozzle, and adapted to cover said recess, substantially as and for the purpose specified.

8. In a machine for making type-bars, in combination, a mold adapted to be opened at one end for the removal of the type-bar, whereby said type-bar and the matrix may
30 be moved endwise while still in contact with each other, with a shelf at the end of said mold onto which the type-bar slides as it moves out of the mold, a lever having a projection adapted to engage with the matrix-
35 block, and mechanism for operating said lever, substantially as and for the purpose specified.

9. In a machine for making type-bars, in combination, a shelf onto which the type-bar
40 slides as it is pushed from the mold, a finger over said shelf, a pivoted lever, a cross-bar thereon, a spring and a cam for operating said lever, substantially as and for the purpose specified.

45 In testimony whereof I affix my signature in presence of two witnesses.

CHARLES SEARS.

Witnesses:

EDWIN L. THURSTON,
NELLIE M. WOOD.