No. 616,801. Patented Dec. 27, 1898.

J. F. McNUTT.

PAPER CUTTING MACHINE.

(Application filed Sept. 29, 1897.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

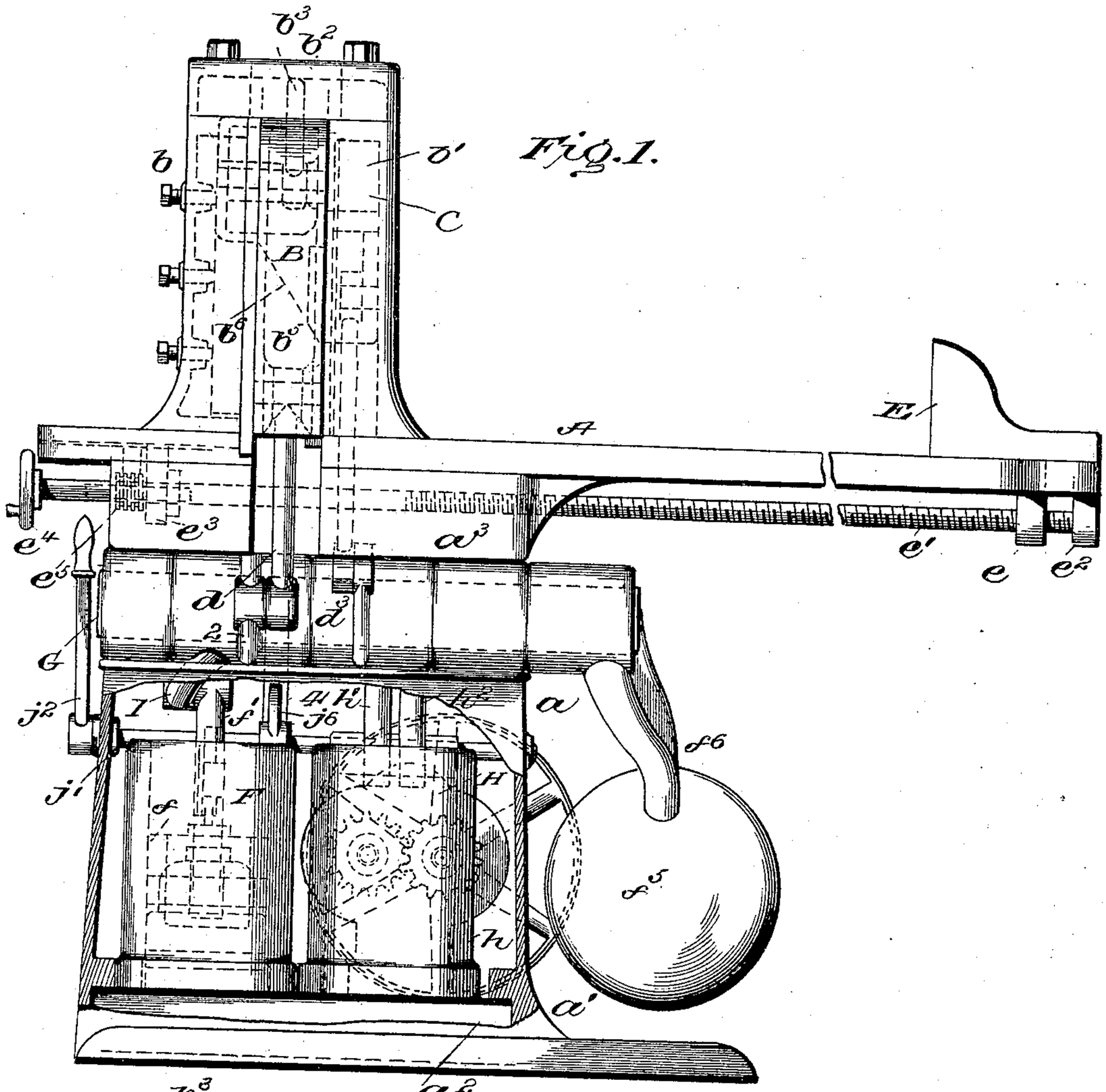


Fig. 6.

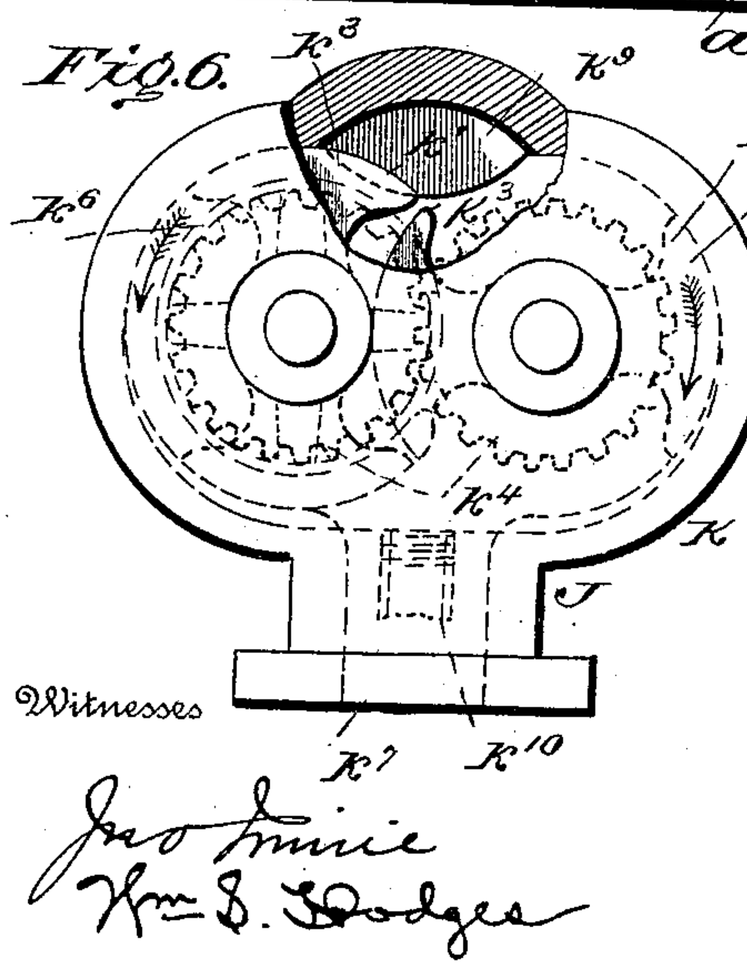
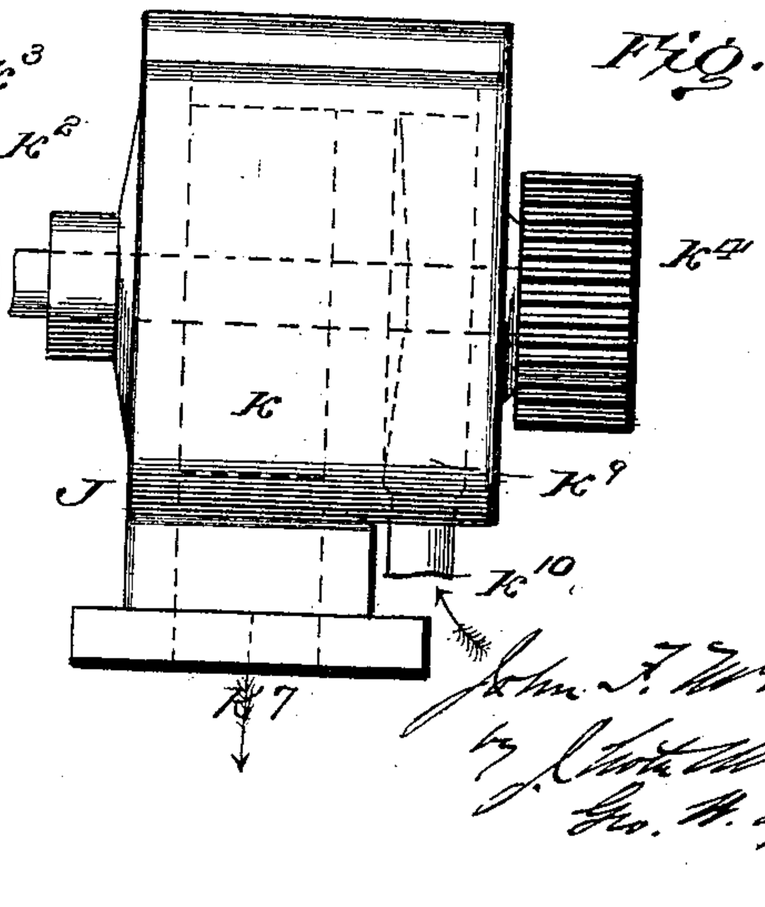


Fig. 7.



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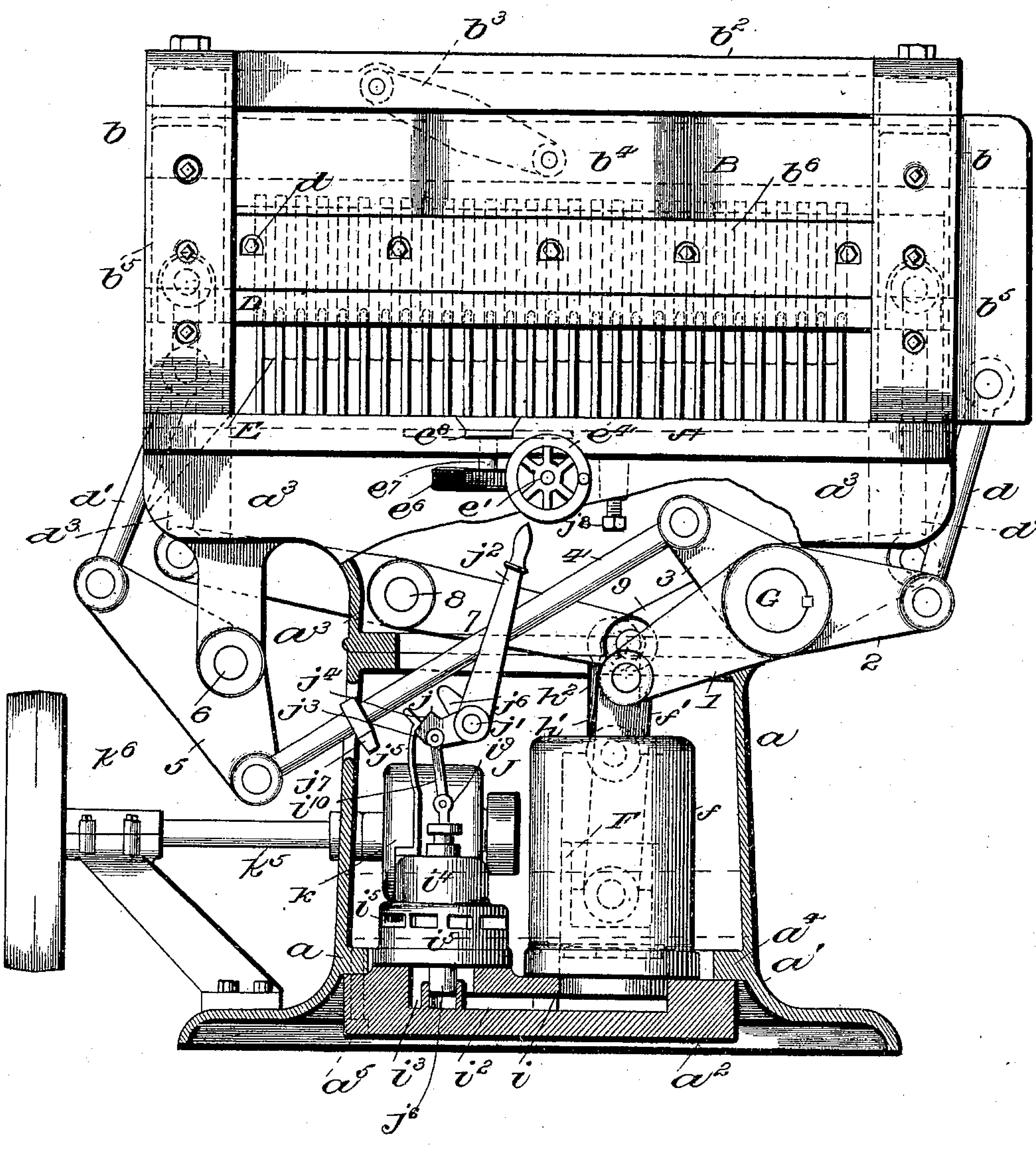
(No Model.) 4 Sheets—Sheet 2.

Fig. 2.



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No. 616,801. Patented Dec. 27, 1898.

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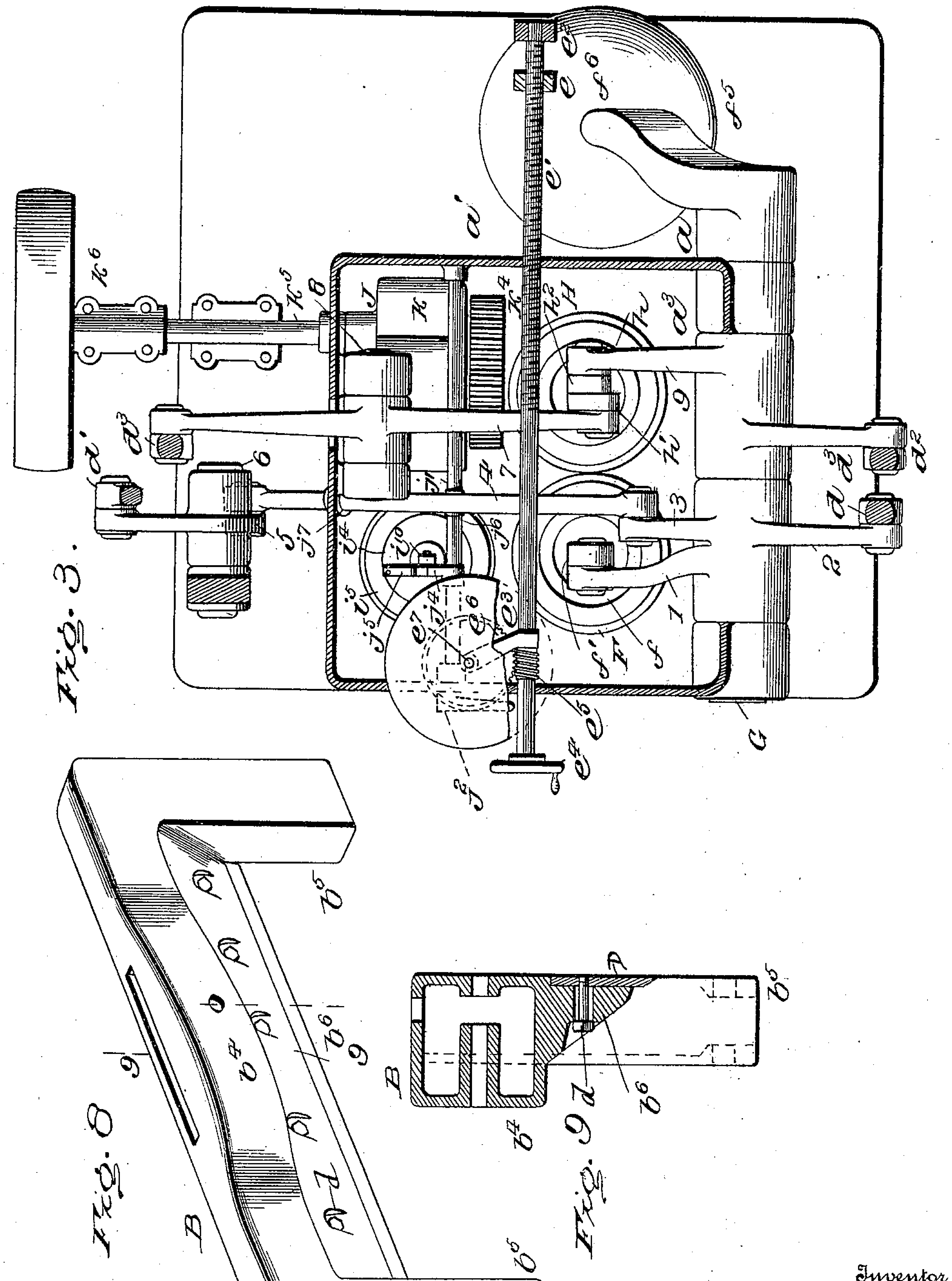
PAPER CUTTING MACHINE.

(Application filed Sept. 29, 1897.)

(No Model.) 4 Sheets—Sheet 3.



Witnesses

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(No Model.) 4 Sheets—Sheet 4.

Fig. 4.

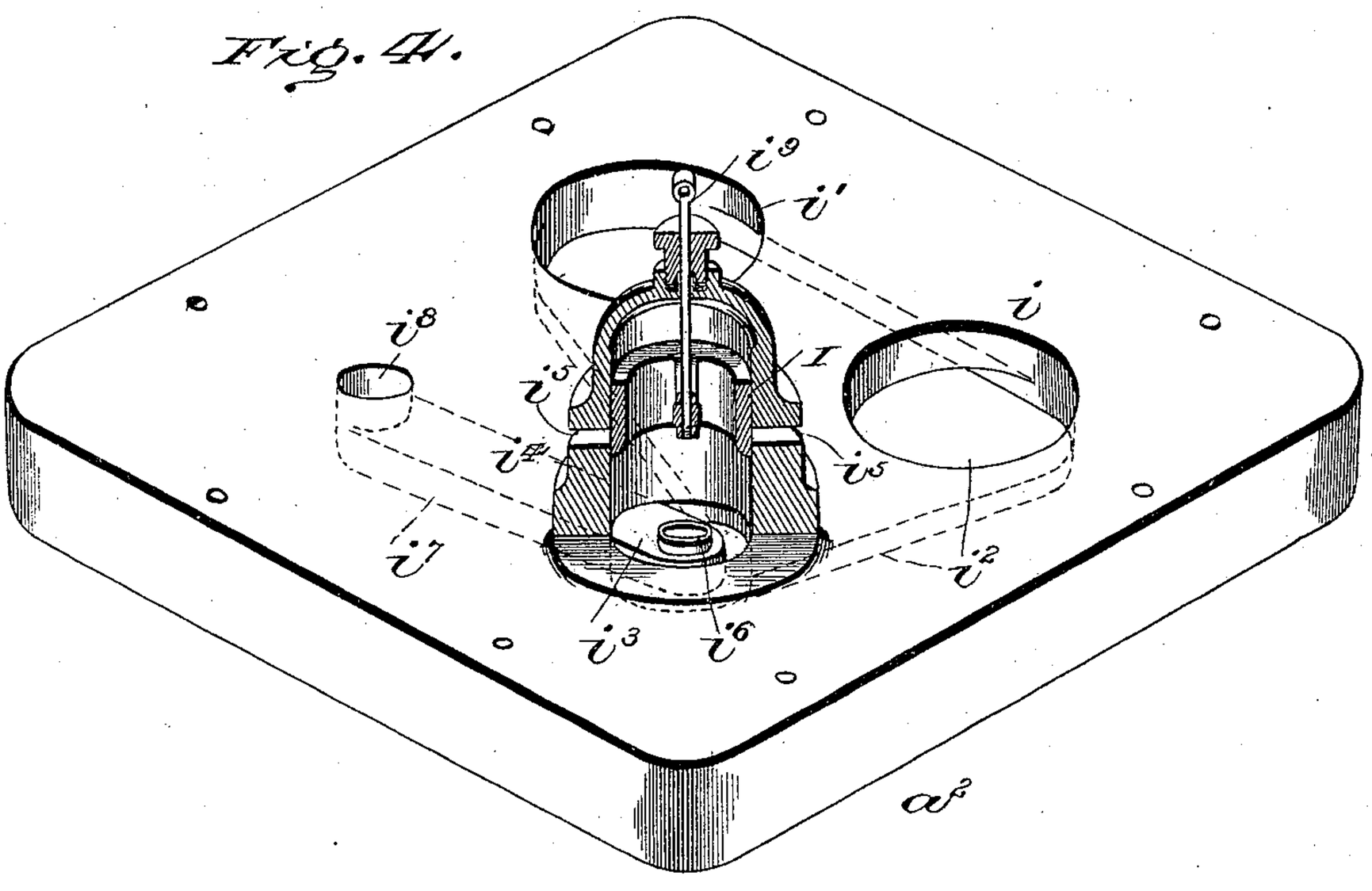
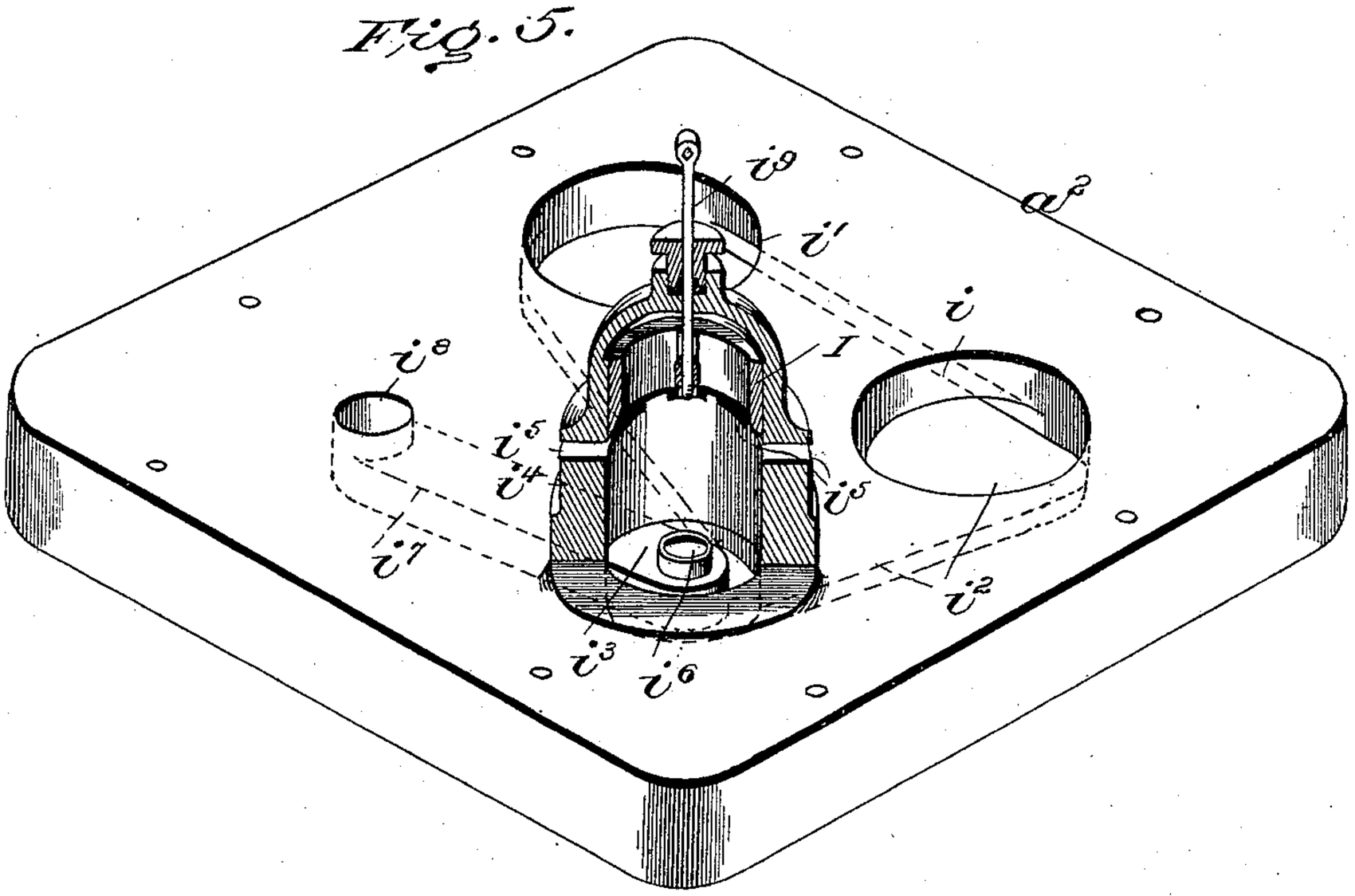


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN FRANKLIN McNUTT, OF WARREN, OHIO, ASSIGNOR TO THE HARRIS AUTOMATIC PRESS COMPANY, OF NILES, OHIO.

PAPER-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 616,801, dated December 27, 1898.

Application filed September 29, 1897. Serial No. 653,428. (No model.)

To all whom it may concern:

Be it known that I, JOHN FRANKLIN McNUTT, of Warren, in the county of Trumbull and State of Ohio, have invented certain new and useful Improvements in Paper-Cutting Machines; 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.

This invention contemplates certain new and useful improvements in paper-cutters.

The primary object of the invention is to provide simple and highly-efficient means for operating a paper-cutting machine by hydraulic pressure.

A further object is to provide a frame of improved form in which the operative mechanism will be inclosed.

The invention will be hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation with parts broken away. Fig. 2 is a similar view looking at the front end of the machine, the controlling-valve being lowered. Fig. 3 is a top plan view with the table, cutter-bar, and clamp-bar removed, parts being indicated in dotted lines. Figs. 4 and 5 are views in perspective showing the controlling-valve, its casing, and the passageway for the liquid. Fig. 6 is a detached front view of the pump. Fig. 7 is a side view thereof. Fig. 8 is a view in perspective of the cutter-bar. Fig. 9 is a cross-sectional view thereof on lines 9 9, Fig. 8.

Referring to the drawings, A designates a flat table which is supported by a column or pillar a, consisting of a hollow casing flared at its lower end a' and having a base a^2. This casing also forms a reservoir for oil or other liquid which under pressure operates the machine. On the upper end of this column is fitted a flange portion a^3, depending from the under side of table A. The base a^2 is shown as being secured to an inner flange a^4 by screw-bolts a^5. The column is of such dimensions that not only does it constitute the sole support for the table, but it also incloses the mechanism for operating the machine.

At each side of the table A, near the forward end thereof, are vertical guideways formed by two uprights $b\,b'$. The opposite uprights are connected by an upper cross-bar b^2.

B is the cutter-head, the ends of which are designed to fit between the uprights $b\,b'$, and C is the clamp-bar, which is movable vertically in uprights b', the latter being formed with guideways for said bar. The inclined shearing movement of the cutter-bar is obtained by means of a link b^3, pivoted at its ends to cross-bar b^2 and head B, respectively. Heretofore the almost universal practice of builders of this class of machines has been to make the cutter-bar thin and deep and to provide for its having contact with the guiding-surfaces for only a limited distance, the height or depth of the bar and knife being about twice the length of the vertical movement of the knife, and the front face of the bar being beveled, so as to clear the paper, obtains a guiding-surface but little over half the depth of the bar, or about equal to its vertical movement. With such proportions the cutting edge of the knife is in advance of the guiding-surfaces a distance equal to one-third or one-half the depth of the bar and is in a measure overhung. Hence when there is slight play between the guiding-surfaces and the cutter-bar the variation of the knife is mutiplied.

I purpose making the cutter-bar hollow and of box form, being bulged outward at its central portion b^4, and form it at its ends with widened downward extensions b^5, which are designed to fit snugly between the uprights $b\,b'$. From the central box portion depends a longitudinal tapered or reduced flange b^6, to the flat face of which the knife D is firmly secured by screws d. The bearing-surfaces presented by the end extensions b^5 are about the distance of a stroke of the knife below the edge thereof—that is, when the cutter-bar is raised the lower ends of the extensions b^5 are about level with the top surface of table A. This provides a bearing or guiding surface for the knife from three to four times the length of the stroke thereof and insures an absolutely positive and unyielding guide for the cutter-bar and knife. By thus making the cutter-bar and providing bearing-surfaces

therefor several times greater than the length of the stroke accurate results may be obtained, all danger of any deflection of the knife being successfully avoided. By bulging the box-like cutter-bar increased stiffness is obtained with the least possible increase in weight. The spring of the knife is in almost every case either outward or inward. If the knife is canted so that in cutting it will pull inward or outward, the bar is sufficiently rigid to counteract this tendency.

To the lower ends of the extensions b^5 are pivotally secured the upper ends of links d d', which are connected to the mechanism by which the raising and lowering of the cutter-bar is effected. To the ends of the vertically-movable clamp-bar C are pivotally secured the upper ends of links d^2 d^3, which are likewise connected to operative mechanism.

E is an adjustable gage extended transversely over table-top A and having a depending lug e, which works on the threaded portion of a rod e', extended longitudinally beneath the table, being supported at its rear end by a boss e^2, while near its forward end it is extended through a bearing e^3. A handled wheel e^4 is fast on the front end of this screw-rod, by turning which the gage can be moved back and forth. On this rod e', near its forward end, is a worm e^5, with which meshes a toothed wheel e^6, fast on a short shaft e^7, depending from the table A. On this shaft e^7 is a dial-wheel e^8, the marks or figures on which can be viewed through a cut-out in the front edge of the table A. The surface of this dial is graduated into the desired number of parts to represent inches capacity of the machine from the knife to the gage. The pitch of the screw-thread of rod e' should be such that the dial will make one complete revolution to the corresponding complete forward or backward movement of the gage.

Within the reservoir-casing constituting the column or pillar by which the table is supported is located the mechanism for operating the cutter and clamp bars.

F is a piston, f the cylinder therefor, and f' a short rod projecting upwardly from said piston. To the rod is pivoted one end of an arm 1, fast on a shaft G, supported by and extended transversely through the upper part of the column at one side thereof. A second arm 2, extended from the opposite side of and fast on this shaft, is connected at its outer end to the link d of the cutter-bar. A third arm 3, also fast on shaft G, is connected by rod 4 to the lower end of a working beam 5, fulcrumed on shaft 6 and connected at its upper end to the link d', said rod 4 being projected through a slot-opening in the column-casing. Hence the raising of piston F will through the described connections effect the lowering of the cutter-bar and knife. A counterbalancing-weight f^5, secured to an arm f^6, fast on the end of shaft G, serves to normally hold the cutter raised. H is a second piston whose cylindrical casing h is also within the column adjacent to the piston F and its cylinder. This piston has two rods h' h^2 projecting therefrom. To the rod h' is pivoted one end of a beam 7, mounted on a shaft 8, and after being extended through an opening in the column is connected to the lower end of the link d^3 of the clamp-bar. To the rod h^2 is connected one end of a beam 9, loosely mounted on shaft G, and connected at its other (outer) end to the lower end of the other link d^2 of said clamp-bar. Thus when the piston H is raised the clamp-bar will be lowered through the beam connections. This piston acts as a counterbalance for the clamp-bar.

The base a^2 of the column is formed with two cylindrical openings i i', to which are fitted the casings f and h, respectively, said casings opening into a common horizontal chamber i^2, formed in said base. This chamber leads from an opening i^3, over which is located a valve-casing i^4 of a valve I. This valve-casing has an outlet into the hollow column, the same consisting of annular ports i^5, which are opened and closed by the valve according as the latter may be raised or lowered. Into this valve-casing opens the nozzle-like end i^6 of a channel i^7, formed in base a^2 and leading from an opening i^8, over and communicating with which is a pump J. The rod i^9 of valve I is connected by a link i^{10} to an arm j, fast on a shaft j', extended transversely through column a. On the front projecting end of this shaft is a handle j^2. The end of arm j is "squared," so to speak—that is, it has two flat surfaces j^3 j^4, against either one of which constantly bears the upper end of a spring-arm j^5, secured at its lower end to valve-casing i^4. This spring tends to hold shaft j' in either of its two positions, consequently retaining the valve I raised or lowered. On this shaft j' is a short arm j^6, which is designed to be engaged by a block j^7 on rod 4, such engagement in practice serving to automatically reverse the operation of the machine—that is, by elevating the previously-lowered valve I—thereby terminating the cutting operation.

In practice I prefer the use of a suitable oil under pressure for effecting the operation of the machine. The extreme levels of the liquid are indicated by dotted lines on Fig. 2. The liquid is forced through channel i^7 and upon escaping from the nozzle-like end thereof into the valve-casing will pass through port i^5 out into the column when the valve is raised; but if said valve is lowered over the annular ports i^5 the liquid will be forced to pass down into chamber i^4 and thence up into both of the cylinders f and h, operating the pistons thereof. The piston h of the clamp-bar mechanism is first acted upon. For that lesser resistance is presented. As this piston is forced upward the clamp-bar will be lowered until it strikes the pile of paper, the resist-

ance of which will resist the motion of the actuating-piston *h*. The latter will now remain practically stationary. This will continue while the fluid-pressure acts on piston *f*, forcing the latter upward and through the described connections effecting the lowering of the cutter-bar and knife. Immediately the knife begins to cut the paper the pressure in the cylinder *f* will be increased to meet the resistance of the cut, and it will be seen that the pressure applied to the clamp-bar will be increased exactly in proportion to the pressure required to drive the knife through the paper. If the pile of paper is wide to the full capacity of the machine, the pressure applied to the clamp-bar will be correspondingly greater. Should the pile of paper to be cut be narrow, the power applied to said clamp-bar would of course be less just in proportion to the width of the cut. When the knife reaches the bottom of the stroke, the end of arm 1 will strike the adjustment-bolt j^8, (see Fig. 2,) which prevents the knife being driven into the cut block of the table, and at the same time block j^7 on rod 4 will engage the arm j^6, thereby partly turning the shaft j', and through arm *j* and rod i^{10} effect the raising of valve I sufficiently to partly open the annular ports in the valve-casing, and in this position the engaging corners of spring j^5 and arm *j*, having just passed the spring, will complete the upward motion of the valve and its parts, thus throwing the annular ports wide open. The operating-handle j^2 is now in its lowered position. When the machine is to be operated, the operator moves this handle upward into the position shown in Fig. 2, thereby lowering the valve I, so as to close the annular ports i^5 in the valve-casing and cause the oil or other liquid under pressure to pass through the chamber i^2 of the base into the piston-cylinders.

Any preferred form of pump may be employed for forcing the liquid to the piston-cylinders. In Figs. 2, 6, and 7 I have shown a rotary pump J, located within the reservoir-column. Within the casing *k* of this pump are two pistons k' k^2, having each two quarter-circle lobes k^3 diametrically opposite each other, the central cylindrical portion of each being engaged by the lobes of the other. These pistons are geared together by gear-wheels k^4, and on the extended shaft k^5 of one piston is a driving or belt pulley k^6. The outlet-opening k^7 registers with the opening i^8 of channel i^7. Within the casing *k* of the pump is cored a chamber k^9, which leads from the lower suction-inlet k^{10} (opening into the column) to the upper side of the pump-casing, from whence the oil is taken by the pistons and delivered to the opening in the base of the column. The lowest level of the liquid should never fall below this inlet. In practice the valve I is normally raised within its casing, allowing the oil to escape into the reservoir-column; but the instant the handle j^2 is raised, thereby effecting the lowering of the valve and the consequent cutting off of escape through annular ports i^5, the oil is caused to travel through the chamber in the base direct to the piston-cylinders.

It will be observed that the instant the cutting operation is completed the machine is automatically stopped and the parts returned to their normal positions.

I claim as my invention—

1. A paper-cutting machine having upright guideways, a hollow cutter-bar in box-like form having a depending flange, and widened depending end portions fitting in said guideways, a knife attached to said flange, and means for operating said cutter-bar, as set forth.

2. A paper-cutting machine having upright guideways, a hollow cutter-bar in box-like form having a depending flange and a central bulged portion, a knife attached to said flange, and means for operating said cutter-bar, as set forth.

3. A paper-cutting machine having upright guideways, a hollow cutter-bar in box-like form having a depending flange and a central bulged portion and widened end portions, a knife attached to said flange, and means for operating said cutter-bar connected to said end portions, substantially as set forth.

4. In a paper-cutting machine, a table having guideways, and a liquid-reservoir supporting said table, in combination with the cutter and clamp bars movable in said guideways, and hydraulic devices located in said reservoir and connected to said bars for operating the latter, substantially as set forth.

5. A paper-cutting machine having a liquid-reservoir, a table supported by said reservoir, a cutter-bar located above said table, a weight for normally holding said cutter-bar elevated, and a hydraulic device located within said reservoir for effecting the lowering of said cutter-bar, substantially as set forth.

6. A paper-cutting machine having a liquid-reservoir, a table supported by said reservoir, a cutter-bar and clamp-bar above said table, and a hydraulic device for operating said cutter and clamp bars located within said reservoir, and means for automatically reversing the operation of said device after the cutting is completed, substantially as set forth.

7. A paper-cutting machine having a liquid-reservoir, a table supported by said reservoir, a cutter-bar and a clamp-bar located above said table, pistons within said reservoir having connections with said bars, cylinders for said pistons, means also within said reservoir for forcing liquid into said cylinders, and means for automatically directing such liquid from said cylinders into said reservoir, substantially as set forth.

8. A paper-cutting machine having a liquid-reservoir, a table supported by said reservoir, a cutter-bar above said table, a cylinder and piston therefor within said reservoir having

connections with said cutter-bar, a weight, or the like, normally holding said cutter-bar raised, a clamp-bar also above said table, and a cylinder and piston therefor within said reservoir having connections with said clamp-bar, and means also within said reservoir for forcing liquid into said cylinders, said piston connected to said clamp-bar being operated in advance of said piston of the cutter-bar, substantially as set forth.

9. A paper-cutting machine having a liquid-reservoir, a table supported by said reservoir, a cutter-bar and clamp-bar above said table, hydraulic devices within said reservoir having separate pistons connected, respectively, to said cutter-bar and clamp-bar, a pump, or other feeder, also within said reservoir for supplying a fluid to said devices, and a valve within said reservoir intermediate of said pump and said devices for controlling the fluid-supply to said cylinders, substantially as set forth.

10. The combination with a paper-cutting machine having cutter and clamp bars, of a liquid-reservoir, pistons therein connected to said bars, means for forcing liquid against said pistons, and a valve intermediate of said forcing means and piston for controlling an outlet into said reservoir, whereby when said outlet is opened the liquid will escape into said reservoir and relieve the pressure from said pistons, as set forth.

11. A paper-cutting machine having a hollow supporting-column, a table supported by said column, a cutter-bar and clamp-bar above said table, hydraulic devices within said column having separate pistons, connected, respectively, to said cutter-bar and clamp-bar, a pump, or other feeder, within said column for supplying a fluid to said devices, a valve also within said column intermediate of said pump and said devices, and means connected to said valve designed to be operated automatically when the cutting operation is completed, whereby the fluid-supply to said devices will escape into said column, substantially as set forth.

12. A paper-cutting machine having a hollow supporting-column, a table supported by said column, a cutter-bar and clamp-bar above said table, hydraulic devices within said column having separate pistons connected, respectively, to said cutter-bar and clamp-bar, a pump, or other feeder, within said column, for supplying a fluid to said devices, passage-ways within said column leading from said pump to said devices, a valve-casing into which said passage-way opens, a valve in said casing for controlling the fluid-passage to said devices, and means for automatically operating said valve when the cutting operation is completed, whereby the fluid will escape through said valve-casing into said column, substantially as set forth.

13. A paper-cutting machine having a cutter-bar and clamp-bar, a hollow supporting-column, hydraulic-operated devices within said column connected to said cutter and clamp bars, a pump having an inlet opening into said column, a passage-way leading from the outlet of said pump to said devices, a valve-casing with which said passage-way communicates having escape-ports, a valve for opening and closing said ports, and means for operating said valve, substantially as set forth.

14. A paper-cutting machine having a cutter-bar and clamp-bar, a hollow supporting-column, hydraulic-operated devices within said column connected to said cutter and clamp bars, a pump having an inlet opening into said column, a passage-way leading from the outlet of said pump to said devices, a valve-casing with which said passage-way communicates having escape-ports, a valve for opening and closing said ports, mechanism connected to said valve, and means for operating said mechanism automatically when the cutting operation is completed, substantially as set forth.

15. A paper-cutting machine having a cutter-bar and clamp-bars, a hollow supporting-column, hydraulic-operated devices within said column connected to said cutter and clamp bars, a pump having an inlet opening into said column, a channel leading from the outlet of said pump, a valve-casing into which said channel opens having an outlet into said column, a passage-way leading from said valve-casing to said devices, a valve in said casing designed to open and close said outlet, and means for operating said valve, substantially as set forth.

16. A paper-cutting machine having a cutter-bar and clamp-bar, a hollow supporting-column, hydraulic-operated devices within said column connected to said cutter and clamp bars, a pump having an inlet opening into said column, a channel leading from the outlet of said pump, a valve-casing into which said channel opens having an outlet into said column, a passage-way leading from said valve-casing to said devices, a valve in said casing designed to open and close said outlet, mechanism connected to said valve, and means for operating said mechanism automatically when the cutting operation is completed, substantially as set forth.

17. The combination with the table having vertical guideways, and the liquid-reservoir supporting said table, of a cutter-bar movable in said guideways, a piston and its cylinder within said reservoir, connections between said piston and the ends of said cutter-bar, a weight acting on said cutter-bar, against the upward movement of said piston, and means also within said reservoir for forcing said piston upward, substantially as set forth.

18. The combination with the table having vertical guideways, and a support for said table, of a cutter-bar movable in said guideways, links depending from said cutter-bar,

a hydraulic-operated piston having a rod projecting therefrom, a shaft having arms fast thereon connected to said piston-rod and to one of said links, a third arm also fast on said shaft, and connections between said latter arm and the other link of said cutter-bar, substantially as set forth.

19. The combination with the table having vertical guideways, and a support for said table, of a cutter-bar movable in said guideways, links depending from said cutter-bar, a hydraulic-operated piston having a rod projecting therefrom, a shaft having oppositely-projected arms, connected, one, to said piston-rod, and, the other, to one of said links, a third arm fast on said shaft, a pivoted beam, and a rod connecting said third arm to said pivoted beam, which latter is connected to the other one of said links of said cutter-bar, substantially as set forth.

20. The combination, in a paper-cutting machine, with the table having uprights, and a liquid-reservoir supporting said table, of a clamp-bar movable vertically in said uprights above said table, a piston and its cylinder within said reservoir, connections between said piston and said clamp-bar, and means also within said reservoir for forcing said piston, substantially as set forth.

21. The combination, in a paper-cutting machine, with the table having uprights, and a liquid-reservoir supporting said table, of a clamp-bar movable vertically in said uprights above said table, links depending from said clamp-bar, a hydraulic-operated piston in said reservoir having rods projecting therefrom, two pivoted beams connected to said piston-rods and to said links, and means also within said reservoir for forcing said piston, substantially as set forth.

22. The combination with the table having vertical guideways, and a support for said table, of the cutter and clamp bars movable in said guideways and having depending links, hydraulic-operated pistons, one of which has two rods projecting therefrom, the other piston having a single rod, the shaft having two arms fast thereon, one being connected to said single piston-rod, and, the other, to one of the links of said cutter-bar, a third arm also fast on said shaft, a pivoted beam connected at one end to the other link of said cutter-bar, a rod connecting the other end of said beam to said third arm, a beam loosely mounted on said shaft connected at one end to one of said rods of the other piston and at its other end to one of the links of said clamp-bar, a weight fast to said shaft, and a pivoted beam connected at one end direct to the other rod of said last-mentioned piston and, at its other end, to the other link of said clamp-bar, substantially as set forth.

23. In a paper-cutting machine, the combination with a table and a support therefor, hydraulic-operated pistons, and connections between said pistons and the cutter-bar and clamp-bar, of a device for controlling the passage to said pistons, comprising a valve, a shaft connected to said valve having an arm, a spring for retaining said shaft and valve in either one of two positions, and a projection carried by the connection between one of said pistons and said cutter-bar designed to engage said arm and effect the movement of said valve, whereby the pressure will be relieved from said pistons, substantially as set forth.

24. In a paper-cutting machine, the combination with a table and a support therefor, hydraulic-operated pistons, and connections between said pistons and the cutter-bar and clamp-bar, of a device for controlling the passage to said pistons, comprising a valve, a shaft having an arm, a rod connecting said arm to said valve, a spring bearing against said arm and tending to hold said valve in either one of two positions, a second arm fast on said shaft, and a projection carried by the connection between one of said pistons and the cutter-bar designed to engage said latter arm and effect the movement of said valve, whereby the pressure will be relieved from said pistons, substantially as set forth.

25. The combination, in a paper-cutting machine, with the table, hollow supporting-column, and guideways, of the cutter and clamp bars, hydraulic-operated pistons in said column connected to said bars, a pump for forcing liquid to said pistons, a valve for controlling the passage of such liquid to said pistons, a shaft supported by said column and extended outside thereof, a handle on such extended end, a connection between said shaft and valve, a spring acting on said shaft, and an arm on said shaft designed to be engaged by the connection between one of said pistons and the cutter-bar, whereby the pressure will be diverted by said valve from said pistons, substantially as set forth.

26. In a paper-cutting machine having a hollow supporting-column, cutter and clamp bars, and a pump in said column, of a base within said column having a channel leading from said pump and terminating in a nozzle-like discharge end, a chamber also in said base leading from said discharge end, a valve-casing fitted over the adjoining ends of said channel and chamber and having annular ports, a valve movable in said casing for opening and closing said ports, mechanism for raising and lowering said valve, hydraulic-operated pistons having cylinders into which said chamber opens, and connections between said pistons and said cutter and clamp bars, substantially as set forth.

27. The combination, in a paper-cutting machine having a clamp-bar and a cutter-bar, of hydraulic devices, a hollow column in which such devices are located, connections between said devices and clamp and cutter bars, a pump within said column having an inlet opening into said column, a passage-way lead-

ing from the outlet of said pump to said devices, a valve and its casing interposed between said pump and said devices for directing the flow of the liquid to said devices and also into said column, and means for operating said valve, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN FRANKLIN McNUTT.

Witnesses:
W. H. SMILEY,
MARY McGEE.