

(No Model.)

5 Sheets—Sheet 1.

L. DOW.

TYPE SETTING MACHINE.

No. 412,606.

Patented Oct. 8, 1889.

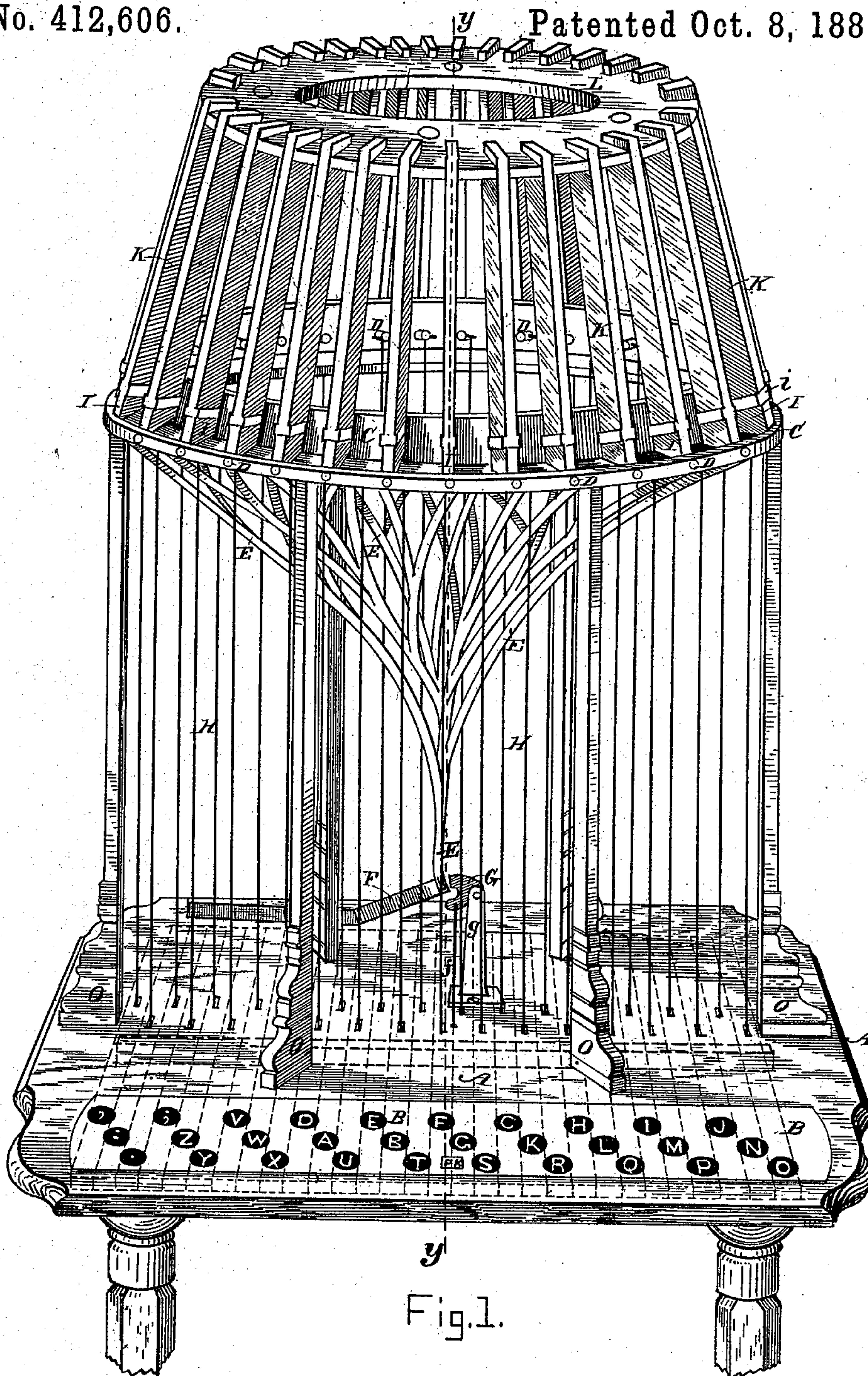


Fig. 1.

Witnesses.
A. H. Latham
Charles Rogers

Inventor
Loring Dow

(No Model.)

5 Sheets—Sheet 2.

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TYPE SETTING MACHINE.

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Fig-2

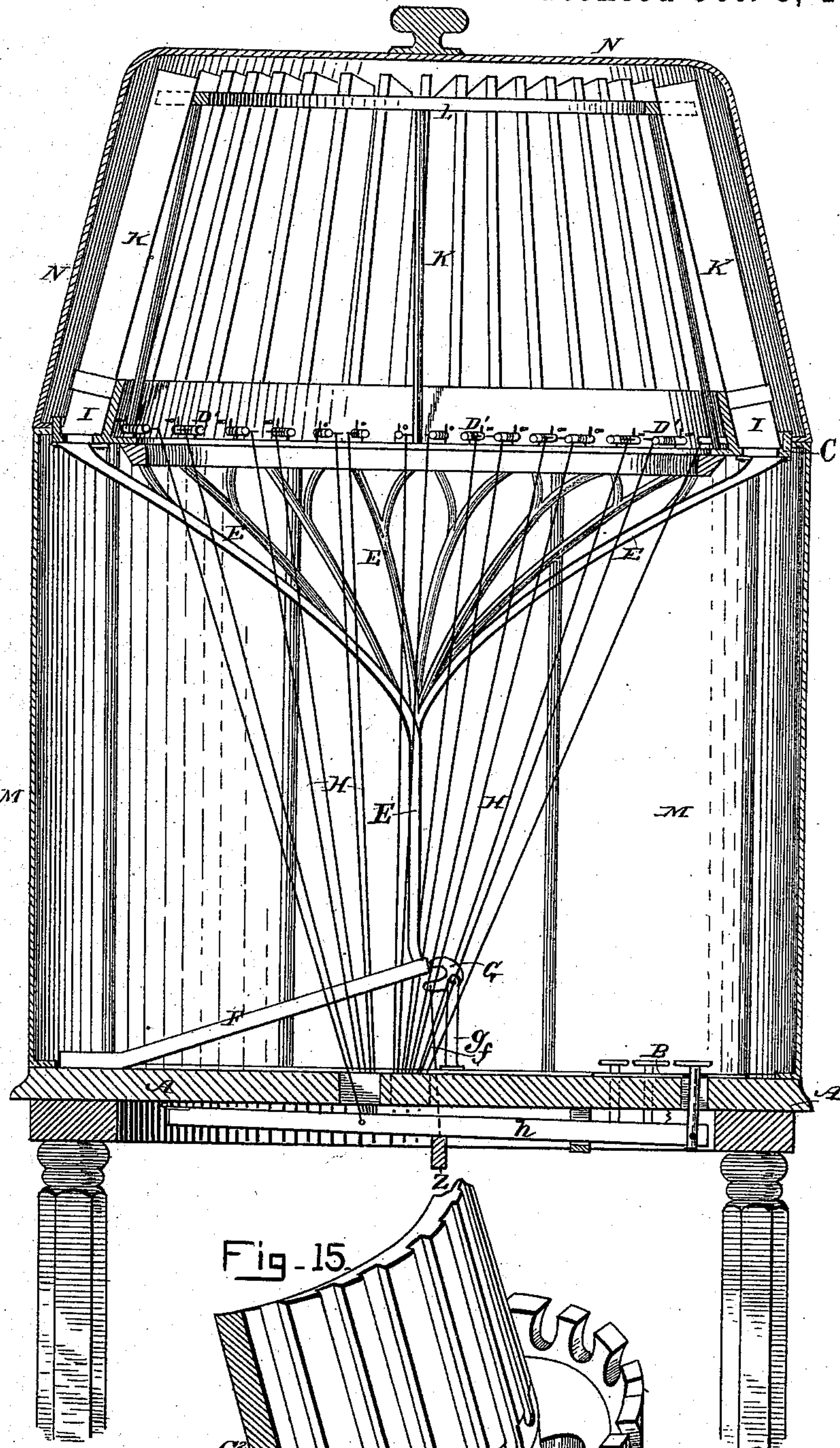
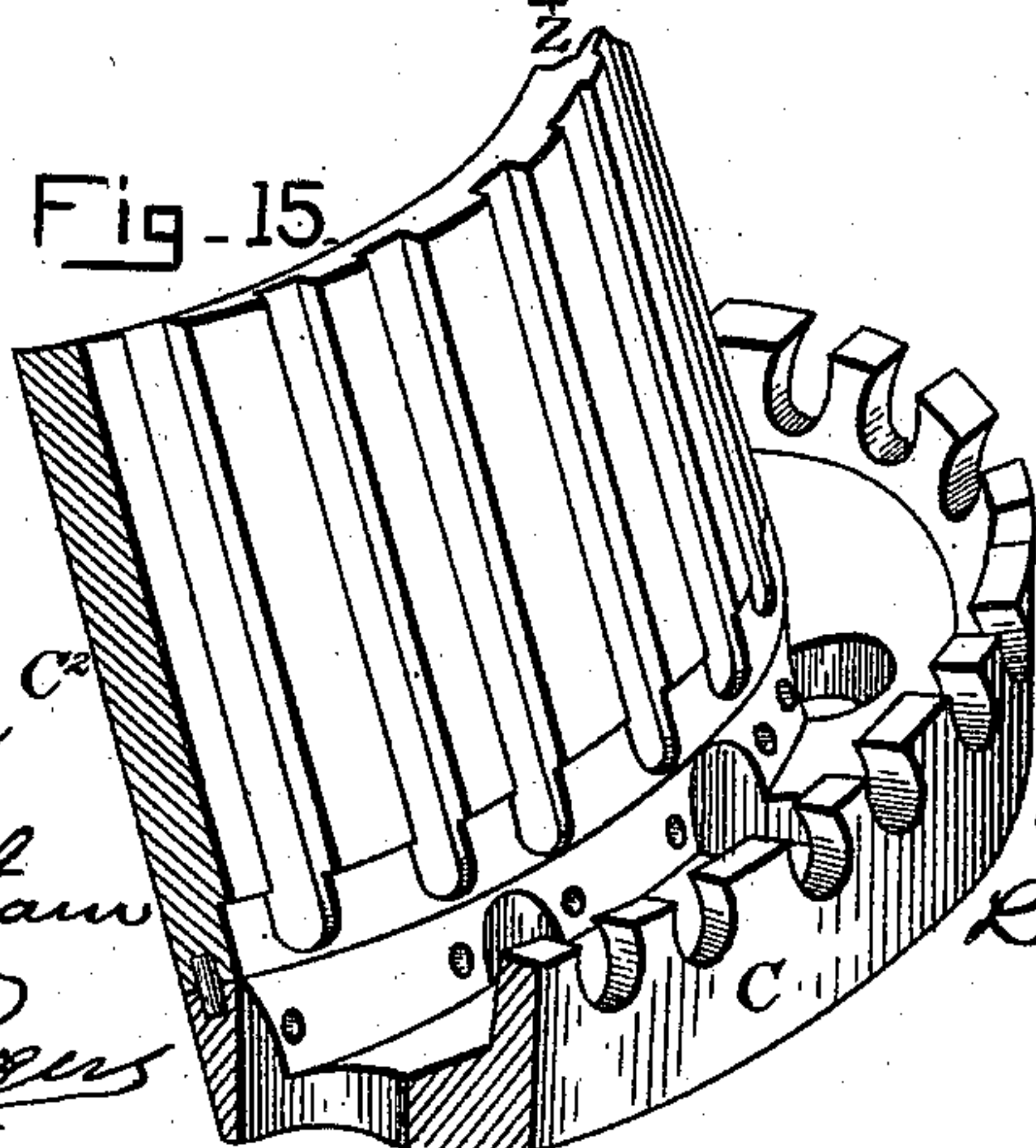


Fig-15



Witnesses:
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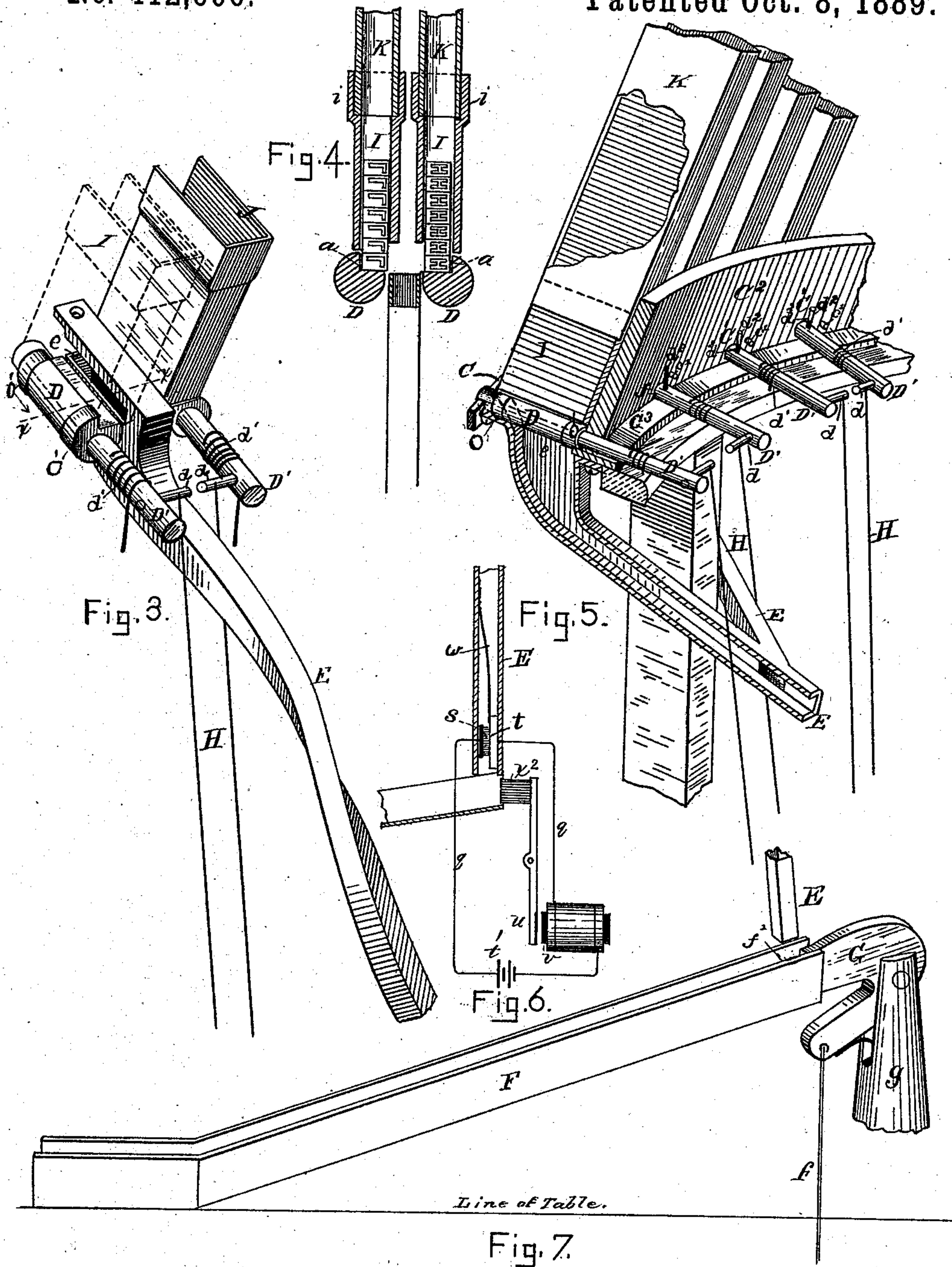
(No Model.)

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L. DOW.
TYPE SETTING MACHINE.

No. 412,606.

Patented Oct. 8, 1889.



Witnesses:
A. Latham
Charles Rogers

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(No Model.)

5 Sheets—Sheet 4.

L. DOW.

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Patented Oct. 8, 1889.

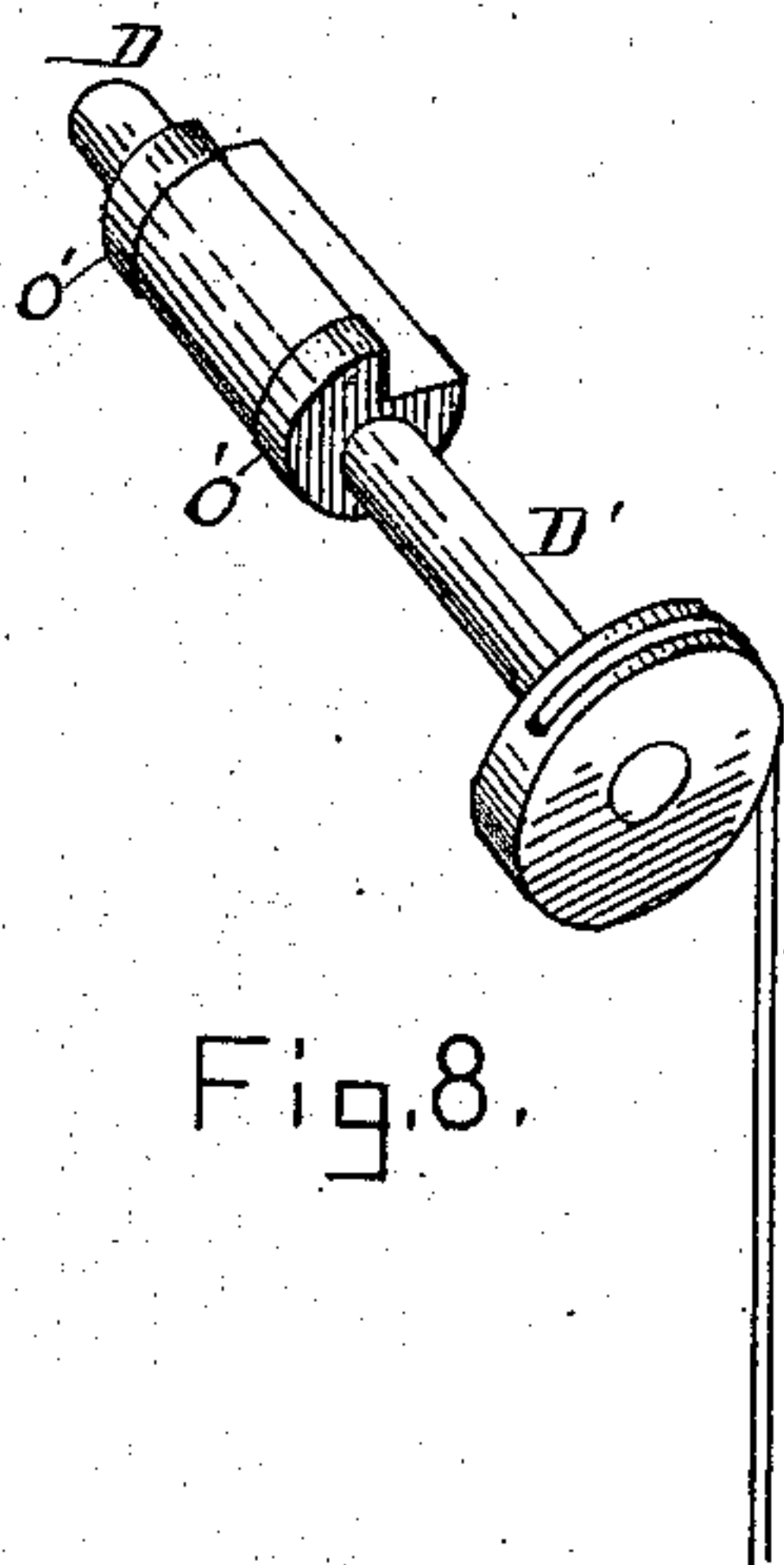


Fig. 8.

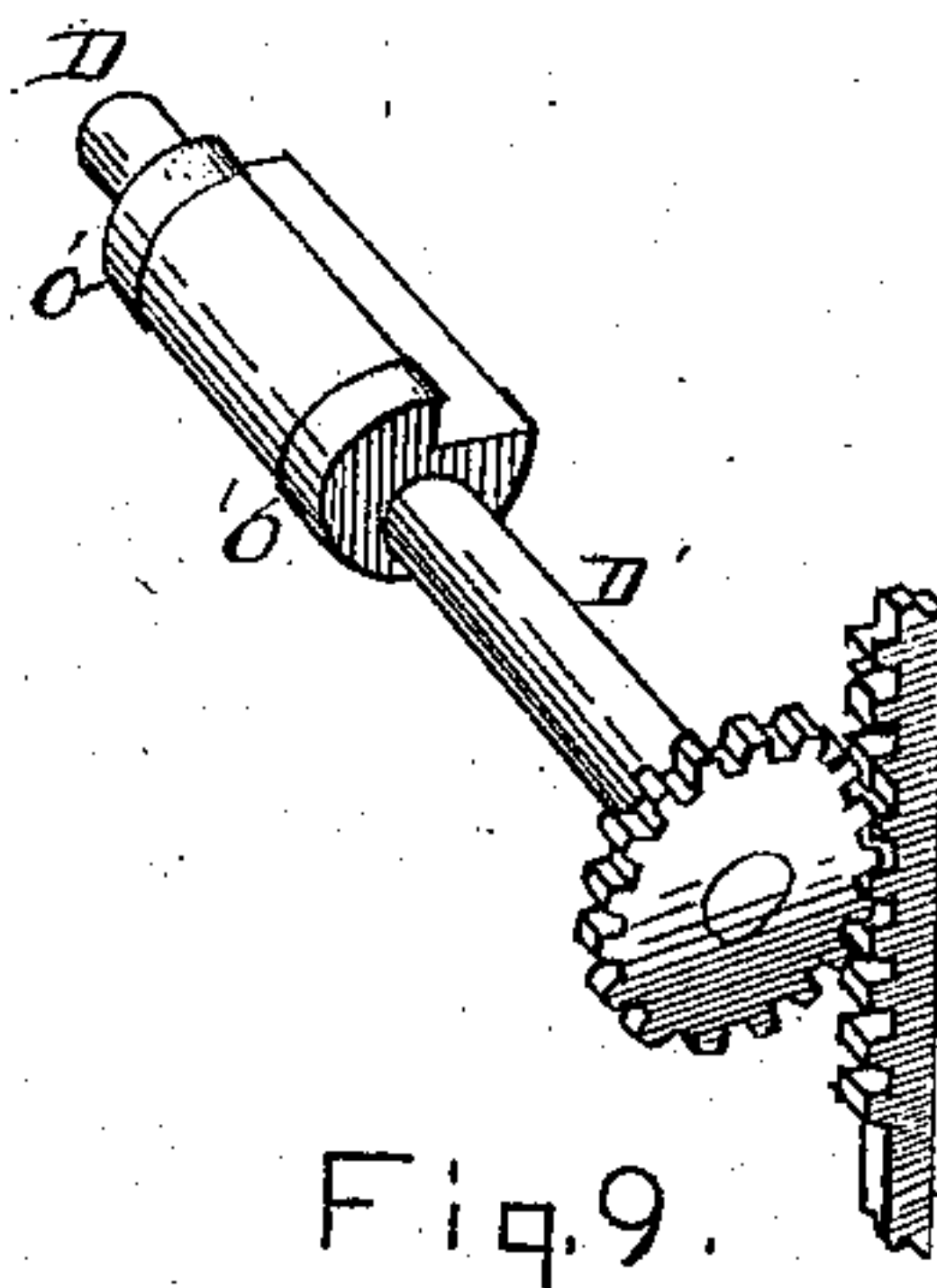


Fig. 9.

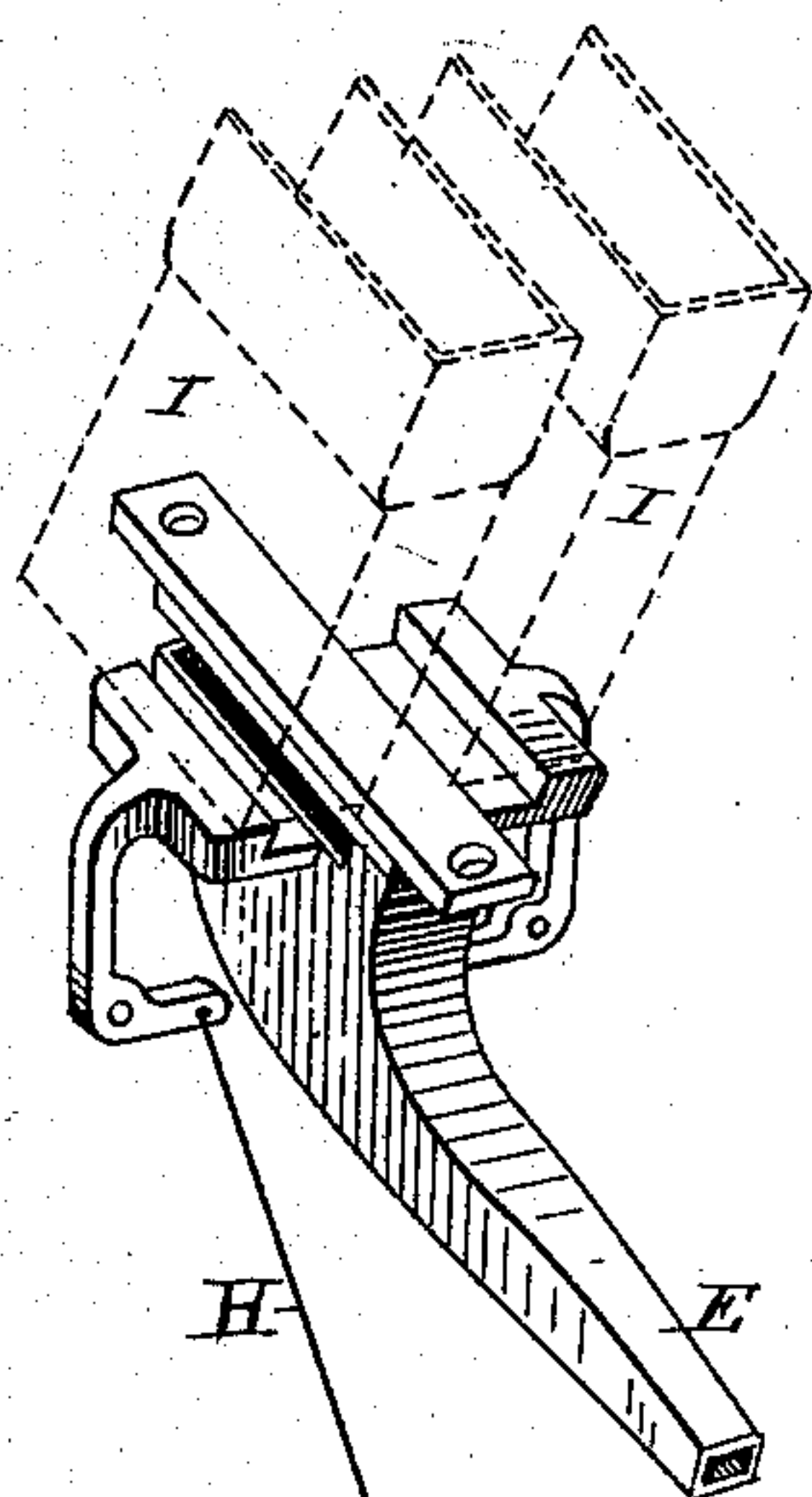


Fig. 10.

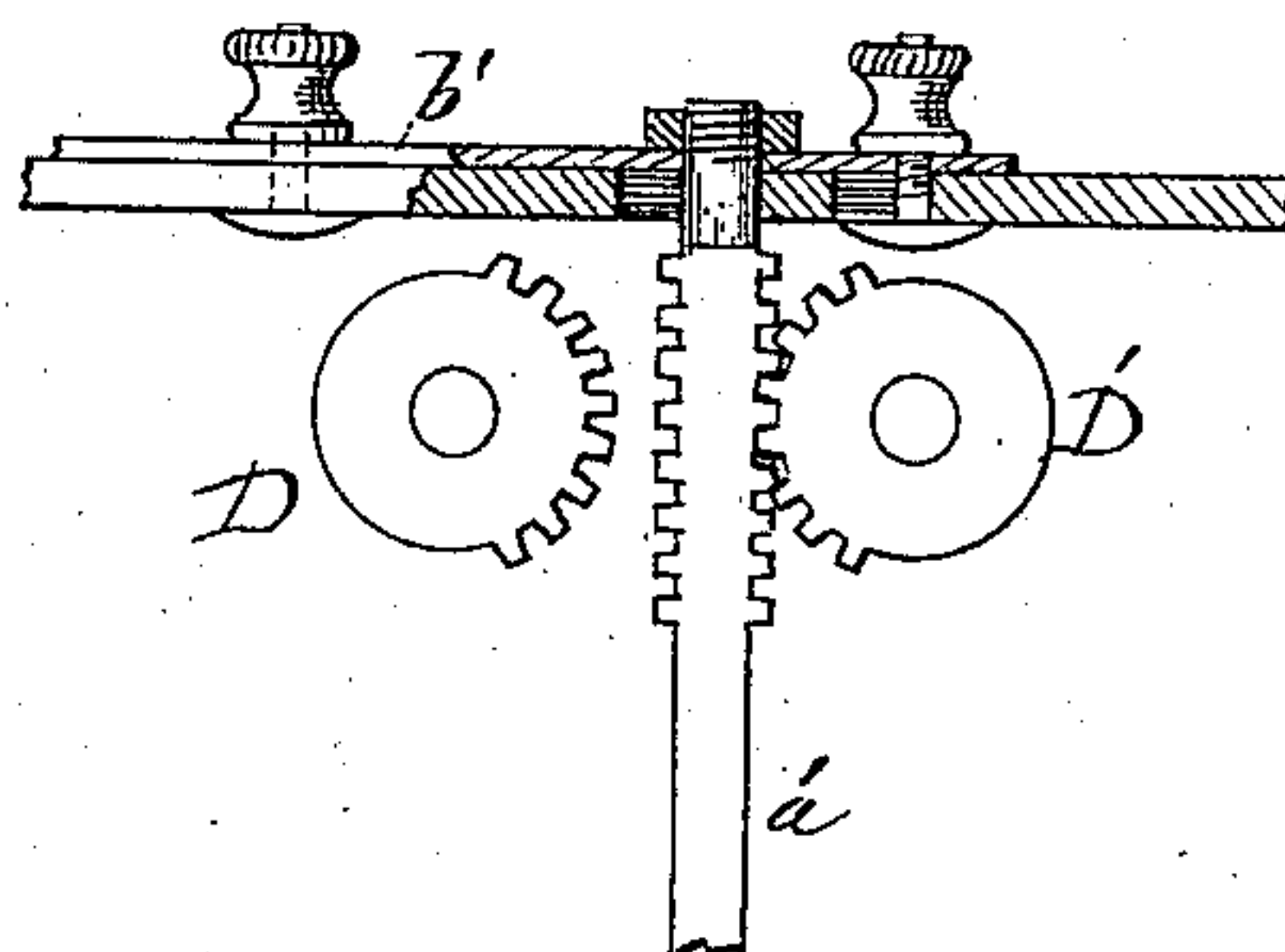


Fig. 11.

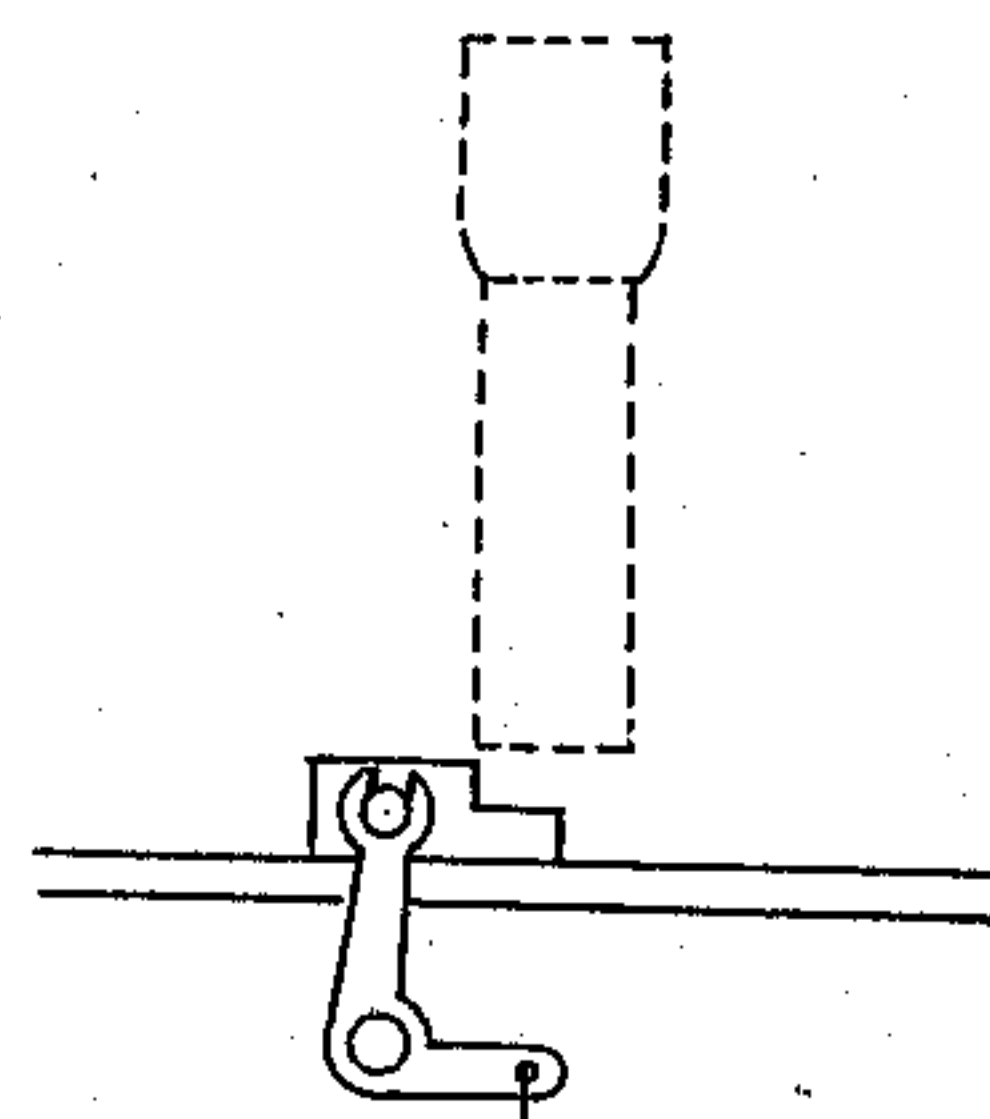


Fig. 13.

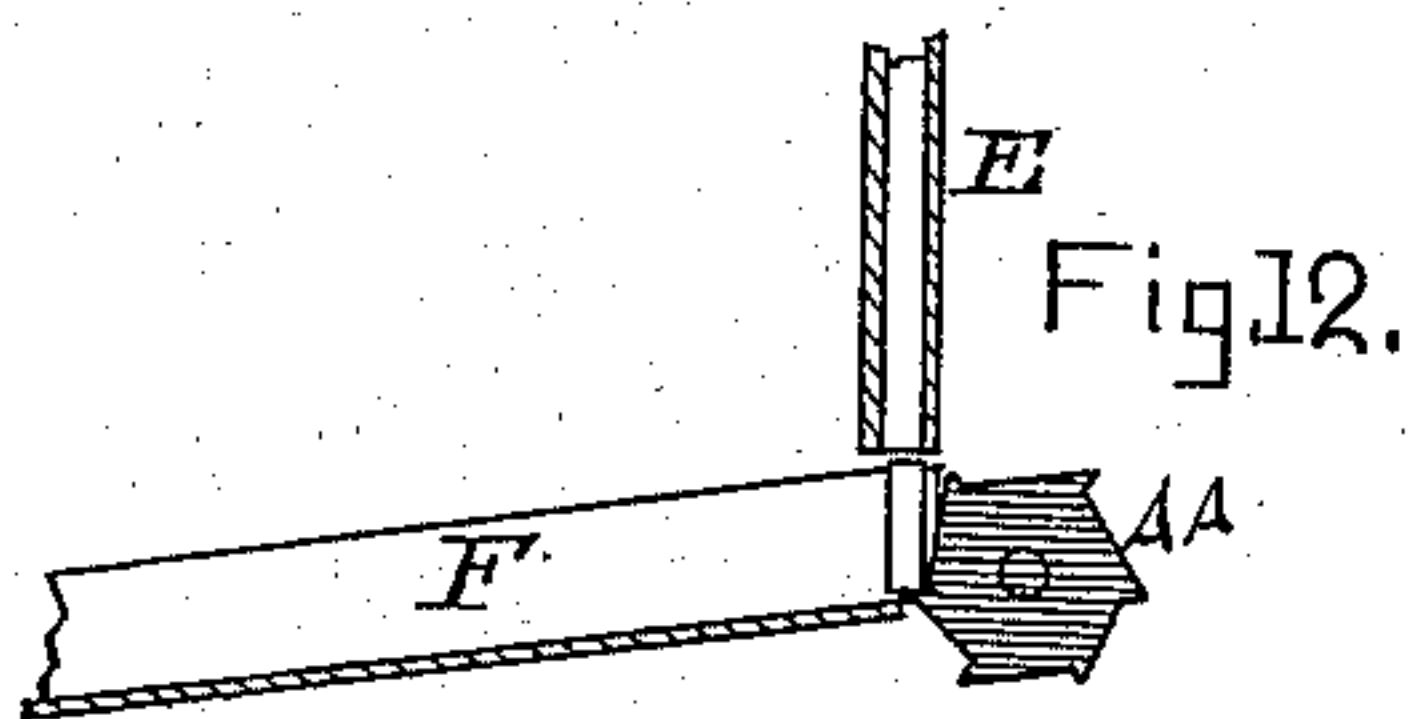


Fig. 12.

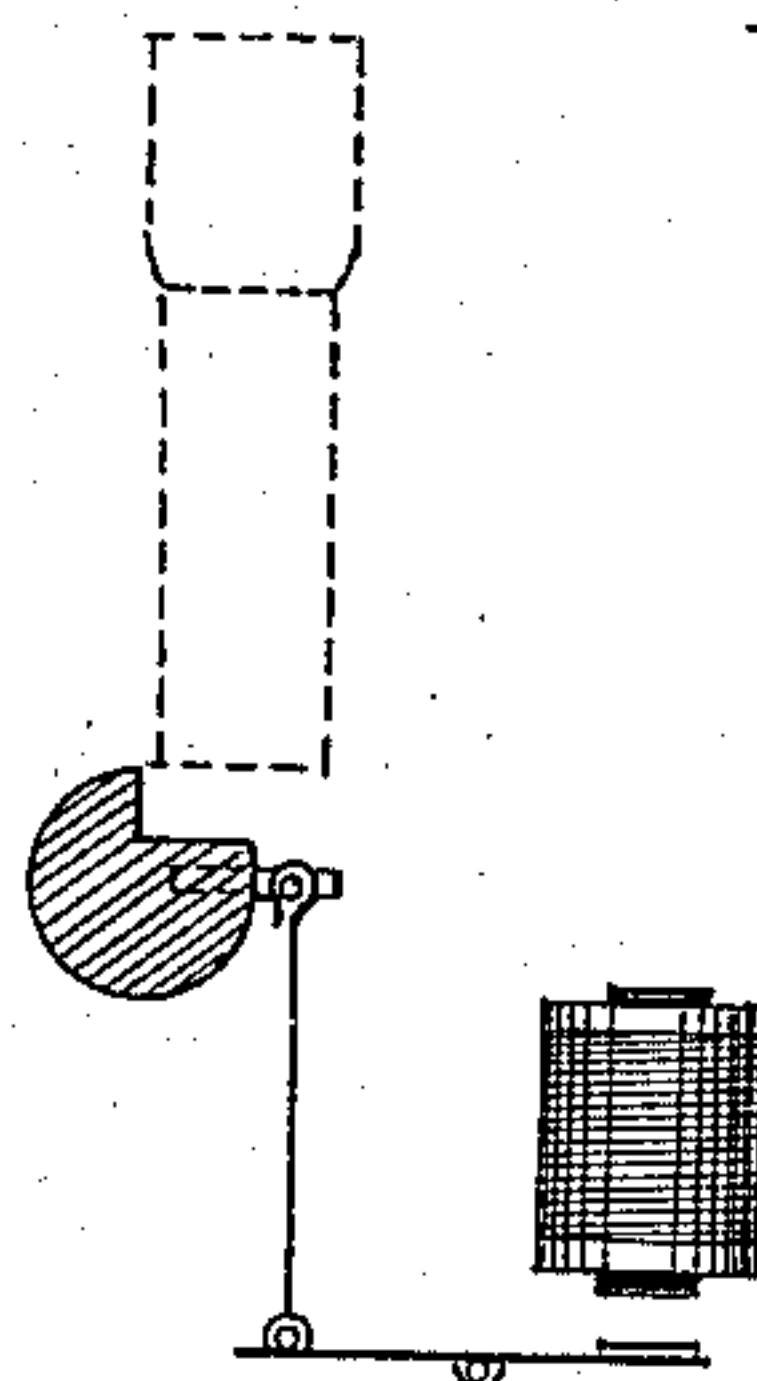


Fig. 14.

Witnesses:
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(No Model.)

5 Sheets—Sheet 5.

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Fig. 16.

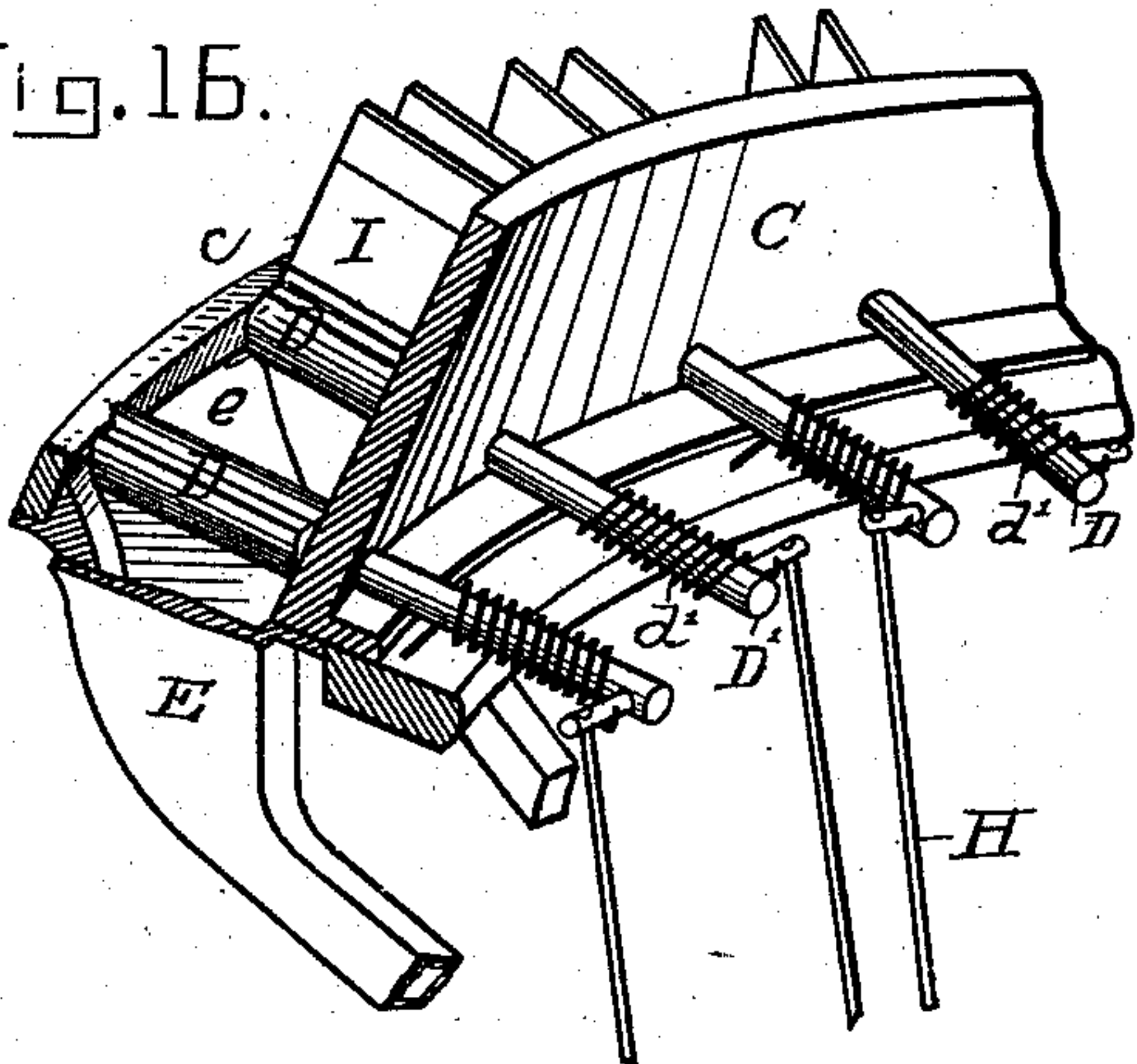


Fig. 20.

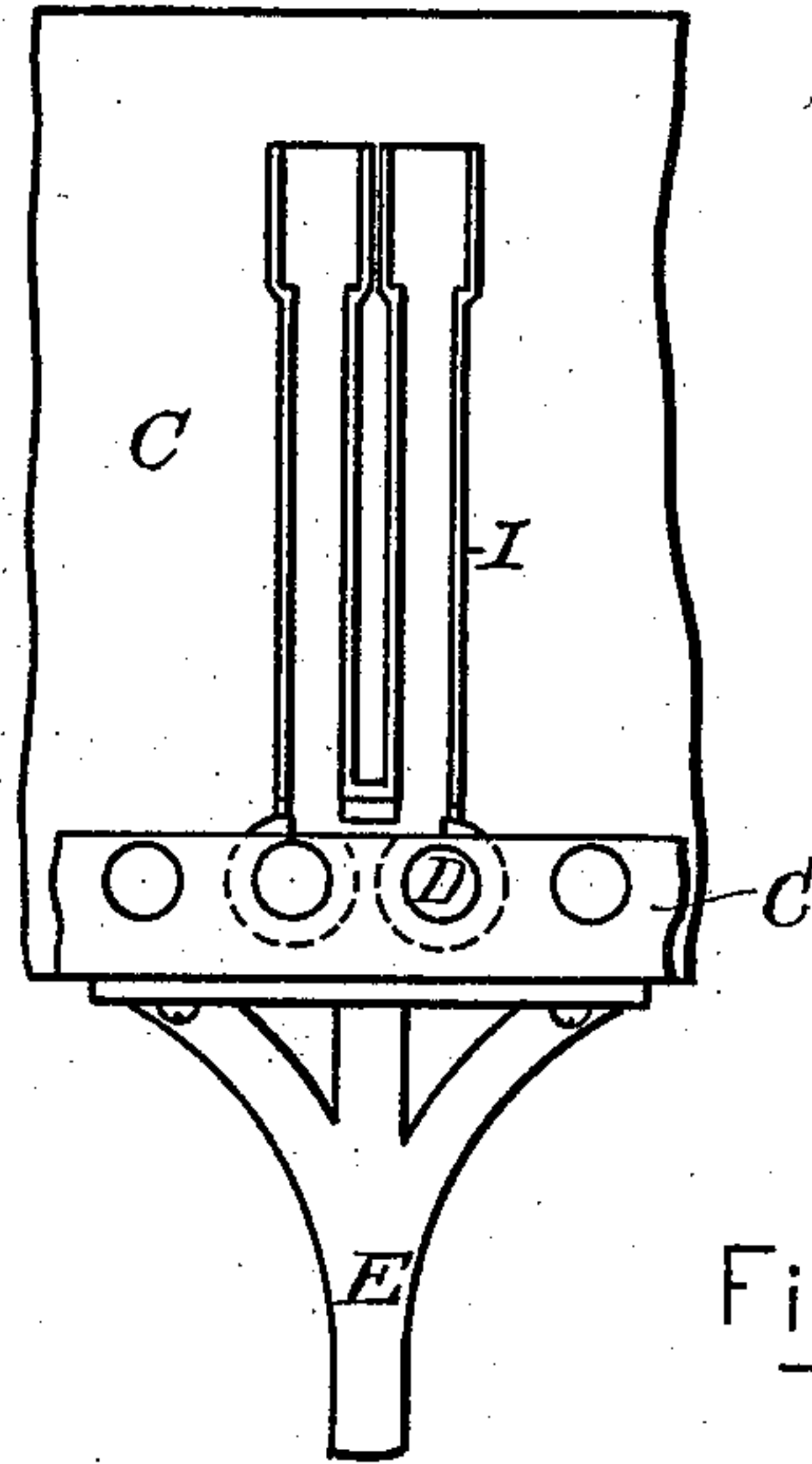


Fig. 17

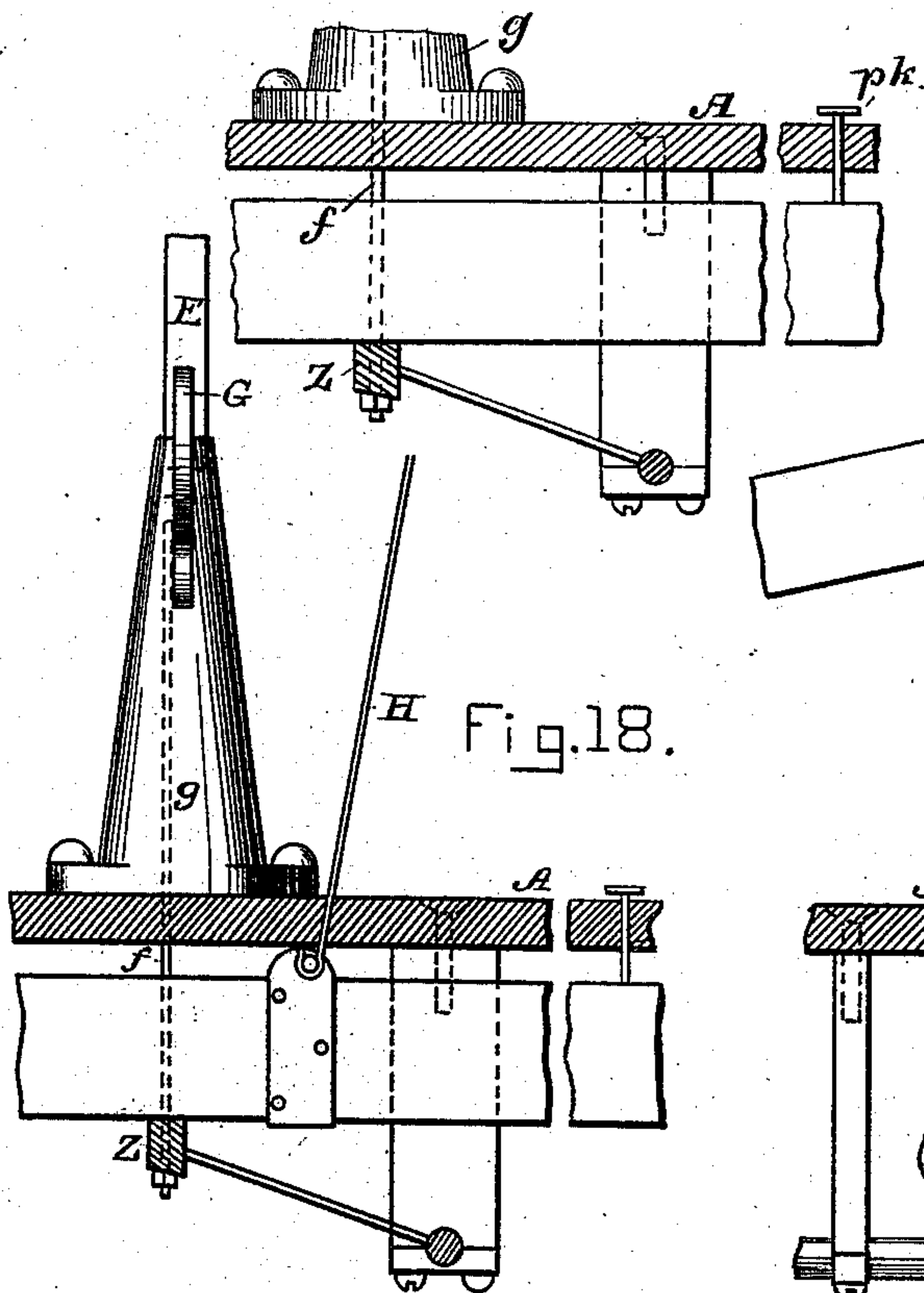


Fig. 18.

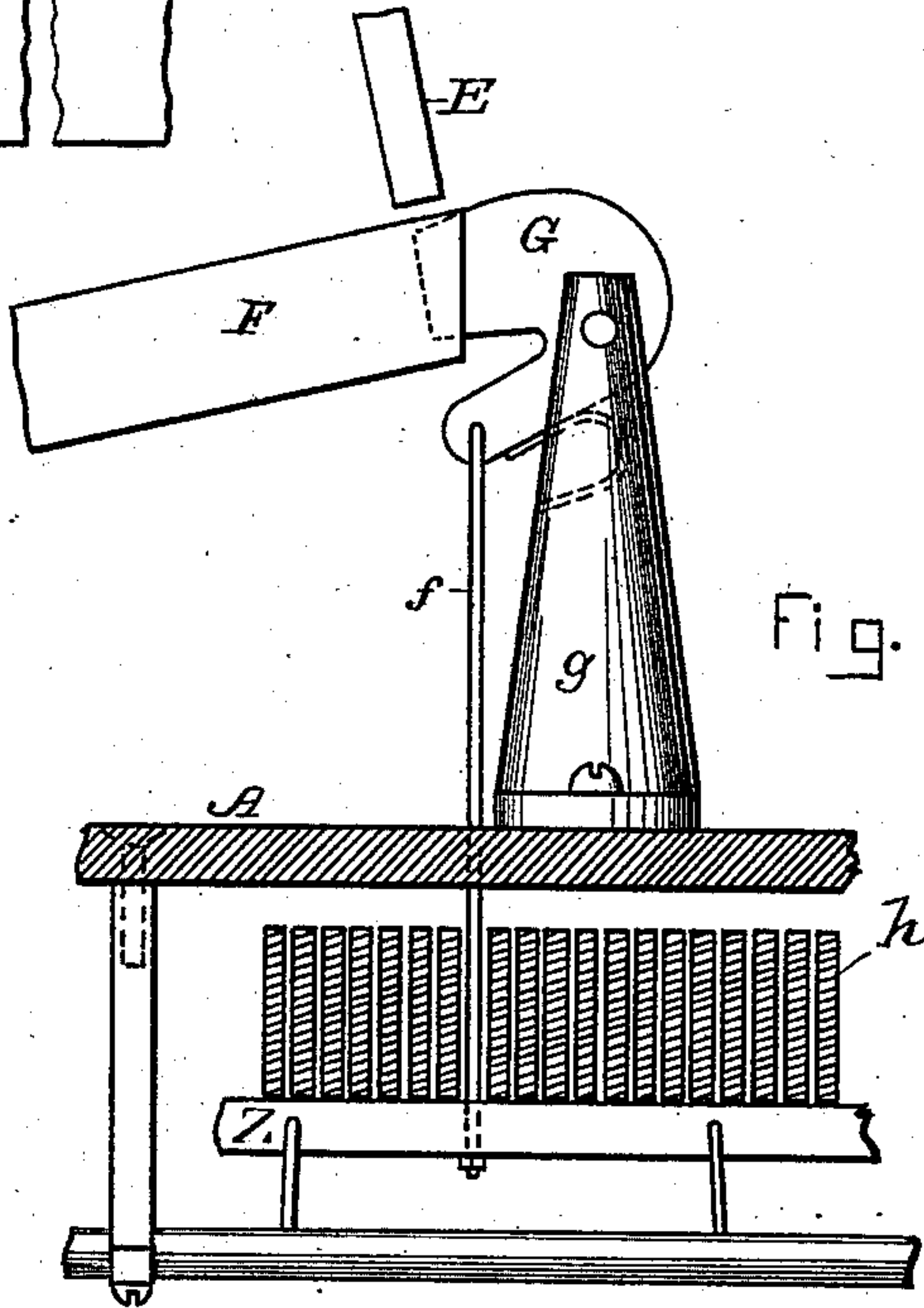


Fig. 19.

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Matthew H. Blunt.

Inventor
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UNITED STATES PATENT OFFICE.

LORENZO DOW, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE AMERICAN
TYPE SETTER COMPANY, OF PORTLAND, MAINE.

TYPE-SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 412,606, dated October 8, 1889.

Application filed November 13, 1885. Serial No. 182,771. (No model.)

To all whom it may concern:

Be it known that I, LORENZO DOW, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Type-Setting Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in type-setting machines in which the types are arranged in grooves or channels by hand or a distributor and move down by gravity as the lowermost type in the column is successively caused to descend through channels or grooves to the "stick," whence they are taken to be justified; and my improvement consists, first, in making the grooves partly permanent and partly removable, so that the work of the operator can go on continuously; second, in a new method of releasing the bottom type in the column, dispensing with all levers except the single one of the key-board, thereby greatly simplifying the construction; third, in disposing the channels with the operating devices for removing the bottom type successively as they are required in a circular form, thereby making a great saving in the space these machines occupy; fourth, a new method of bringing the type into the proper position as they descend by gravity to the stick; fifth, in operating devices to move the stick along to afford room for each type as it descends in order, and, sixth, in the construction of the several parts and in their combination with each other, whereby in an individual machine an exceedingly-compact device is made and the several parts are capable of very exact and certain action, and very rapid and perfect work can be done, as will now be fully described, and pointed out in the claims. I attain these several results by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a general view of the machine, showing it in perspective, the cover being removed. Fig. 2 is a vertical central section of the machine on line *y* of Fig. 1, the position of the pusher and the type-stick being in this

figure at right angles with the key-board; Fig. 3, a detail in perspective to show the lower end of the type-channels, the rollers, and converging delivery-tubes; Fig. 4, a vertical section to show lower end of the type-channels and rollers; Fig. 5, a perspective partially in section, showing type-channel, ring, delivery-tube, roller, and means for actuating the same; Fig. 6, a detail showing means for contracting the delivery-tube and modification of the pusher; Fig. 7, a perspective view showing the pusher and stick in relation to the end of the type-channel. Figs. 8, 9, and 10 show modifications of means for operating the roller. Fig. 11 shows means for removing the type when the arrangement of channels has been duplicated. Figs. 12, 13, and 14 show modifications of means for removing the types from the ends of the channels. Fig. 15 is a detail illustrating generally the appearance of a machine of the usual construction having my "ring" or base applied to it. Figs. 16 and 17 are details showing the ring, type-receptacle, or short channels, and means to deliver type to the channel leading to the stick. Figs. 18 and 19 are details to show means for operating the pusher. Fig. 20 is a detail showing how the pushers can be operated without opening the type-channels.

A, Fig. 1, is the table or stand that supports the machine. The levers *h*, operated by the keys, may be below the top of the table, in which case the table becomes a part of the machine; or they may be on the top of it. In use I prefer the latter arrangement as more convenient. In the figure the top of the table is shown as a part of the machine.

B is the key-board, carrying a key for each character used in the machine. These keys rest on and are attached to one end of the levers *h*, the fulcrums of which are at the other end. In the space between are attached the rods or wires that operate the device for removing the bottom type from the type-channels and delivering it to the converging channels that lead to the stick F. To the ring or base C the lower part of the type-channels are attached, as will be explained hereinafter, as well as the channels or tubes below; and in the following descrip-

tion the word "ring" will generally include the part of the type-channels which is attached thereto.

D indicates the device for removing the type from the channels as seen from the outside, which I shall designate as the "roller."

E represents the converging tubes or channels, down which the types move by gravity after being released by the roller to the channels E, which deliver them to stick F. In this stick or receptacle the type are arranged in proper order to be cut up by the justifier and arranged into columns for the printer.

G is the "pusher," which thrusts forward the type as they successively fall from the mouth of the tube, to which they are brought by the converging tubes or channels.

H are the rods or wires connecting the levers *h* of the key-board with the rollers.

I show the part of the type-channel permanently attached to the ring, which enables those operating the machine to replace the removable part K, when empty, with one of a similar kind loaded with type. This device enables the work of the operator on the keys to go on without interruption.

L is simply a support to the removable part of the type-channels I K, which rest on the top of the fixed portion I below and on L above. This support L is attached and held in place by proper supports connected below with the ring. It need not be at the upper end of the removable part K. In practice about two-thirds of the way from the lower end is most convenient.

D' is the inner end of the roller.

In Fig. 2, M and N indicate the cover, which may be on when the machine is not in use.

Without further reference to the frame or table that supports the various parts of my machine, I will proceed to a more definite description of it and its several parts, beginning at the top, where the operation really commences, and following it to the point where the stick is ready for the justifier.

The type-channels K are severally filled by hand or by a distributor each with type of a single letter—as "a" or "b," for example—or any characters that it may be desired to set, and are then deposited each in its place, which is designated by its proper mark, the upper end resting on the support L and the bottom resting on the fixed portion of the type-channel I, so that the descending type move freely down. These channels are inclined at an angle of about thirty degrees, so that the friction of moving may be on the sides and bottom of the type and not on the face. If the channels were set vertically, there is no way of preventing the type from falling forward out of the type-channel, which is open in that direction in order to prevent all contact with the faces of the type. When these removable channels K become empty by the slow descent of the type down to the

fixed portion of the channel I, as they are successively used they are removed, leaving the fixed portion I full, so that the operator on the keys has time to continue his work while the empty channel K is being replaced by one that is full. The lower portion of the channel I, through which the type descend, is fixed—that is, is made a part of the ring. It is attached to the ring by sliding down in a dovetailed groove, so as to be easily removed, if necessary. To the top is attached a stay or guide *z*, to hold the lower end of the removable channel K accurately upon the groove in the lower one, that the type may not hitch as they descend. Both the upper and lower portion may be made of metal or other suitable material. The lower end of this fixed type-channel I does not quite touch the roller, but space is left for it to move freely thereunder, while the type standing therein rest wholly on the groove in the roller. This is shown in Fig. 4.

The roller D D', Figs. 8 and 9, enables me to dispense with the complicated arrangement of levers and springs heretofore used and to effect the object desired by a simple positive motion wholly reliable. This roller, as its name indicates, is a small cylinder of metal, preferably supported by and moving in proper openings in the ring. It is longitudinally grooved, as shown in Figs. 3 and 4, so that the shoulder on one edge of the type is a little lower than the top of the type it supports, while there is no shoulder on the other. This roller is moved by a pin or its equivalent in one end or the other—that is, in front or rear of the ring through which it passes—which pin *d* is connected with the upper end of the rod or wire H, attached to the lever of the key. In place of the pin may be used a small wheel or a ratchet, as shown in Figs. 8 and 9.

When the connection is made with the key-board, a depression of the key causes a partial revolution of this roller. The shoulder holding the type moves forward, carrying one type with it out of the bottom of the column which remains resting on the round part of the roller. No matter how rapidly or suddenly the key may be struck, the type held by the roller moves out gently as the shoulder moves forward. The face end of the type, as it is moved forward by the roller, slides upon a portion of the ring lying between the rollers which sustains that end, while the other or foot end, as it passes off the roller, having no support, drops into the mouth *e* of one of the conveying-channels E, down which it glides face end up to the common point of emergence for all the type at the head or beginning of the stick. The roller D therefore not only acts as a support for the type, but in the operation of the machine is an ejector, by means of which the type are, without other instrumentalities or means, delivered into the channels E.

As the type differ in thickness, each roller is grooved for its particular type. When the

type lies in the groove, it is just below the end of the fixed channel, which will not allow the one above to move out, so that should the type adhere together the positive motion of the roller will easily separate them. The middle of the body of the roller on which the type-column rests while the shoulder is moving forward with its type is made a little smaller than the two extremities of said body, so that the type resting on the roller touches it at only two points near its two extremities, as seen at O' , Figs. 8 and 9. This is done in order to reduce the amount or extent of the surface of the type-column resting on it while the movement of expelling the type held by the groove is going on. The above construction adds largely to the facility of this operation. A coiled spring d' around the end D' of the roller brings it back to its position as soon as the finger is lifted from the key, and the type now at the bottom, before held by the body of the roller, instantly drops into the groove, and is ready on a depression of the key to be removed and delivered into the mouth of the tube or channel leading to the stick. The base or, as I prefer to call it, "ring" to which the short fixed channels are attached, and in which the rollers move, is simply a channel with one side higher than the other, (see Figs. 5 and 15,) the outside, which is the lower, serving only as a bearing for the rollers and for the face end of the type as pushed out by the shoulder of the roller to slide on, and the inside, which is the higher part, supporting the other end of the rollers, as well as the short fixed channels I , down which the type descends to the groove in the roller. The distance between the outer and inner sides of the ring is a little less than the length of the type used in the machine—say three-fourths of an inch—and is filled by the rollers and the mouths of the tubes or channels down which the type fall. The inside portion, being higher than the outer, is inclined at the same angle as the type-channels I attached to it. The heel of the type touches and slides down on the outside of this rear or inner portion of the ring on its delivery over the mouth of the tube or channel down which it is to fall. The face end of the type projects upon the front or lower part of the ring, which is of the same height as the bottom of the groove in the roller, upon which the type slides when the shoulder advances as the roller is revolved, as shown in Figs. 5, 15, 17, and 18. Between each pair of rollers is the mouth or entrance to the tube or channel down which it is to fall. On the interior of the ring is a small pin c' , near each roller, which, in connection with a pin d^2 , through the end D' of the roller, acts as stop to it when brought back by the coiled spring after delivering the type. This is seen in Fig. 5. The ring is supported by two or more standards. (Shown in Fig. 1 and marked O .)

The rollers and their respective channels I

prefer to arrange in pairs, one roller of the pair delivering its type to the right and the other to the left, both into the mouth of the same channel, whereby I reduce the number of channels and the complexity of this part of the machine. This arrangement is shown in Figs. 3 and 4. By this means I am able in a ring of fourteen inches exterior diameter to arrange eighty-eight rollers with their separate type-channels, using, say, brevier type, and in one of twenty inches one hundred and sixty.

Heretofore type-setting machines have not been made of a circular form, so far as I know, except the Thorne machine, which does not bring the type to the stick by gravity, but by a revolving plate. The type have been arranged in channels standing in straight rows, by which arrangement those falling down the outside grooves have farther to travel than those in the middle. By disposing the type-channels in a circular form, as I do in Fig. 1, all the channels or tubes conducting the falling type to the stick and having their origin between the rollers in the ring are of absolutely the same length. The upper ends of these tubes or channels are connected with the ring. They are of metal, preferably of copper, brass, or tin, and formed so that the type falling into the open mouth e , as in Figs. 3 and 5, cannot turn over. Since the type standing in the various channels face in directions no two of which are alike, in circular or curved-shaped machines it is necessary that in their descent to the stick all should be made to face in the same direction; otherwise there would be confusion in the single tube or channel, from which all must emerge to the stick in proper order. This is perfectly accomplished by giving to the tubes a twist, beginning with one very slight to that of a half-turn on the side opposite that taken as the one position to which all the type conform on their emergence from the single tube or channel, to which all converge. This is shown in Fig. 3 in the tube or channel E . This slight twisting of the tubes is found in practice in no way to retard the freely-falling type.

The size of type not being the same for each letter, it is obvious that when the larger type come into a common channel E that channel might be so large that the smaller ones would turn over and so throw the stick into disorder. This is obviated by using a very light and yielding spring in the lower or larger part of the tube E , as in w , Fig. 6, by which the channel is made to conform to the sizes of the falling type sufficiently to keep them in position. When the single type arrives at the upper end of the stick at f' , Fig. 7, it is necessary that it should not remain an instant or the one following down the tube or channel may strike it on its face. It must be advanced down the stick at once. This is done by the pusher G , suitably pivoted to the standard g , fixed to the base A . The

pusher is operated by the rod *f* in the same figure, which rod is seen in Fig. 1, to pass down near the center of the table, and is connected with a lever *Z*, situated under the levers of the key-board, and on which they rest, (see Fig. 2,) so that the depression of any key depresses this lever and actuates the pusher. This cross or universal lever has also its separate key, which is shown in Fig. 1, and marked *p k* on the key-board, and is not connected to any roller, and consequently will actuate the pusher without causing any type in the tubes above to fall. The details of this connection are shown in Figs. 19, 20, and 21; but in order that this pusher may be wholly automatic I operate it by an electro-magnet, as seen in Fig. 6, where the type *t* passes at the lower end between a yielding brush or spring *s*, that is connected with one pole of a battery. The passage of the type down makes for an instant electric connection through the wires *g g* with the poles of the battery *t'*. This brings the armature down on the electro-magnet *v*, bringing forward the pusher *x*², which is returned to its position by a spring, waiting the arrival of the next type. By these means the type are advanced forward as fast as they arrive to the point where the justifier takes them in hand.

In Fig. 5 the short type-channels *I* are shown as attached to the upper part *C*² of the ring and the rollers *D* in the lower part *C*³.

Figs. 10 and 13 show other means of removing the type by using pushers with shoulders in place of the rollers. Their use will be clear without further explanation. Fig. 12 shows another form of pusher, which was used in the Mitchell machine, which can be operated either with the universal lever already described or by an electro-magnet.

Fig. 14 shows a method of operating the roller by an electro-magnet.

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

1. In type-setting machines of a curved or circular shape, the tubes or channels converging and twisted, substantially as described, and for the purposes specified.

2. In type-setting machines, the short fixed type-channels *I*, fitted at the upper end to receive and hold in position the removable channels *K*, substantially as described.

3. In type-setting machines, the base or ring, in combination with the twisted converging channels or tubes, substantially as described, and for the purposes set forth.

4. In type-setting machines, the channels, part of which are fixed and part removable, in combination with the rollers, substantially as described.

5. In type-setting machines, the ejecting-rollers, in combination with the actuating-rods and a key-board, substantially as described.

6. In type-setting machines, the rollers, in combination with electro-magnets, substantially as described, and for the purposes specified.

7. In type-setting machines, the combination of the rollers, the converging and twisted tubes or channels, and the pusher by which the type are made to advance in the stick, substantially as described, and for the purposes specified.

8. In type-setting machines, the rollers, in combination with the pin or stop and the coiled spring, substantially as described, and for the purposes described.

9. In type-setting machines, the base or ring, in combination with converging tubes or channels and pushers actuated by levers through the keys, substantially as described, and for the purposes specified.

10. In type-setting machines actuated as set forth, the pusher *A A*, the tube, with its spring, and the stick, in combination with the base or ring, the type-channels, and the rollers, substantially as described, and for the purposes described.

11. In type-setting machines, the universal bar or lever, in combination with the pusher, the converging channels, and the base or ring, and the type-channels, substantially as described, and for the purposes set forth.

12. In type-setting machines, the circularly-arranged type-channels, in combination with ejecting-rollers, substantially as described, and for the purposes set forth.

13. In type-setting machines, the combination of the ejecting-rollers in pairs with the type-channels above in pairs, and the conveyer-tube below, one of the said tubes coming between each pair of rollers and channels, substantially as and for the purposes set forth.

14. In a type-setting machine of the curved or circular form, the combination of the inclined type-channels with the ejecting-rollers and the converging and twisted tubes below, whereby the type when delivered from the channels above fall directly into the tubes below, substantially as described.

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

LORENZO DOW.

Witnesses:

GEORGE H. WARE,
FRANK L. FULLER.