(No Model.) 4 Sheets—Sheet 1.

W. R. FOX.

SHAPING MACHINE.

No. 459,629. Patented Sept. 15, 1891.

Fig. 1.

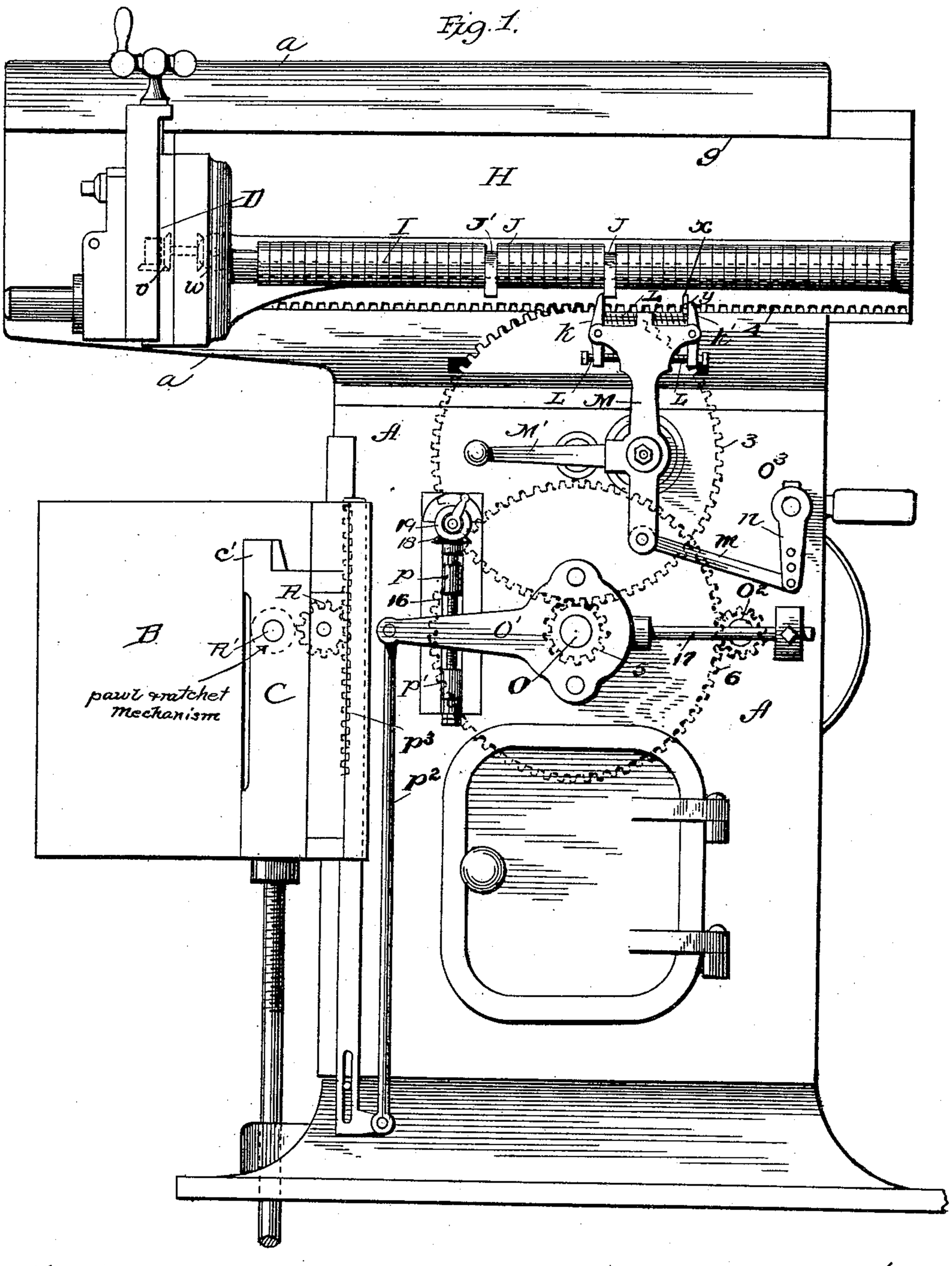

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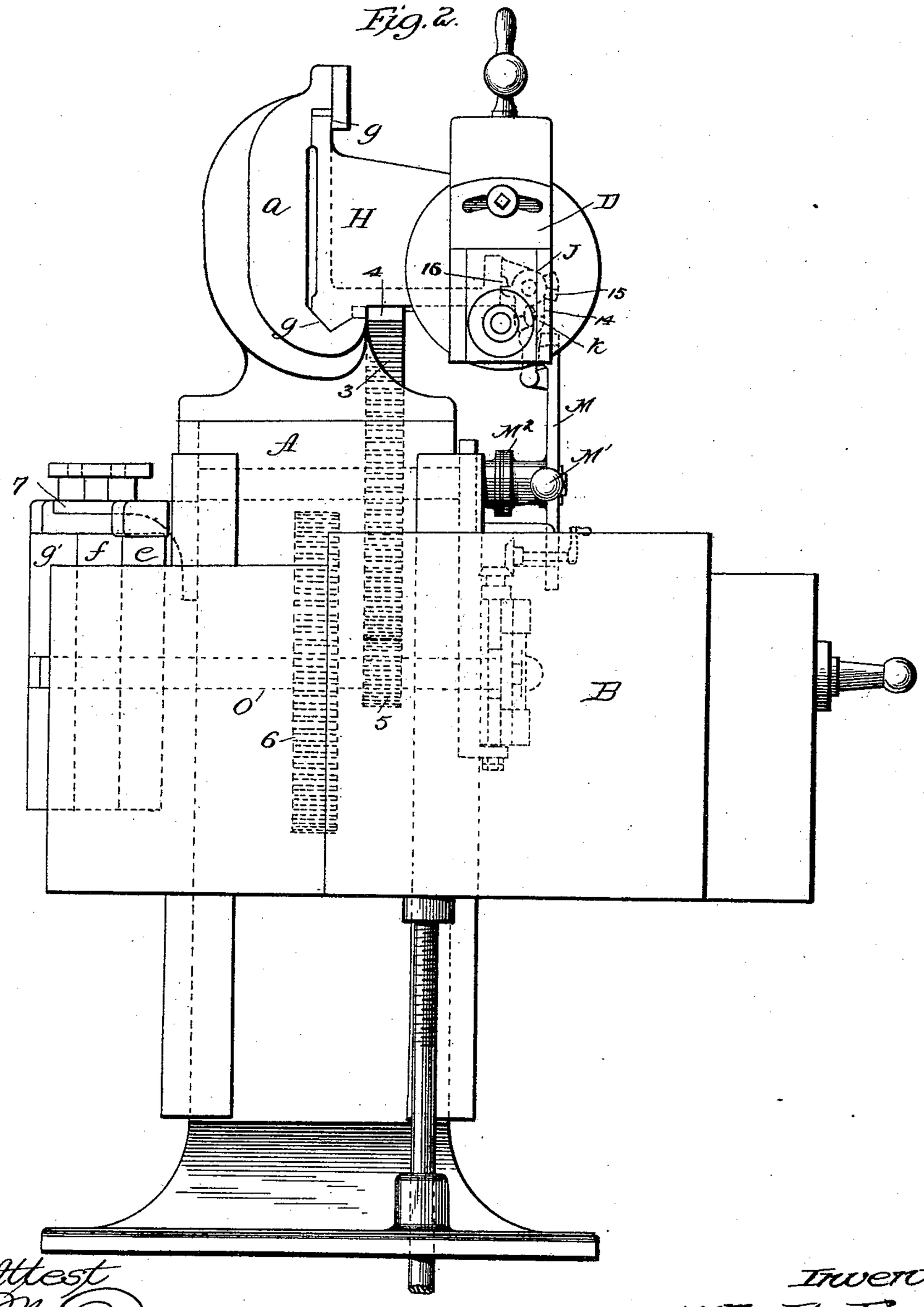
Fig. 2.



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SHAPING MACHINE.

No. 459,629. Patented Sept. 15, 1891.

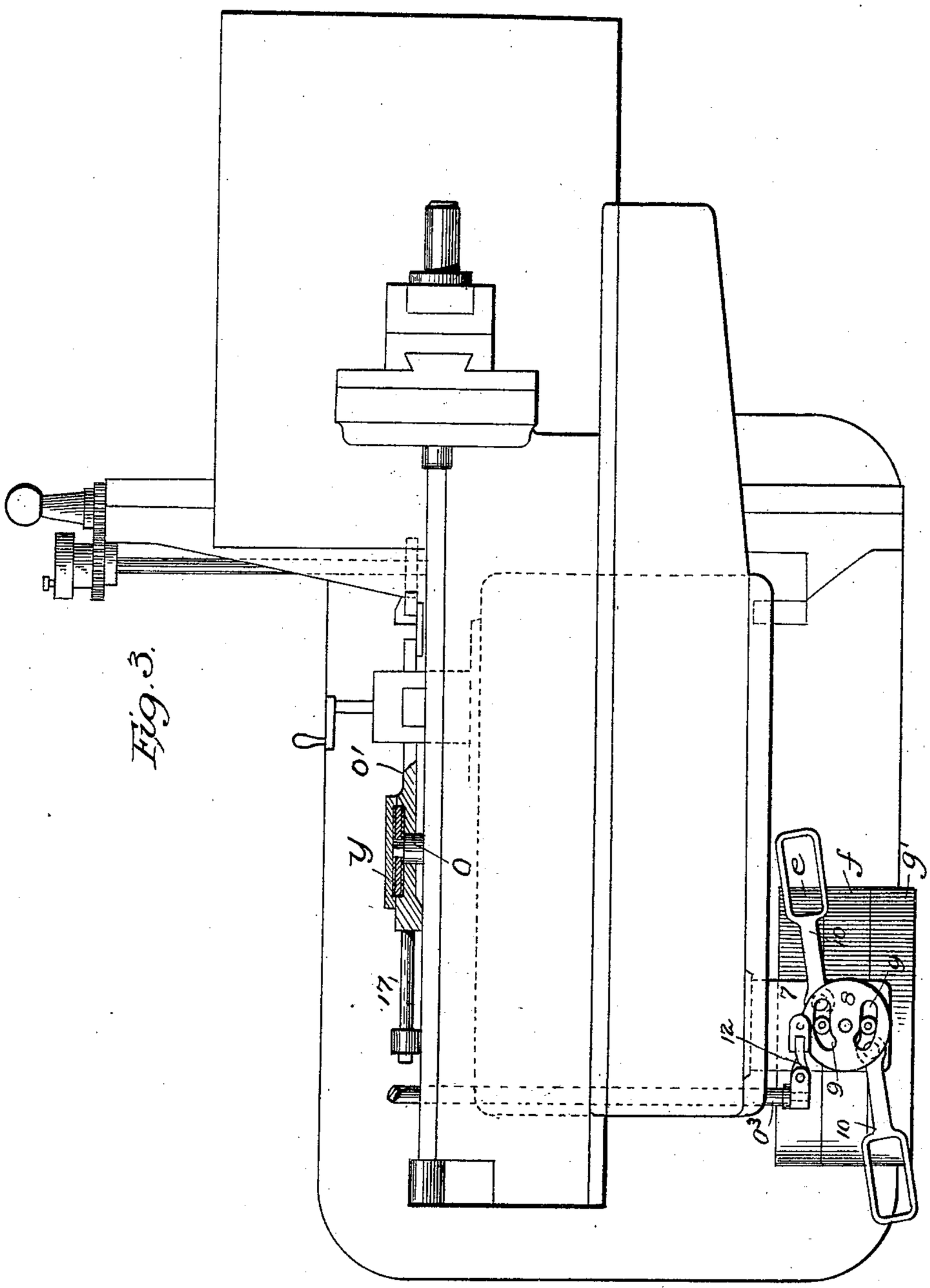

Fig. 3.

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(No Model.) 4 Sheets—Sheet 4.

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SHAPING MACHINE.

No. 459,629. Patented Sept. 15, 1891.

Fig. 5.

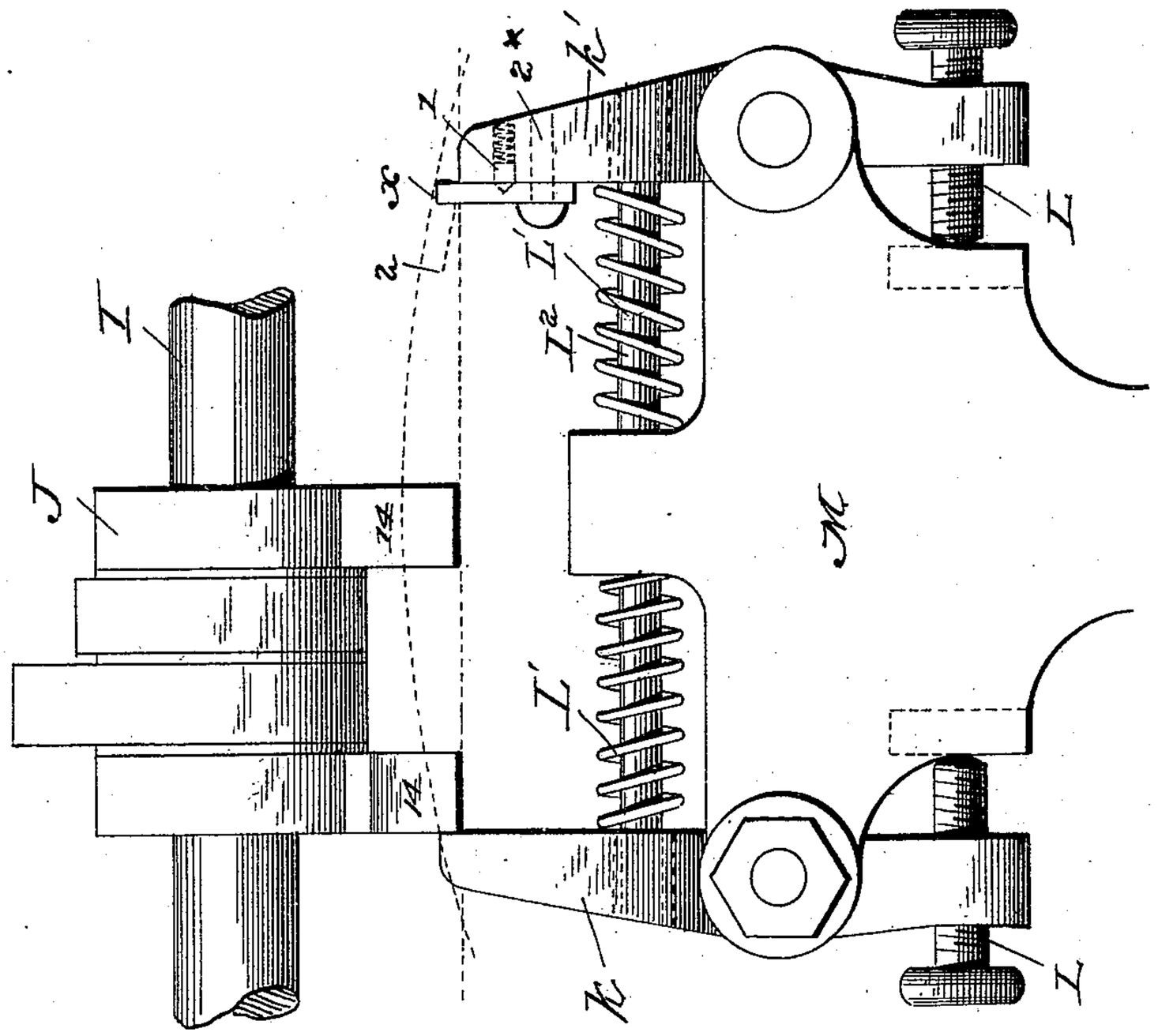

Fig. 4.

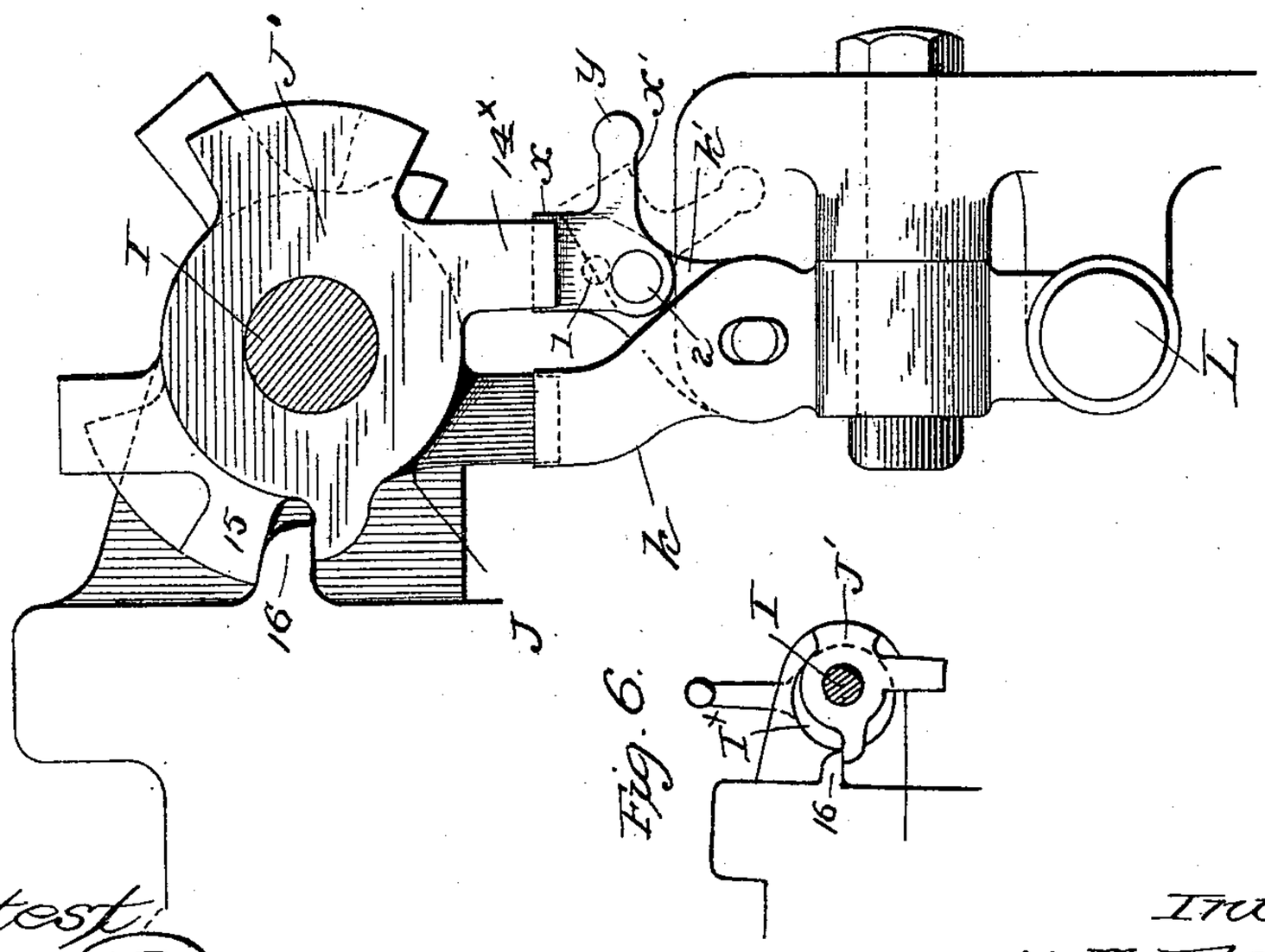

Fig. 6.

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UNITED STATES PATENT OFFICE.

WILLIAM R. FOX, OF GRAND RAPIDS, MICHIGAN.

SHAPING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 459,629, dated September 15, 1891.

Application filed February 7, 1891. Serial No. 380,695. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. FOX, a citizen of the United States of America, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Shaping-Machines, of which the following is a specification.

My invention relates to shaping-machines, and has for its objects to provide a construction especially adapted to resist strain and prevent springing of the ram and tool-head; to provide for the quick and accurate adjustment of the shifting mechanism for a short or long stroke of the ram; to render the adjustment of the feeding movement of the table ready and certain while the machine is running, and to generally simplify the construction with a view to making the machine effective and durable and to secure quick and easy action in adjusting the parts.

My invention consists in a special arrangement of the ram and its housing, whereby the housing projects over the work-table and holds the ram against springing under the strain of the work in all positions.

It consists of a series of gravity-dogs of special form disposed along and carried by the ram and arranged to correspond to the different lengths of strokes and to be thrown into line with the lever connected with the shifting mechanism.

The invention also includes the mechanism for driving the feed-table and for limiting the amount of movement of said mechanism to vary the feed.

In the drawings, Figure 1 is a side elevation of the machine. Fig. 2 is a front view. Fig. 3 is a plan view to show particularly the belt-shifting mechanism. Figs. 4 and 5 are detail views of the gravity-dogs and the shifting-lever. Fig. 6 is a detail of a modification.

In the drawings, the main frame A may be of ordinary form. The table B, the vertically-movable guideway C, and the tool-head D do not differ materially from those well known. The ram H is guided in ways *g* in the housing *a* and the tool-head D is supported laterally on this ram or to one side of the guideways, and the housing can thus be extended out over the work-table and forward of the extreme outward position of the tool and head, so that the ram will have a positive bearing at all times without regard to its stroke, thus preventing springing of the ram under strain, and consequently defective work, the guideways being in a vertical plane, and thus securing stability of the ram in all positions. The ram is driven by the gear-wheel 3, meshing with its rack 4, the said wheel being driven from a pinion 5 on the shaft O, which is rotated from the driving-shaft O^2 by a gear-wheel 6 on the shaft O and a pinion on the driving-shaft. The usual pulleys *e f g'* are arranged on the driving-shaft, the intermediate pulley *f* being fast and the others loose upon the shaft. A bracket 7, extending from the machine-frame, supports the belt-shifting device, which causes the ram to move back and forth. This immediate mechanism may be of any well-known form, and in the present case it consists of a disk 8, having eccentric slots 9, which receive studs on the shifting-levers 10. The eccentric is operated by a rock-shaft O^3, to which it is connected by a link 12, pivotally attached to each. From this mechanism it will be seen that when the belts are on the two outside pulleys the machine is stationary. When either of the outside belts is shifted onto the intermediate fast pulley, the pulley rotates in either one direction or the other, according to which the belt is shifted, and by imparting a rocking movement to the shaft O^3 the belts are alternately shifted on the fast pulley, thus reciprocating the ram through the gearing described. In order to accomplish this shifting automatically, a bar I is carried by the ram, and this is filled with a series of gravity-dogs J, placed side by side and corresponding in position to the different lengths of stroke the machine is capable of making, as will be seen hereinafter. These dogs have pivotal movement on the bar, and they are normally turned to hold their projections 14 elevated and inactive, the spurs 15 bearing on a rib 16 of the ram for this purpose. When the dogs are dropped into working position, the projections depend into line with the fingers *k k'*. There are two sets of dogs J J', and the projections 14 of the dogs J are arranged thereon, so that when any dog of that set is dropped down into working position the said projection will be out of line with the projec-

tion $14^{\times}$ on the dog J′ of the other set, it being in a plane in rear of the plane of the projection of the dog J′, as shown in Fig. 4. The dogs of the two sets are alternately arranged on the bar I, so that the dogs of one set are between and adjacent to the dogs of the other set. The fingers *k k′* are also arranged out of line with each other, so that the finger *k* will be in line with the projection of the dogs J, while the other finger *k′* will be in line with the dogs J′. These fingers are pivoted to a shifting-lever M and have set-screws L, by which the position of the fingers in relation to the dogs can be adjusted. A spring L′ keeps the fingers pressed to their outward limit. The spring is held in position by a pin L^2. The lever M is connected with the rock-shaft O^3 by a link *m* and an arm *n*, and it will be seen that the movement of the ram in either direction will bring the proper dog J or J′ against the corresponding finger *k* or *k′*, and this will rock the lever and shift the belts to reverse the movement of the ram. It is understood that when the arm N is in a vertical position both belts are on the loose pulleys, and it is desirable when adjusting the work or the tool to have the latter not in motion and generally the ram at the back end of the stroke, so as not to interfere with the free access to the work. This is usually accomplished on the ordinary shaper by loosening one of the dogs, allowing the ram to recede the proper distance, and then moving the belts onto the loose pulley, as by means of the hand-lever M′. In Figs. 4 and 5 is shown a simple device for accomplishing this with less expenditure of time. The finger *k′* is made of such length that when the shifting-lever is in a vertical position the dogs will just pass over the top of the finger; but when the lever is thrown to the left the finger *k′* will be elevated on the arc of the circle to the point 2. (Shown in dotted lines.) The dog J (or any one that is dropped down) when returning will strike the finger and return it to the position shown in Fig. 5, which will bring the ram to a state of rest. When it is desired to give the ram reciprocating movement, the supplemental finger (which is pivoted to *k′* by the screws $2^{\times}$ and is moved in and out of the working position with the dogs by the handle *y*) is moved into working position, as shown in full lines in Figs. 4 and 5, and projects far enough over the top of the finger *k′*, so that the dog will carry the lever M to the right of the vertical position and reverse the motion of the ram. The supplemental finger is held in upright position by the spring-pin 1. The same object can be attained in other ways by adjusting the relation between the dogs and the fingers, and one way is shown in Fig. 6, in which the dogs as a whole can be adjusted vertically, so that the contact between the dogs and the fingers may be regulated, in order that the contact will cease when the finger reaches a neutral position in bringing the ram to rest or will continue past the neutral point and thus shift the belt. For this purpose the shaft I, carrying the dogs, is carried eccentrically by the movable bearing-plates, as $I^{\times}$, one at each end. The set-screws L serve to adjust the fingers slightly when it is required to get a longer or shorter stroke than the thickness of the dogs would permit, and by reason of the spring L′, interposed between the fingers, no disastrous results will follow from the dog being dropped down on the wrong side of the finger, as the finger will simply yield to the pressure from the dog and the spring will return the finger to its normal position. The fingers describe the arc of a circle from the pivot of the lever M as a center and the dog will pass from the end of the finger in case the ram does not shift its movement quickly enough, as the end of the finger moves downwardly as it swings along the arc end and gradually away from the dog. The series of dogs are especially effective in machines of this character, where it is necessary to shift the length of the stroke very often, the dogs rendering the adjustment rapid, easy, and accurate. Each dog may be numbered to correspond with the inches of travel which it will permit the ram to have. The lever M may be operated by the handle M′, and in order to prevent the free rocking movement the hub of the arm is under frictional restraint at M^2.

The mechanism for moving the table and feeding the work to the tool consists of an arm secured to the shaft O by a friction or slipping joint Y, Fig. 3, said arm being connected with a vertically-movable rack p^3 by a pitman p^2. The rack operates the intermediate pinion R, which communicates motion to the screw-shaft R′, engaging and moving the table. The usual pawl connection is made at this point to cause the table to feed in one direction or the other by successive actions. The table is guided in ways *c′*.

It is the object of this part of my invention to provide such a mechanism as will be capable of quick and accurate adjustment to vary the feeding movement of the table while the mechanism is in operation. Heretofore it has been customary in some machines to connect the pitman with a slotted disk by an adjustable bolt or clamp, and in varying the feed of the table this clamp is adjusted in the slot to or from the center of the disk, so that the stroke of the pitman is varied and the feed movement of the table changed. While this construction serves the purpose for large planers, where the stroke is long and there is ample time to make the adjustment while the disk is stationary, it is not suitable for a shaper in which the stroke is short, as very often the disk is in continual motion, so that the workman is not able to make such accurate adjustment as desired without stopping the machine. I have overcome this difficulty in a simple manner by providing an adjustable device arranged independent of the driving mechanism, but

adapted to limit the movement thereof. In order to accomplish the result the arm O′ is connected to the shaft O by a friction or slipping joint, as before described, and the movement of said arm is limited by stops *p p′*, one on each side of the arm. These stops can slide in a guideway 16 on the machine-frame, and they are adjusted to and from the arm O′ by a right and left hand screw operated by bevel-pinions 18 19. The amount of movement which the arm has determines the feed of the table, and it will be seen that the stops permit more or less movement, according to their adjustment, the friction or slipping joint allowing the arm O′ to stop moving after striking the stops *p p′*. A weight is fixed to the extension 17 of the arm O′ to counterbalance the weight of the mechanism connected therewith.

It will be understood that while I have described the series of dogs as combined directly with the ram they may be used with other reciprocating parts which are intended to shift the driving mechanism automatically.

Instead of adjusting the tool-block by the handle projecting upwardly from the head, said handle may be arranged on the side and connect with the adjusting-screw by the beveled pinions *w v*. (Shown in dotted lines of Fig. 2.) This enables the head to be swung over any number of degrees without having the handle interfere with the housing.

I claim as my invention—

1. In combination, the ram, the housing extending over the work-table and beyond the inner limit of the ram's movement to positively support the same in its different positions, and the work-table adjustable toward and from the overhanging housing, substantially as described.

2. In combination, the machine-frame, the work-table, the housing projecting from the frame over the work-table, the ram extending longitudinally along said housing, and the tool-head supported from the side of the ram, substantially as described.

3. In combination, the work-table, the housing extending from the machine-frame over the work-table, the ram extending longitudinally along said housing, said ram having gear-teeth along it, and the gear supported on the main frame and engaging with said teeth, the said work-table being adjustable vertically toward and from the overhanging housing, substantially as described.

4. In combination, the ram, with driving mechanism therefor, shifting mechanism, and a series of dogs held normally out of line with the connections to the shifting mechanism and arranged to be moved into line therewith, said dogs corresponding in position to the various lengths of strokes desired, substantially as described.

5. In combination, the ram, with the driving mechanism therefor, shifting mechanism, and the dogs movable into and out of line with the connections to the shifting mechanism, substantially as described.

6. In combination, the ram, with the driving mechanism, the shifting mechanism, the rod I, and the dogs pivotally supported on said rod, and connections to the shifting mechanism.

7. In combination, the ram, with the driving mechanism, the shifting mechanism, the connections to the shifting mechanism, and the adjustable dogs carried by the ram and supported to have movement in vertical planes for said adjustment, substantially as described.

8. In combination, the ram, with the driving mechanism, the shifting mechanism, two dogs J J′, with projections arranged to be out of line with each other when adjusted to working position, the fingers *k k′*, corresponding, respectively, in position to the projections of the dogs J J′, and the connections from the fingers to the shifting mechanism.

9. In combination, the ram, with driving mechanism, the dog, and the finger to be struck by said dog adjustable longitudinally of the ram, substantially as described.

10. In combination, the ram, the driving and shifting mechanism, the dogs, and the rocking part M, carrying the fingers *k k′*, said fingers being yielding in one direction, substantially as described.

11. In combination, the ram, the driving mechanism and shifting mechanism, the dogs, the rocking part M, carrying the fingers *k k′*, and the connections to the shifting mechanism, substantially as described.

12. In combination, the ram, with the driving mechanism, the movable table, the operating mechanism for said table connected with the driving mechanism by a friction-joint, and the stops *p p′* for limiting the movement of the operating mechanism, said stops being adjustable to and from each other.

13. In combination, the table, the friction-arm on the driving-shaft, the stops *p p′*, one on each side of the arm, and the right and left hand screw for adjusting said stops, substantially as described.

14. In combination, the ram, with the driving mechanism, the shifting mechanism, the dog carried by the ram, and a finger in line with said dog to be struck thereby at each reciprocation of the ram for moving the finger to a neutral point in shifting the belt to the loose pulley, one of the said parts (the dog or finger) allowing an adjustment whereby the contact between them may be maintained after the neutral position is reached for continuing the shifting of the belt onto the reversing-pulley, substantially as described.

15. In combination, the ram, with driving and shifting mechanism, the dog carried by the ram, the connections to the shifting mechanism, including the finger *k′*, arranged

to be struck by the dog and moved to neutral position and be out of line with the dog when in said position, with the belts on the loose pulley, and the supplemental finger *x*, adjustable into and out of line with the dogs and carried by the finger *k'*, substantially as described.

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

WILLIAM R. FOX.

Witnesses:
GEO. G. WHITWORTH,
CHAS. F. ROOD.