

No. 671,266.

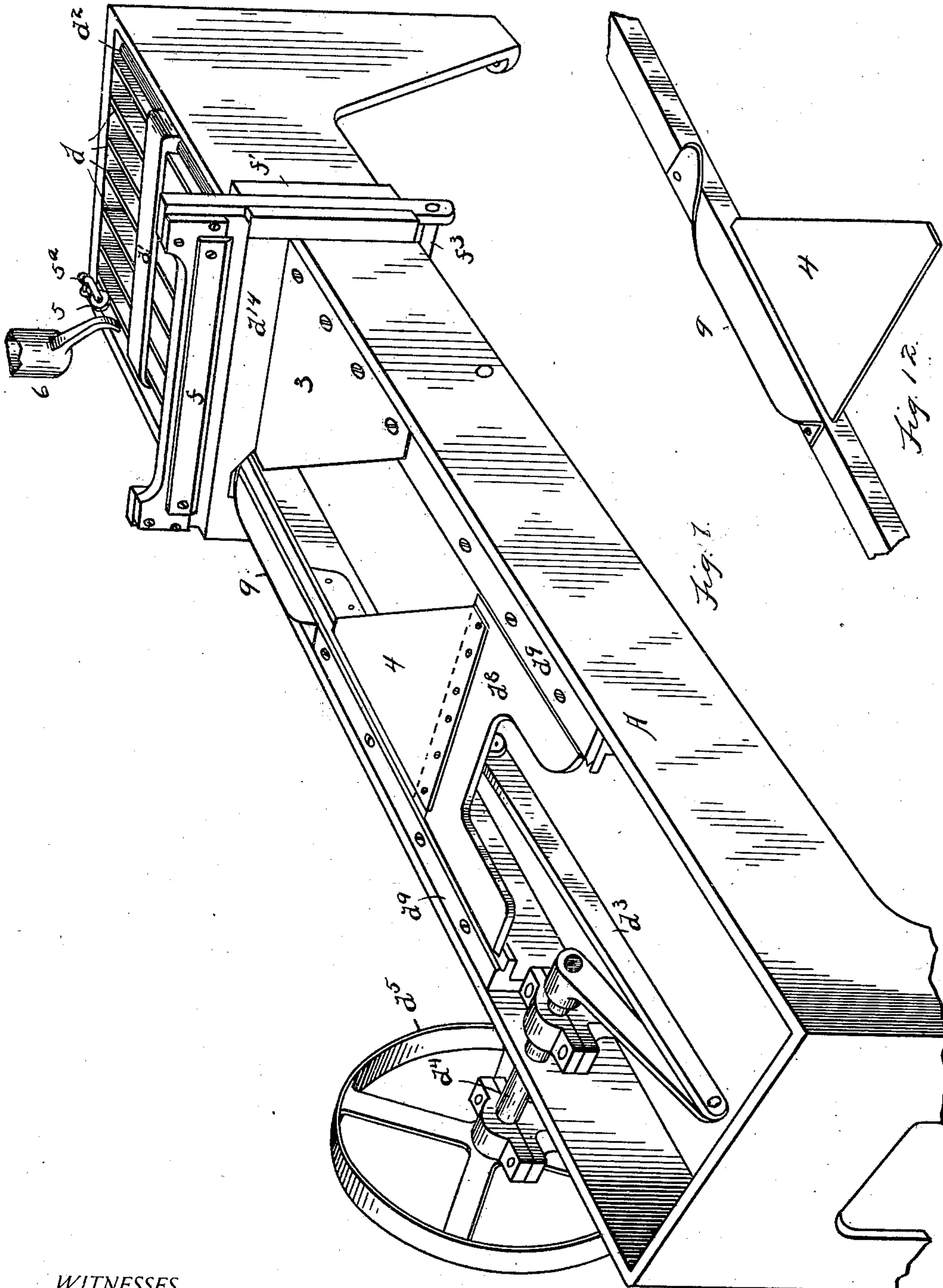
Patented Apr. 2, 1901.

G. P. DAVIS.
PAPER BAG MACHINE.

(No Model.)

(Application filed Aug. 5, 1899.)

6 Sheets—Sheet 1.



WITNESSES
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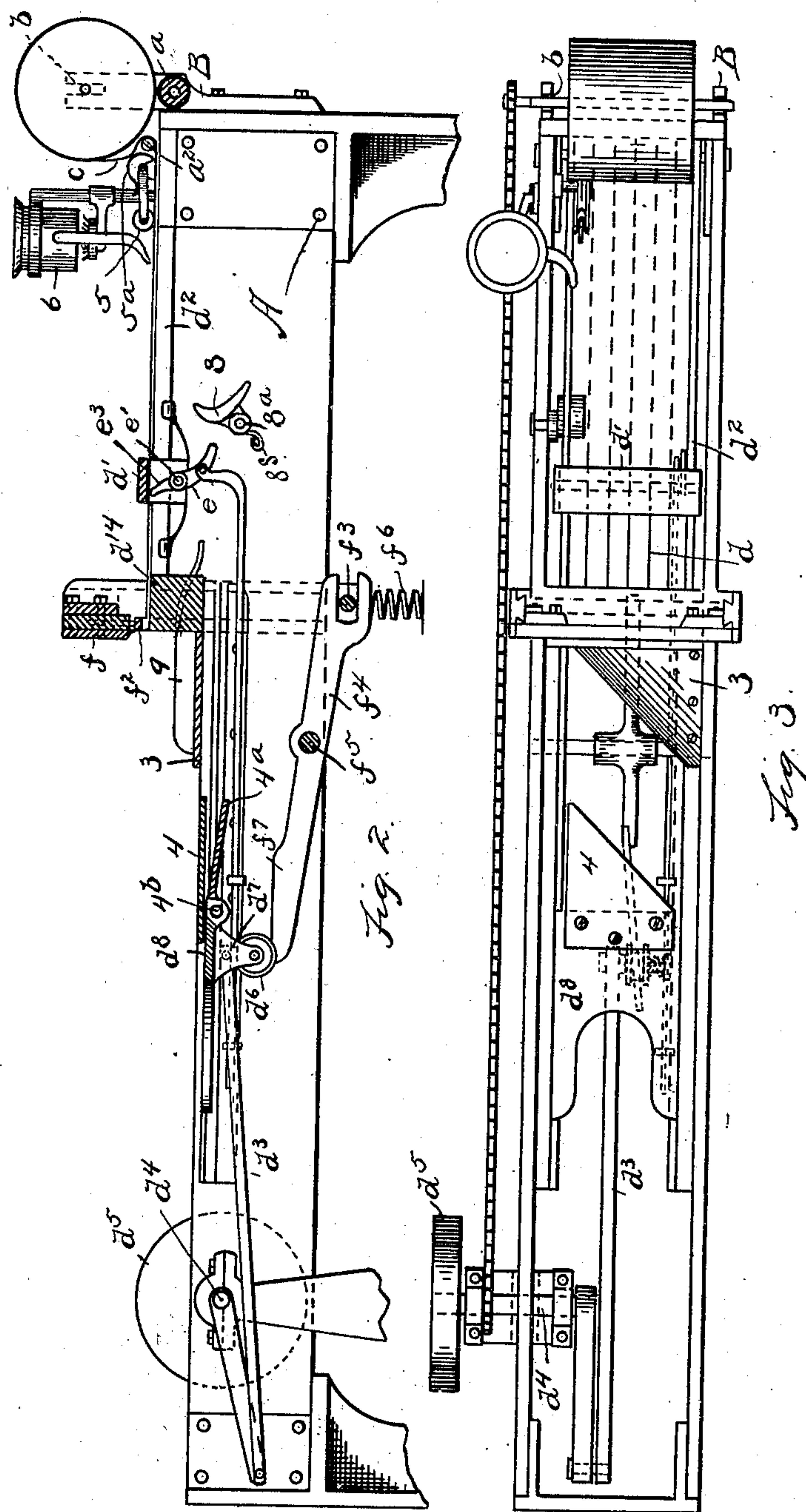
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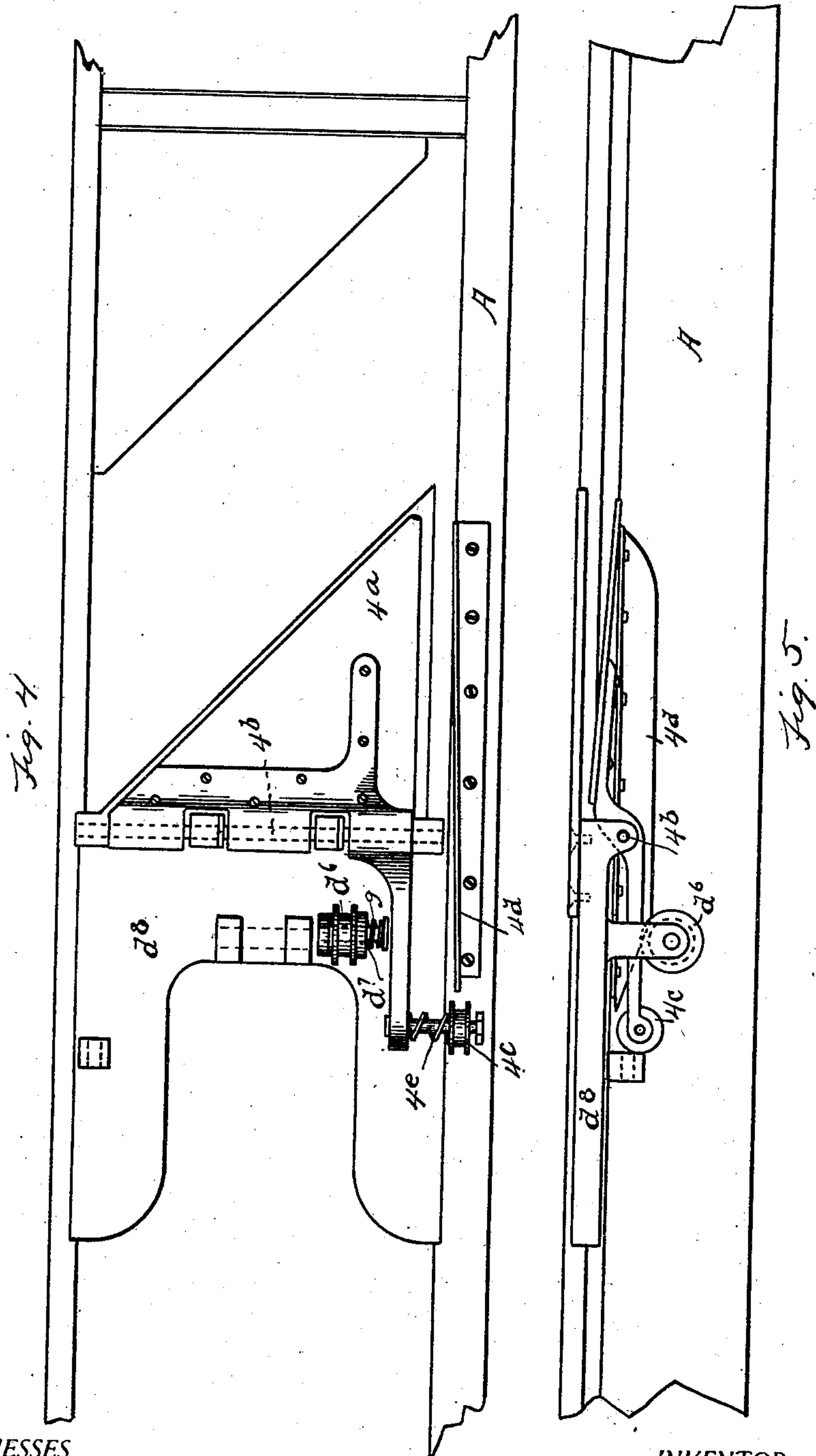
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6 Sheets—Sheet 3.



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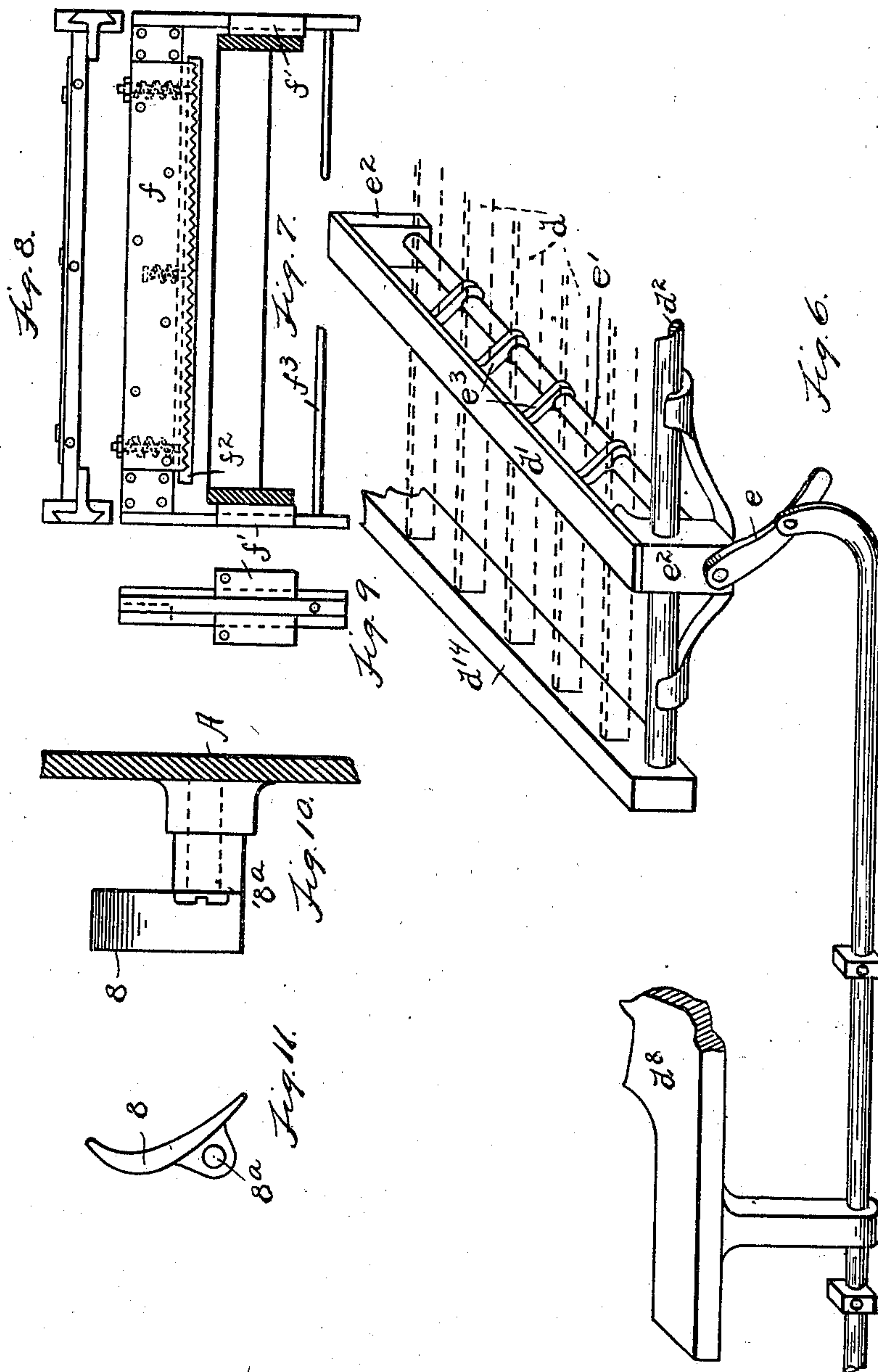
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6 Sheets—Sheet 5.

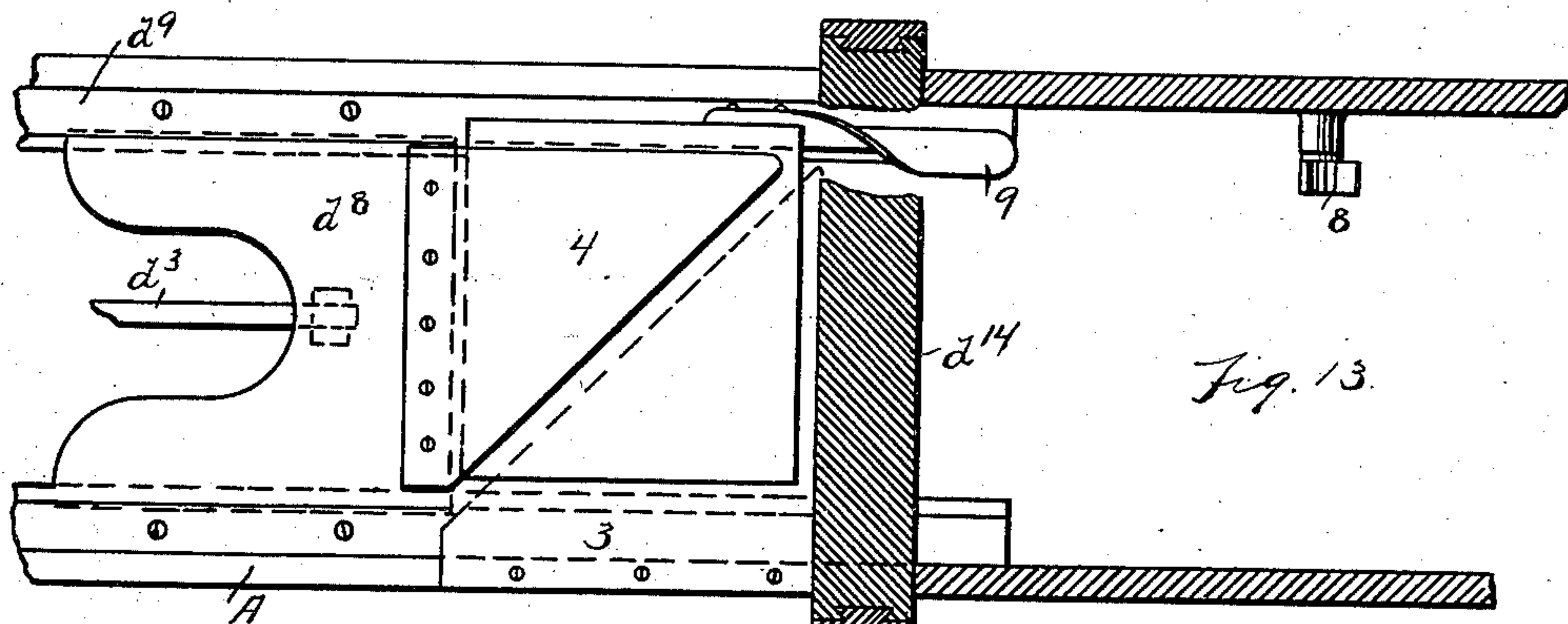


Fig. 13.

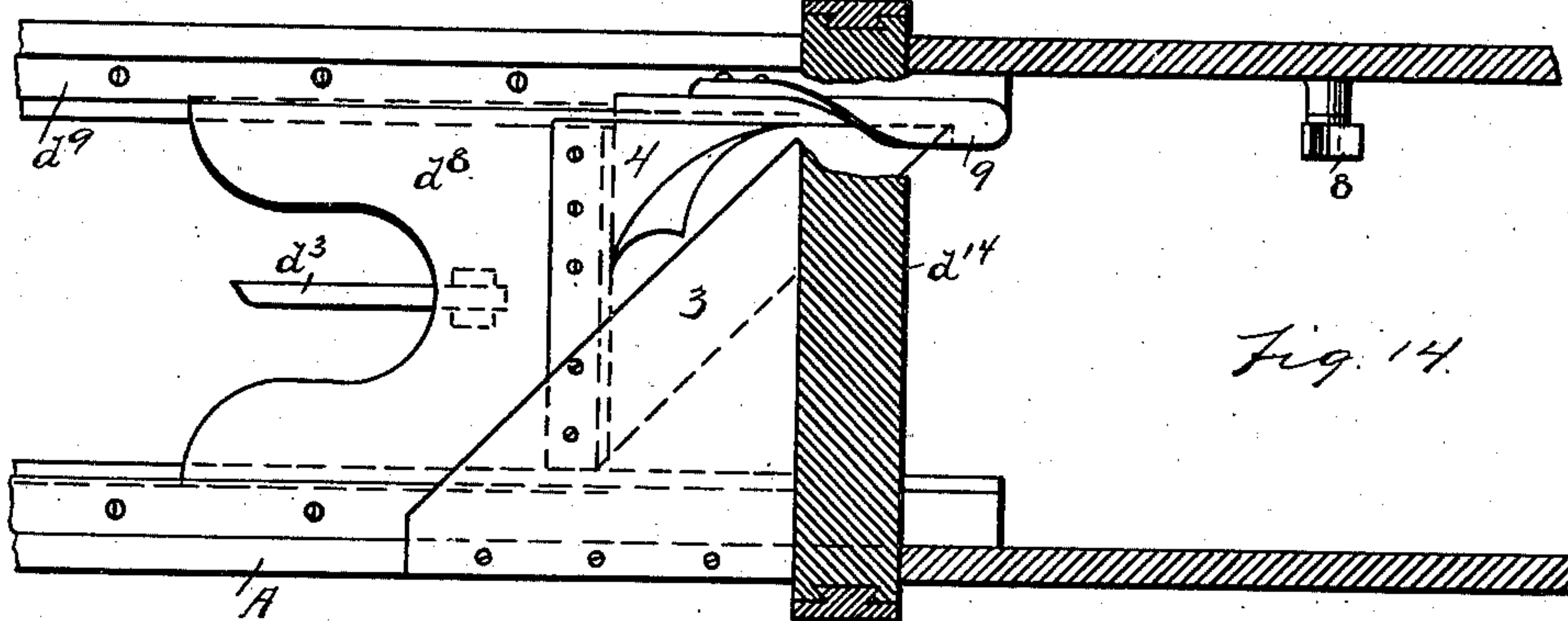


Fig. 14.

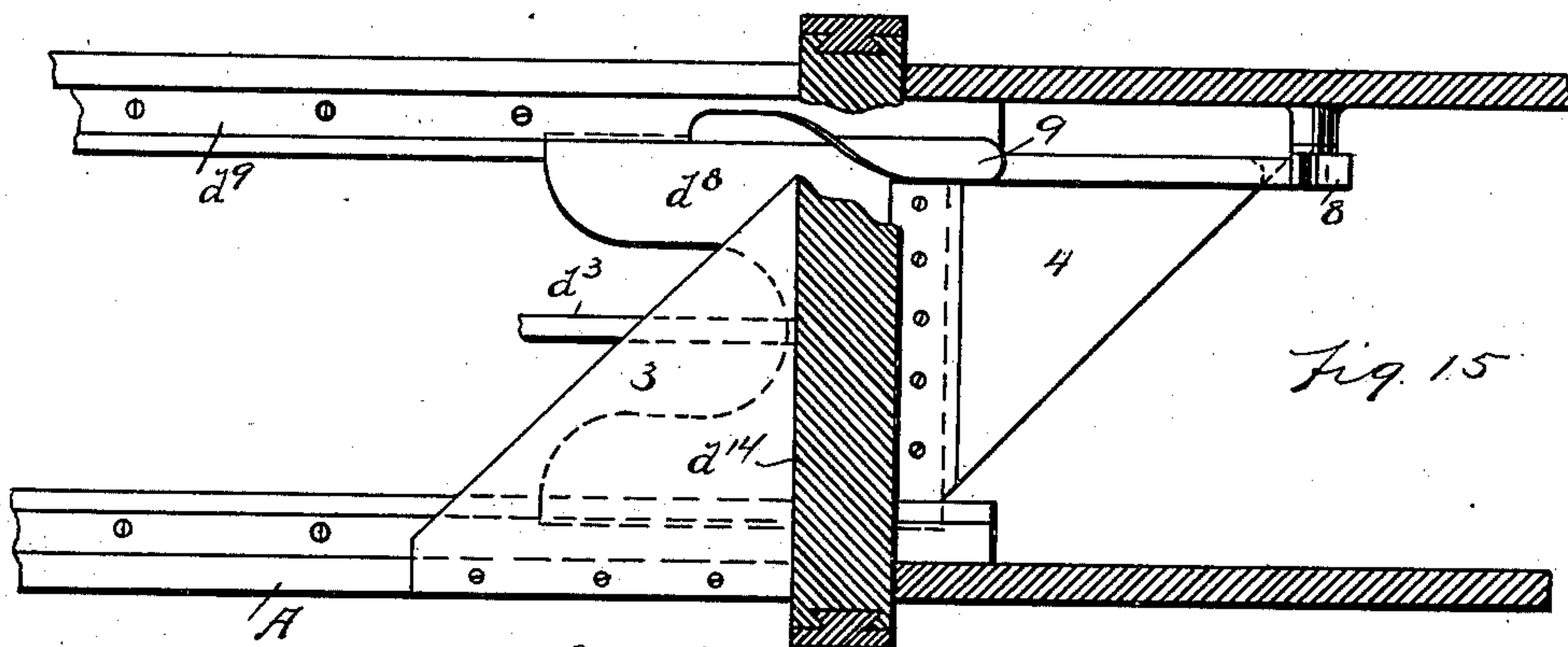


Fig. 15.

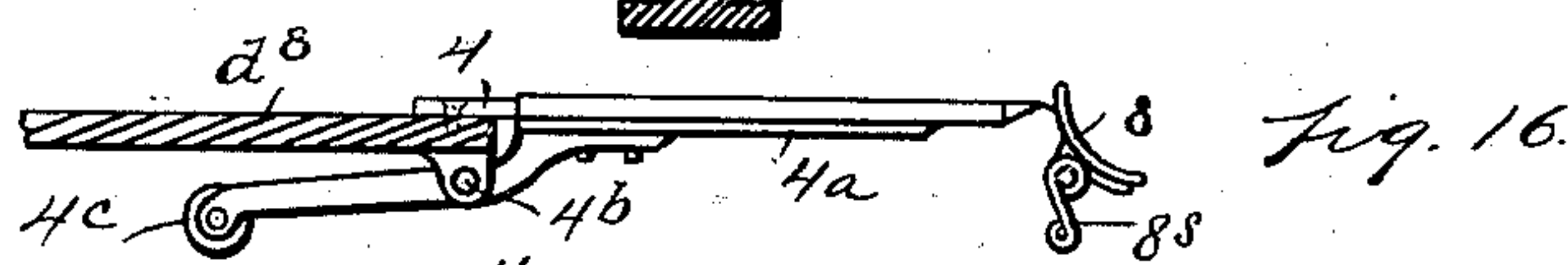


Fig. 16.

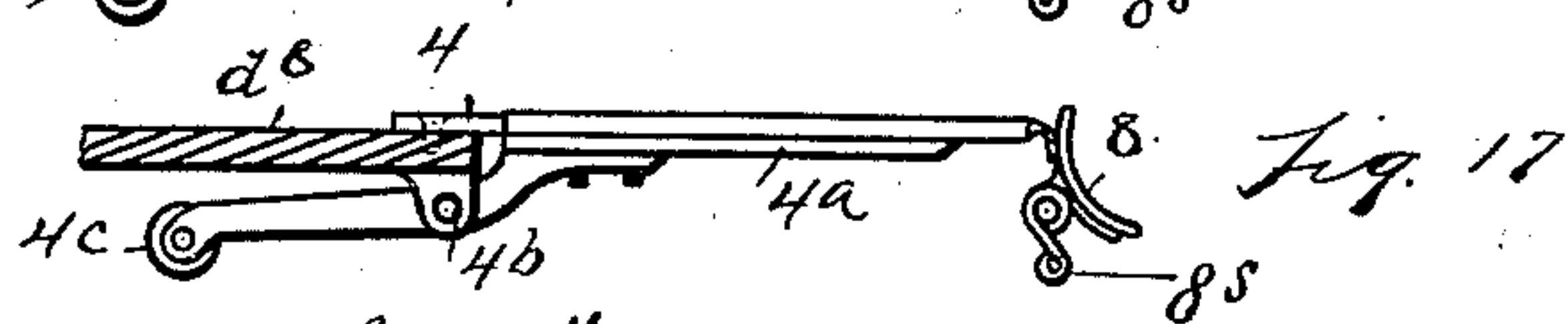


Fig. 17.

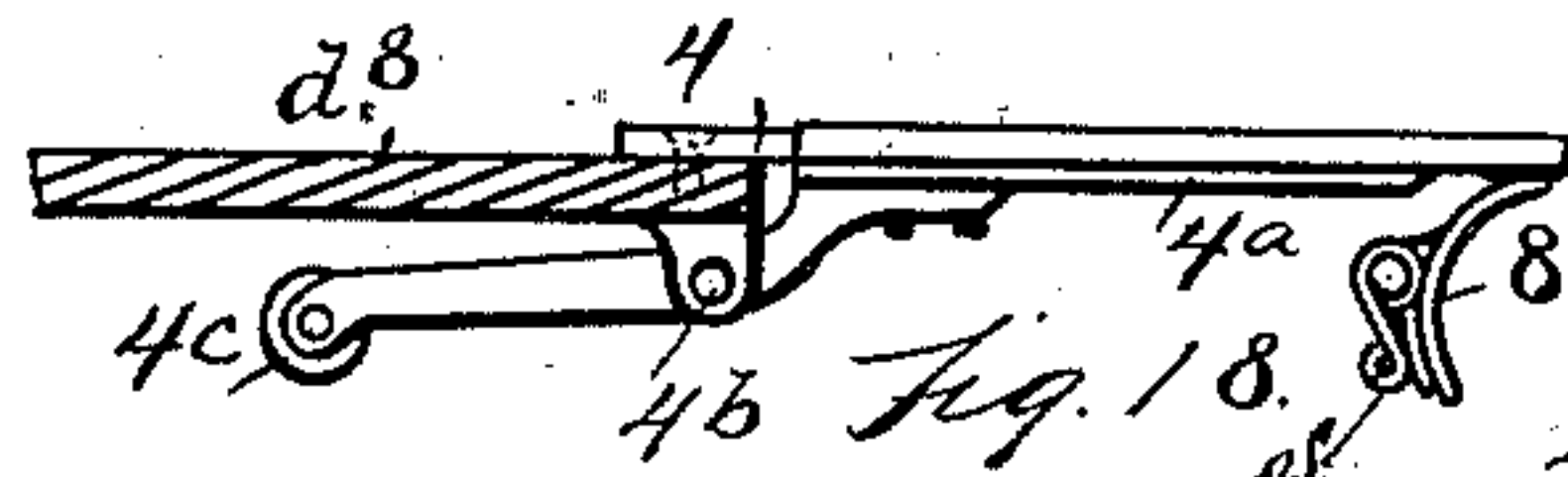


Fig. 18.

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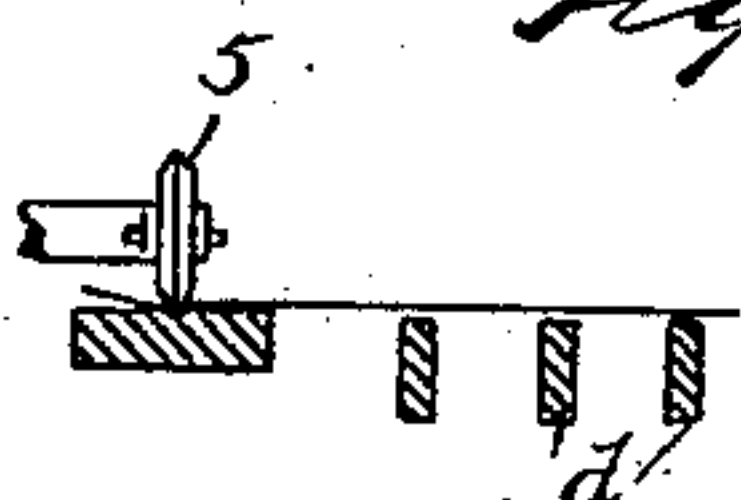
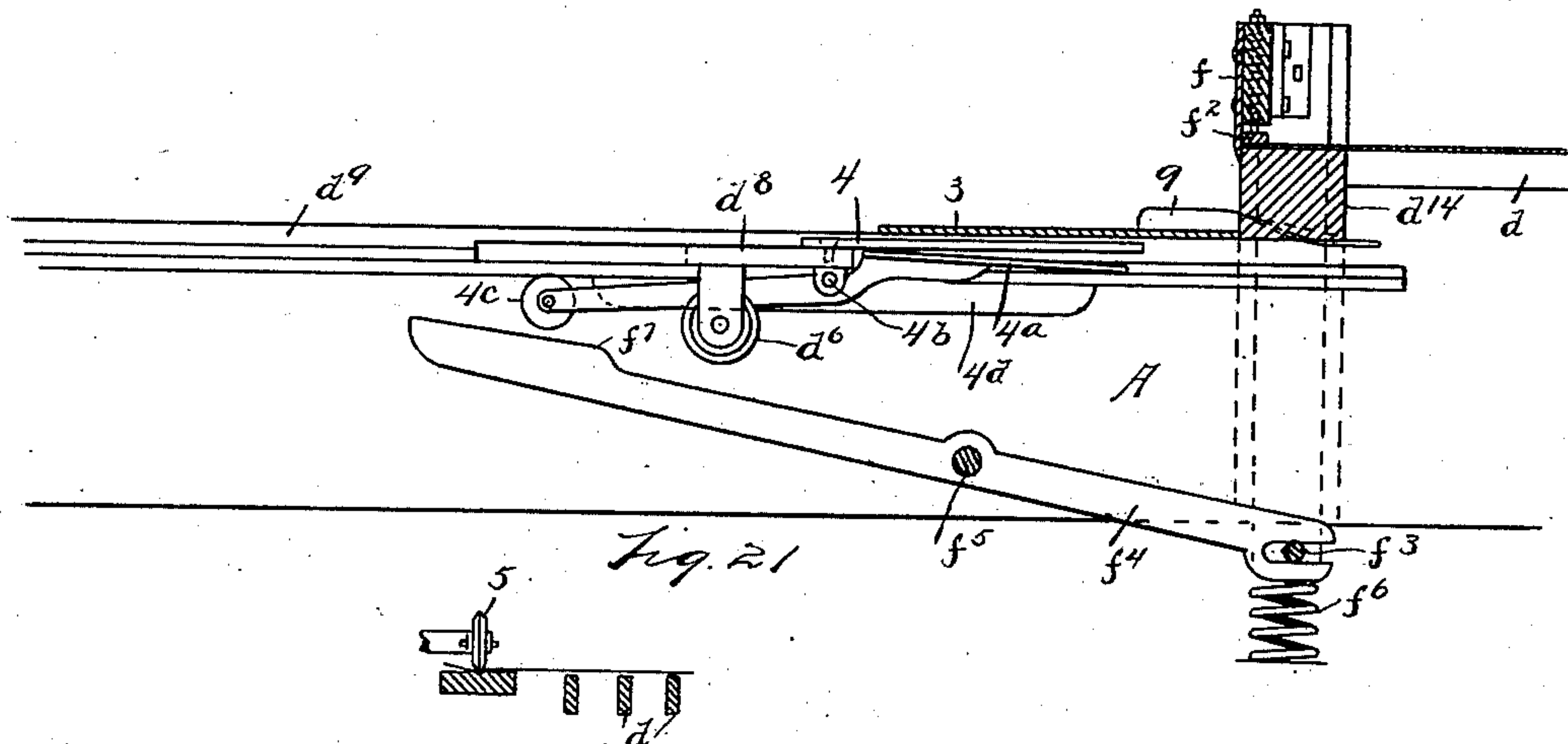
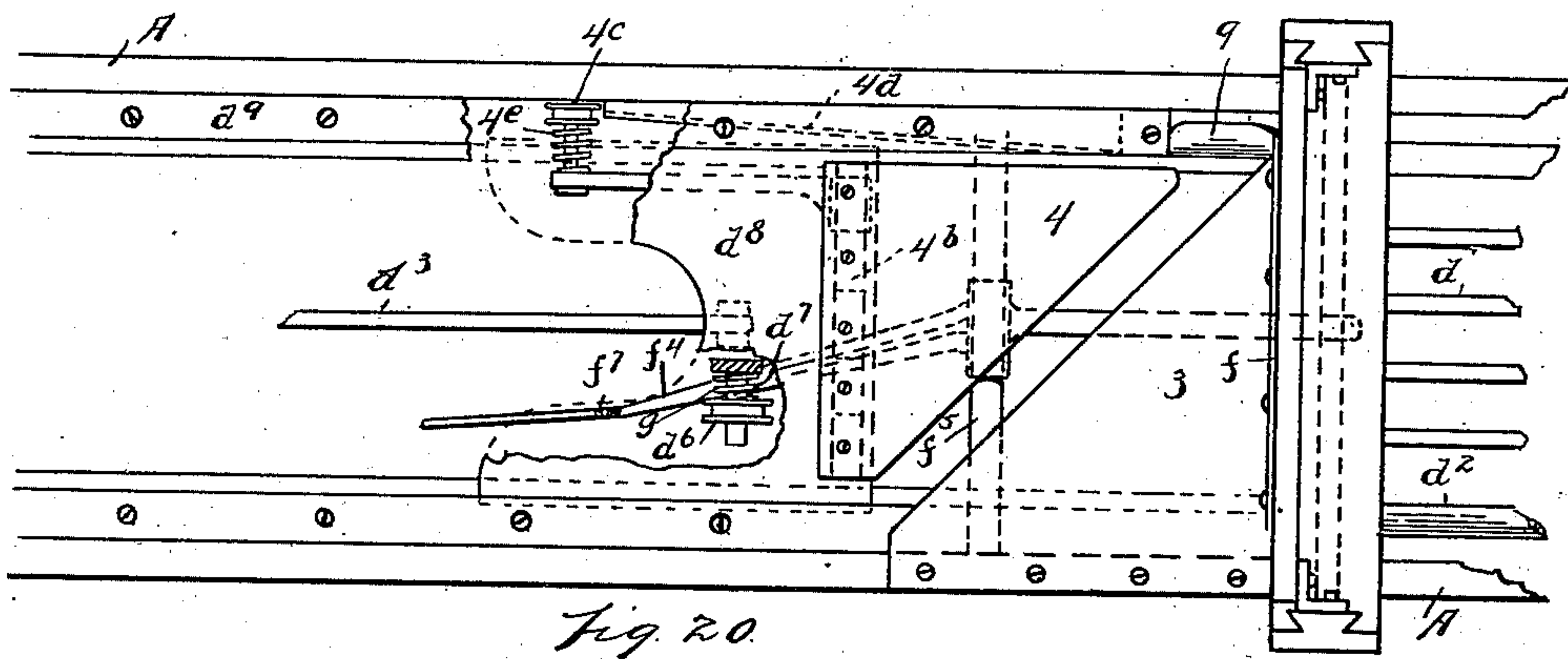
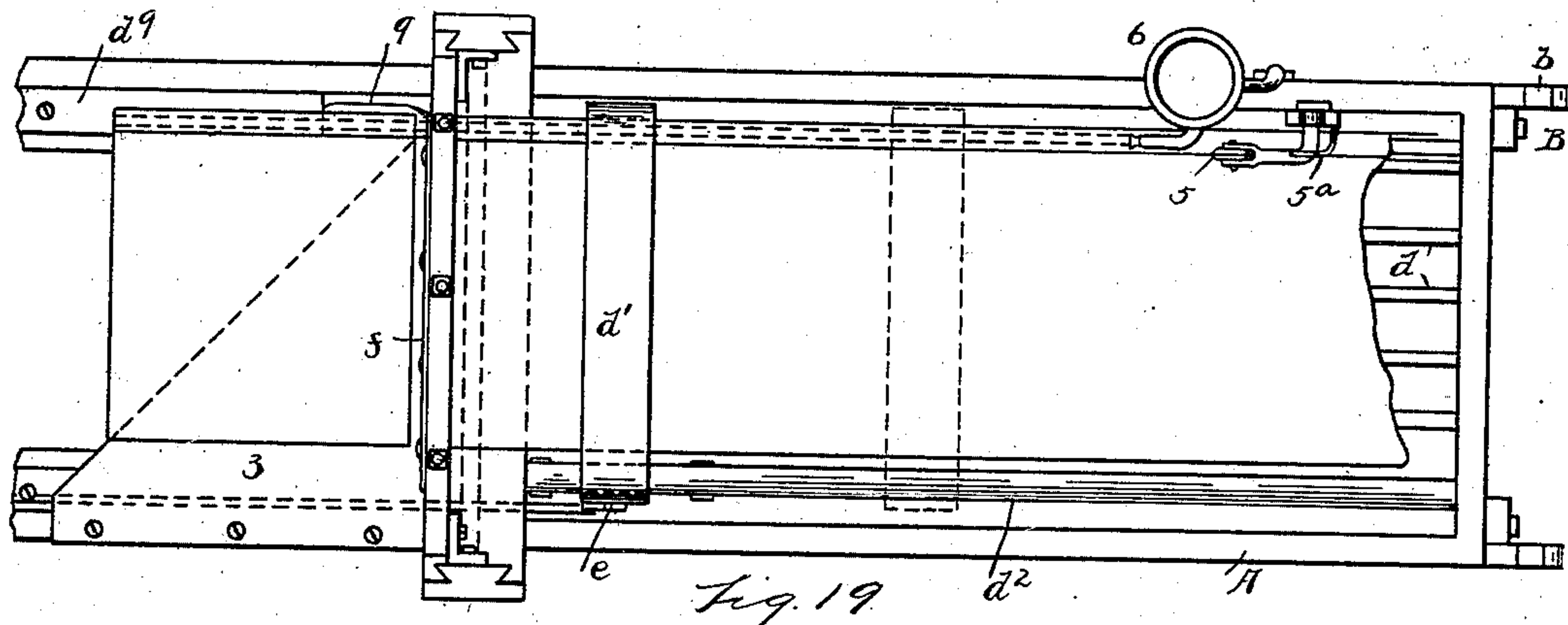
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(Application filed Aug. 5, 1899.)

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6 Sheets—Sheet 6.



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UNITED STATES PATENT OFFICE.

GEORGE P. DAVIS, OF DETROIT, MICHIGAN, ASSIGNOR TO THE CONTINENTAL PAPER PACKAGE CO., OF SAME PLACE.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 671,266, dated April 2, 1901.

Application filed August 5, 1899. Serial No. 726,286. (No model.)

To all whom it may concern:

Be it known that I, GEORGE P. DAVIS, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Paper-Bag Machines; and I 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 pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to paper-folding machines, and has for its object an improvement in paper-folding machines of the class adapted to fold paper bags known as "cornucopias." The bag folded by this machine is made from a rectangular, square, or nearly square piece of paper folded diagonally, with the diagonal fold running parallel to and slightly at one side of the diagonal of the paper. Such a fold brings the end edge of the paper over parallel to a side edge of the paper, and the side edge of the paper is folded back over the end edge and pasted down onto it. The bag now has the shape of a right-angled triangle, of which the folded edge forms the hypotenuse, one of the right sides forms the open end and the other right side the pasted end. A small part of the in-turned edge projects beyond the hypotenuse at the point, and in order to perfectly close this point this part is turned back on the bag and pasted down. The machine, which forms this bag from a continuous strip of paper, is shown in the drawings and described in the following specification.

In the drawings, Figure 1 is a perspective of the machine. Fig. 2 is a longitudinal vertical section. Fig. 3 is a plan view. Fig. 4 is an enlarged detail plan view of the folder. Fig. 5 is a side elevation, partly in section, of the part shown in Fig. 4. Fig. 6 is a detail of the paper-feeding mechanism. Fig. 7 is a cross-section showing in detail the knife. Fig. 8 is a bottom view of the knife. Fig. 9 is a detail of one of the knife-supports. Figs. 10 and 11 are details of the point-turning device. Fig. 12 is a detail of the edge-folder. Fig. 13 is a plan view showing the position of the reciprocating plate before it begins

to operate on the paper. Fig. 14 is a plan view showing the position of the reciprocating plate with the paper between the folding-plates and partially folded. Fig. 15 is a plan view showing the position of the plates after the reciprocating plate has traveled entirely past the fixed plate, and it indicates the position of the paper on the reciprocating plate. Fig. 16 is a vertical longitudinal section showing the point of the bag on the reciprocating plate as the plate, with the bag thereon, approaches the point-turner. Fig. 17 is a vertical longitudinal section showing the same parts as Fig. 16 after the reciprocating plate has contacted the point-turner and forced it partially over. Fig. 18 is a vertical longitudinal section showing the same parts with the reciprocating plate still farther over the point-folder. Fig. 19 is a plan view of an end of the machine, and it shows the paper and the paste-feeding mechanism. Fig. 20 is a plan view showing the reciprocating and stationary folding-plates and the means for actuating the knife-lever and the jaw-lever. Fig. 21 is a vertical longitudinal elevation of the levers and rollers which actuate the levers shown in Fig. 20. Fig. 22 is a cross-section of the paper, showing it as it engages under the creasing-wheel.

The machine consists of a frame, at one end of which there is mounted a roll of paper, and the paper is drawn from the roll by a reciprocating mechanism that seizes the end of the paper and draws it forward until enough paper has been drawn from the roll to make one bag. The front end of the paper is then seized under a bar, and the feeding mechanism moves back toward the roll of paper, again grasps the paper, and pulls a fresh portion from the roll. The first portion is at the same time pushed forward under the holding-bar, which is loosened to enable the paper to go forward, and is cut off, seized in the folding-machine and folded, pushed over the point-folding mechanism, and the point folded back on the body of the bag, and the reciprocating die-plate withdraws from the interior of the bag, and the bag drops to the floor or into a receptacle below the machine.

In the drawings, A indicates the main frame of the machine, at one end of which is a sup-

port B for the roll of paper. The roll of paper rests on a friction-roll a , that is mounted on the support B, and the journal of the shaft on which the paper is wound rests in a fork b of the support B. The strip of paper c is led under a guide-roll a^2 and along a skeleton-topped table that constitutes this part of the machine-frame. The skeleton-topped table consists of a number of parallel slats d , over which reciprocates a cross plate or bar d' , that is held to guide-bars d^2 and is actuated by a linked pitman d^3 from a crank-shaft d^4 . The crank-shaft d^4 is supported in bearings at the end of the frame. Opposite the roll of paper and upon the crank-shaft d^4 is mounted the main driving-wheel d^5 , that receives motion from any convenient source of power. The shaft d^4 is geared to the shaft of the friction-roll a by sprocket-chain gearing. Motion is imparted to the roll of paper by the friction-roll a , which is in continuous motion when the machine is in operation. The pitman d^3 actuates both the plunger and reciprocating die-plate, over which the bag is folded, and the paper-feeding mechanism. In order that it may actuate the paper-feeding mechanism, the plunger-head d^3 is connected to an arm e , that hangs from a rock-shaft e' , so as to allow some lost motion between said plunger-head and rock-shaft, as shown in Fig. 6. The rock-shaft e' is journaled in hangers e^2 , that are mounted on and travel on guide-rods d^2 . The rock-shaft e' lies across the table underneath the slats d . Fingers e^3 rise from the rock-shaft e' between the slats d and are arranged to engage closely against the cross-plate d' when the pitman d^3 is traveling toward the crank end of the machine. When the pitman is traveling away from the crank end of the machine, the fingers e^3 drop from engagement with the plate d' . The paper passes over the slats d , over the ends of the fingers e^3 , and under the plate d' . At the forward end of the skeleton table is a shearing-bar or paper-supporting bar d^{14} , and above this bar is located a vertically-reciprocating knife f , supported in vertical side bearings f' , that rise from the frame A.

The knife f is preferably a serrated knife rather than one which shears closely against the bar d^{14} . A spring presser-bar f^2 hangs at the rear of the knife and engages over the paper with spring-pressure, holding the paper while the knife cuts it and also holding the forward end of the paper to the bar d^{14} when the feed mechanism retreats. The knife and the holding-bar f^2 are actuated by a mechanism shown in Figs. 2 and 3. The frame which carries the knife-bar f is provided with a cross-bar f^3 , with which engages a lever f^4 , that is hung on a pivoted rod f^5 , and the pivoted rod f^5 extends across between the side pieces of the frame A. The knife-frame is pulled downward by a spring f^6 and is lifted by the lever f^4 . The lever f^4 is actuated by the pitman d^3 through the instrumentality of a friction-roll d^6 , that is carried

on a horizontal journal d^7 , borne on a plunger-head d^8 , that travels between parallel rods d^9 . The friction-roll d^6 is normally held by a spring in a location to engage with the free end of the lever f^4 . The roll d^6 is a grooved roll, and the free end of the lever f^4 is bent and has a vertically-widened portion f^7 . The roll d^6 travels entirely to the rear of the free end of the lever f^4 and in its travel engages over the free end of the lever f^4 . The plunger and the roll travel toward the cutting-knife until the roll passes the widened part f^7 of the lever f^4 . When the roll d^6 has traveled inward beyond the end of the widened part f^7 , the roll is held by the spring g opposite the inner end of the widened part f^7 of the lever f^4 and the roll travels back toward the crank end of the machine, engaging over the lever. The spring on the shaft d^7 allows the roll to yield and pass the free end of the lever, and as soon as the roll has passed the free end of the lever the spring brings the roll to position to engage again over the lever with the lever in the groove of the roll d^6 . The widened portion f^7 of the lever slopes upward for a distance and then is so shaped that after the lever f^4 has been swung to lift the knife-bar the roll continues to bear against the lever and hold the knife-bar free from the bar d^{14} during the motion of the pitman toward the crank. Immediately after the roll d^6 travels off from the widened portion f^7 of the lever f^4 the spring f^6 draws the presser-bar f^2 into engagement with the paper lying over the bar d^{14} .

The paper-folding mechanism will be best understood from an examination of Figs. 2, 3, and 13 to 18, inclusive. In front of the bar d^{14} is a fixed triangular plate 3, one side of which is fixed to the side of the frame and a second side of which is fixed across the frame immediately in front of the bar d^{14} and somewhat below its upper edge. In front of this triangular plate is a reciprocating plate mounted on the head d^8 of the pitman d^3 . The triangular plate 4 reciprocates from a location in front of the plate 3 to a location underneath the plate 3. The upper surface of the triangular plate 4 is below the lower surface of the plate 3 by about the thickness of a piece of paper, and both plates are thin, so that the lower surface of the plate 4 is only slightly below the upper surface of the plate 3. (In Fig. 2 the distance is exaggerated in proportion to the other parts of the machine.) Under the plate 4 and hinged to it is a jaw 4^a , that is actuated by a mechanism, hereinafter to be described, and that closes against the paper during the backward movement of the head d^8 and plate 4. In shape the folding plates which are employed for folding purposes are right-angled triangles, with the hypotenuse of each angle lying diagonally across the machine and two hypotenuses parallel with each other. The two parts may vary somewhat from the form shown, and the shape of the bag will vary accordingly; but

the form shown produces a right-angled bag, of which the overfolded edge is at right angles to the open end and the edge of the underfolded side of the paper is parallel to the edge of the overfold. The paper is creased for the overfolded edge by a creasing-roller 5, that lies just in front of the roller α^2 and is held in engagement with the paper by a spring 5^a. In front of the creasing-roller is a nozzle of a paste-tank 6, from which a stream of paste is spread over that portion of the paper which is to be folded over. The paper is held to the reciprocating die-plate by a jaw 4^a. The jaw 4^a is one end of a lever that swings on a pin 4^b and is provided at one end with a grooved friction-roller 4^c, that engages over a track 4^d during the period of the inward motion of the pitman. Near the end of the inward motion the grooved roller 4^c runs off the track 4^d and is carried to one side of the track by the spring 4^e. On the returning or outward movement of the pitman the grooved roller does not engage on the top of the track 4^d and the jaw remains open until the grooved roller passes beyond the outer end of the track 4^d. On its inward stroke the roller again engages on the track 4^d and closes the jaw. The jaw 4^a holds the paper up against the under side of the plate 4 against any possible liability to escape therefrom. The jaw 4^a is not absolutely essential to the working of the machine, because the machine will fold the paper in the proper shape without the jaw and without failures to any great extent; but occasionally a piece of paper will slip from its proper place when the jaw is not used.

8 indicates the point-folder. This point-folder is a curved plate presenting the convexity of its curvature toward the point of the reciprocating die-plate 4. It is hung on an arbor 8^a, which lies at the forward side of and below the arch of the plate.

8^s is a spring tending to turn the curved plate 8 in the direction of the hands of a watch, as shown in the drawings.

The action of the point-turner is as follows: When the point of the reciprocating die-plate 4, carrying the folded paper, approaches the point-turner 8, the point of the bag which projects slightly beyond the truncated point of the plate 4 engages first against the curved plate 8, and because of the resistance of the plate 7 the point of the bag is forced downward somewhat and bends immediately in front of the truncated end of the plate 4. The further progress of the plate brings the end of the plate 4, still covered with the bag, against the curved plate 8 above its center of rotation. The plate 8 yields before the plate 4, but presses strongly against the under side of it, thus carrying the point of the bag around and pressing it up against the body of the bag. The point of the bag consists in part of the projecting triangular-shaped piece of the overfolded edge, and this triangular projecting piece of the folded edge is coated with

paste, so that it adheres to the body of the bag and holds the folded point against the body of the bag.

In addition to the creasing mechanism already described the overfolding is aided by a warped sheet of metal somewhat similar to the hemmer of a sewing-machine, which engages against the edge of the paper and forces it upward from beneath the lower side of the die-plate 4 to a position above and along the paper folded over the upper side of the plate 4.

The operation of the machine is as follows: Supposing the front end of the paper coming from the roll to have been engaged between the fingers e^3 and the plate d' . With the first outward movement of the pitman the end of the paper is brought to and forced between the plate d^{14} and the holding-bar f^2 and is caught and held in that position. The inward movement of the pitman carries the paper-grip back for a new supply of paper and the paper-grip engages the paper when the pitman begins to move outward again. At this time the plate f^2 releases its hold on the paper and the front end of the paper is projected under the knife until enough projects beyond the knife to make one bag. The extreme front end of the paper has engaged under the plate 4. The pitman again makes an instroke, carrying the severed portion of paper with it; but the rear end of the severed portion lies over the plate 3 and the pasted side edge of the severed portion extends beyond the side of the plate 4 and is held up by engagement with the side of the machine to a position to engage with the turning-plate 9. As the pitman continues to travel inward, carrying with it the die-plate 4 and that part of the machine which is immediately connected with it, the paper is forced over the top of the die-plate and the pasted part of the paper is forced in from the side and pressed down upon the edge of the part that has been turned forward. The pitman travels in until the point of the bag is turned by the point-turner 8, and then the pitman begins its outstroke. The same action of the paper-feeding mechanism is repeated with the outstroke of the pitman. The completed bag is held by the action of the plate 8 and drops out of the way as soon as the plate 4 is withdrawn from within it.

What I claim is—

1. In a paper-folding machine, in combination with a frame, and means for feeding paper intermittently, a fixed triangular plate over which the paper is fed, a triangular reciprocating die-plate arranged on a plane lower than the fixed plate, and means for reciprocating the die-plate under the fixed plate, substantially as described.

2. In a paper-folding machine, in combination with a fixed plate, a reciprocating die-plate, located on a plane beneath the fixed plate, a paper-turning guide located at one side of, and extending over, the reciprocating

plate and arranged to turn the edge of the paper over the die-plate, substantially as described.

3. In a paper-folding mechanism, a sever-
 5 ing-knife, a lever arranged to operate said
 severing-knife, a reciprocating mechanism, a
 grooved friction-roll carried by said reciprocating mechanism, the end of the lever being
 arranged diagonally across the path of the
 10 traveling friction-roll, and the friction-roll
 being arranged to move longitudinally of its
 axis, substantially as described.

4. In a paper-folding mechanism, in combination with a reciprocating former around
 15 which the bag is formed, a point-turner consisting of a curved engaging piece, pivoted beneath the line of travel of the forming-piece, and having a curved part which nor-

mally extends across the line of travel, but which can be turned on its pivot to engage 20 entirely underneath the former, substantially as described.

5. In a paper-folding machine, in combination with a paper-roll holder, means for actuating the roll of paper, a reciprocating feed- 25 ing device, a severing-knife, a paste-spreading device, a reciprocating former, a fixed folding-plate, an edge-turner, and a point-turner, all substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses. 30

GEORGE P. DAVIS.

Witnesses:

C. C. JENNINGS,
 JOHN N. GOODRICH.