(Model.) 3 Sheets—Sheet 1.

E. J. STERLING.

PAPER CUTTING MACHINE.

No. 370,287. Patented Sept. 20, 1887.

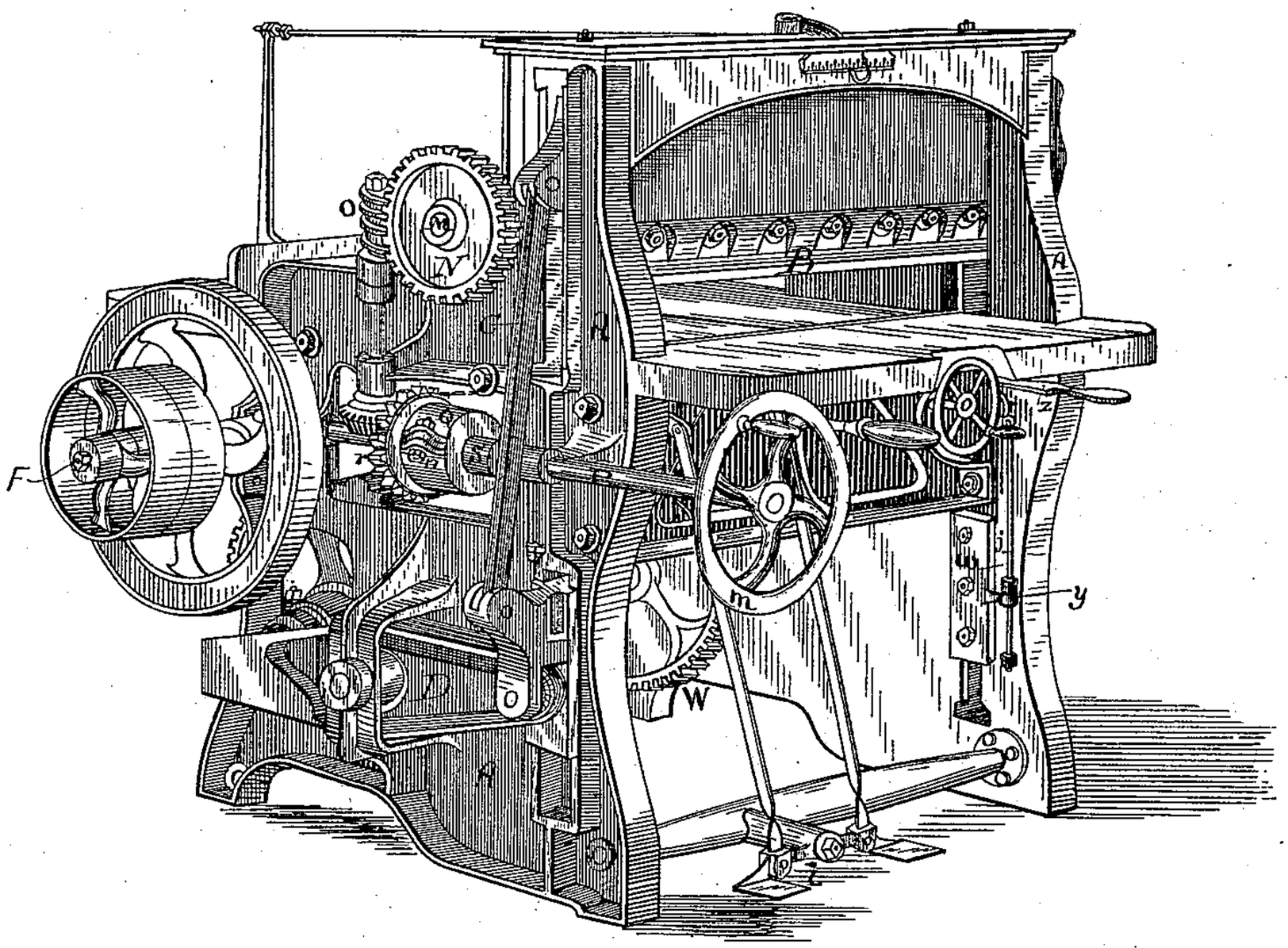

Fig. 1.

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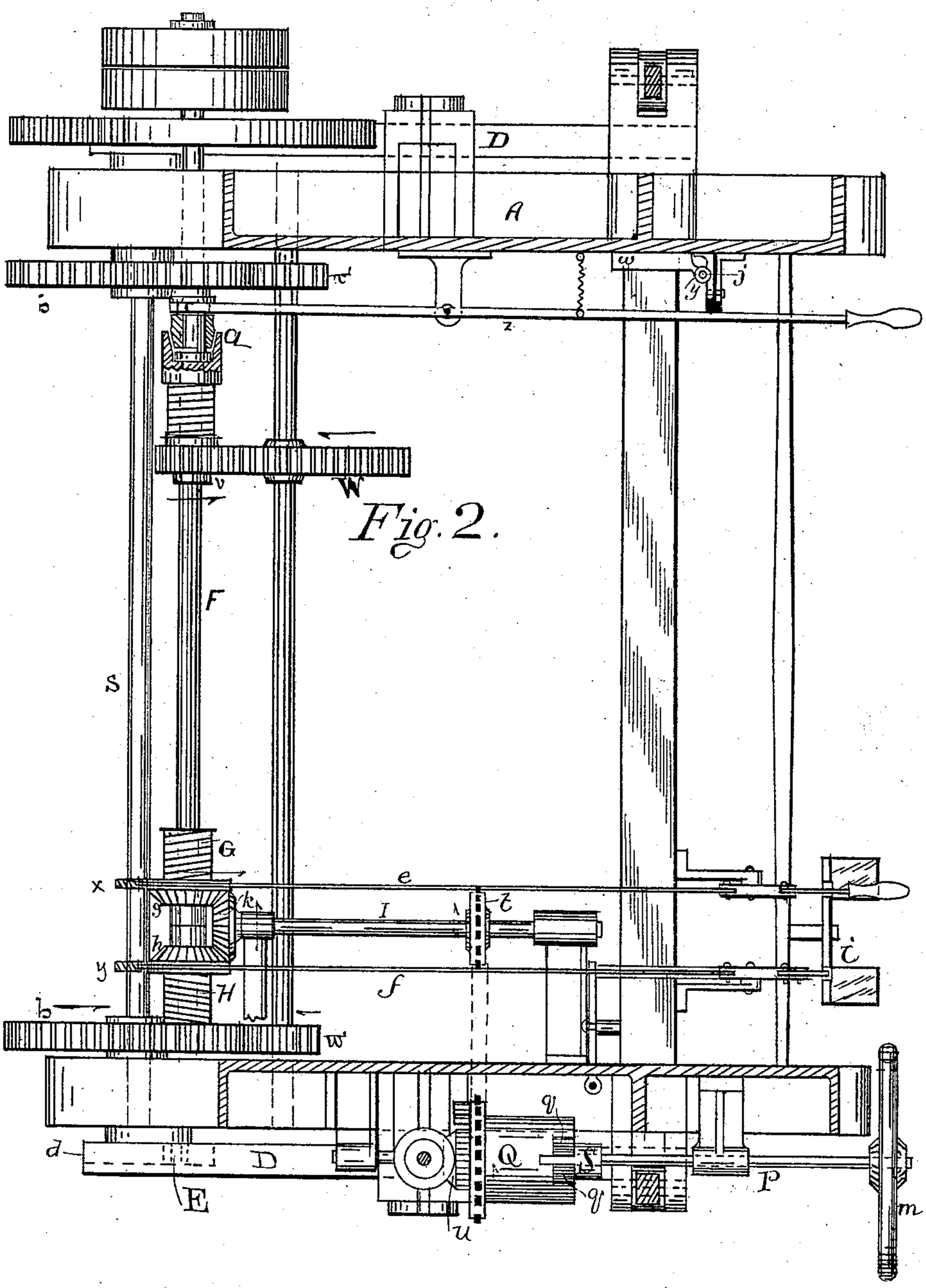

Fig. 2.

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(Model.) 3 Sheets—Sheet 3.

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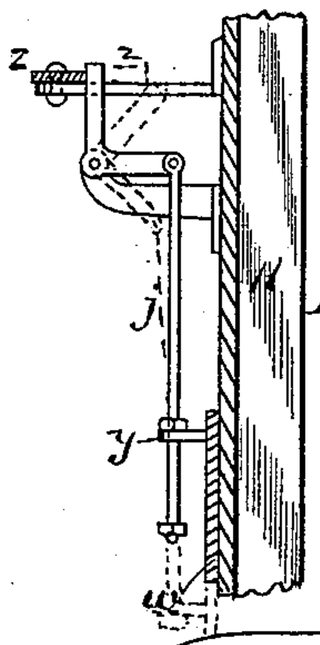

Fig. 4.

Fig 3

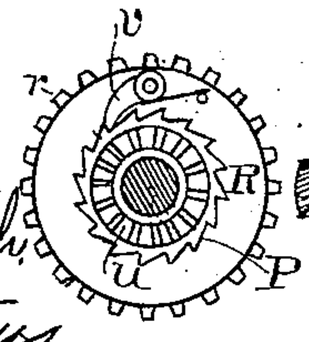

Fig. 5

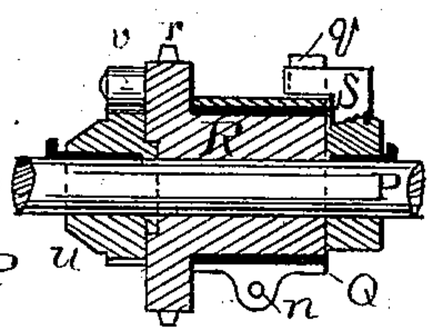

Fig 6

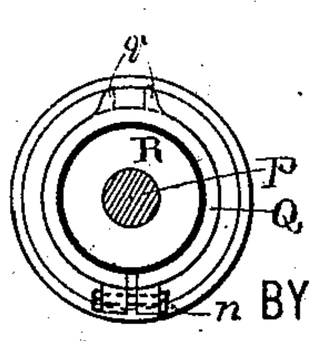

Fig. 7

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UNITED STATES PATENT OFFICE.

EZRA J. STERLING, OF BROOKLYN, NEW YORK.

PAPER-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 370,287, dated September 20, 1887.

Application filed May 8, 1886. Serial No. 201,557. (Model.)

To all whom it may concern:

Be it known that I, EZRA J. STERLING, of Brooklyn, Kings county, in the State of New York, have invented a new and useful Improvement in Paper-Cutting Machines; and I do hereby declare that the following is a full and accurate description of the same.

All paper-cutting machines operated by power heretofore may be arranged in three classes with respect to the clamping mechanism: first, those having a clamp operated by hand preliminary to the action of the knife, and usually by a hand-screw; second, those wherein the clamp constitutes the fulcrum whereon the power rests to actuate the knife; in these machines the pressure of the clamp is proportionate to the resistance encountered by the knife in passing through the paper; third, those wherein the clamp is actuated coincidently with the knife by a cam or similar device irrespective of the resistance encountered by the knife. The first-named clamps the paper independent of the cut, and requires the exercise of considerable manual strength to effect the requisite clamping pressure. The second clamps the paper by power coincidently with the cut. It affords only a constant ratio between the clamping pressure and resistance to the cut, and it is frequently desirable to change that ratio by an increase in the clamping pressure. The third clamps the paper by power coincidently with the cut. It likewise does not afford desirable control. The amount of compression is the same whether the package of paper be thick or thin, or whether it be soft or hard, and, besides, the labor of compression is coincident but independent of the labor of cutting, and therefore both duties are encountered at the same time and a corresponding increase of power is required.

My invention clamps the paper by power under control derived from the motive power for the machine, but previous to the action of the knife, so that the objection to the first-named machines is obviated, because the clamping is independent of the strength of the attendant. The objections to the second and third classes are obviated because the clamping pressure is independent of the cutting pressure, and because the duty of clamping the paper is not coincident with the duty of cutting the same, and therefore an increase of motive power is not required.

My invention therefore essentially consists in combining with the prime mover of the cutting-machine separate and controllable devices for actuating the clamp and for actuating the cutter, so that the clamping is effected by power and irrespective of the strength of the attendant, and the power operations for actuating the clamp and cutter take place at different moments and without requiring an increase in the motive power.

It further consists in the novel mechanical structure of parts whereby the transmission of power from the prime mover to the clamp is effected by means of controllable frictional contacts.

In the accompanying drawings, Figure 1 is a perspective view of my machine. Fig. 2 is a horizontal section below the table. Fig. 3 is an end elevation, partly in section. Figs. 4, 5, 6, and 7 are details.

A is the frame of the machine, usually and preferably constructed of cast-iron.

B is the knife, arranged to move with a downward and endwise movement or draw cut, as usual. The knife B is actuated by means of the connecting-rods C, levers D, and cranks E on shaft S, which are actuated by connection with the constantly-running main shaft F through counter-shaft T and pinions *u*, W, W′, and *b*. The levers D are pivoted to the frame A. The running shaft F is provided with a clutch, *a*, whereby the crank-shaft S and intermediate gearing may be thrown out of connection and allowed to rest at any time. Each lever D is provided with a longitudinal groove or slot, *d*, and the crank E enters and engages in said slot. When the crank revolves in the direction of the curved arrow, it moves from its initial position, as shown in Fig. 3, outward toward the extremity of said lever D, and consequently with an increasing power as the cutting progresses. Also, the crank E depresses the knife during that half of its circuit most distant from the axial center of the lever D, and elevates the knife during the remaining half of its circuit nearest said axial center. Therefore the knife is elevated more rapidly than depressed.

The running shaft F also has upon it two

friction-clutches, G H, individually under control of the clutch-rods *e f* and brakes *x y*, which may be operated by hand or by the tilting treadle or foot-lever *i*. The miter-wheels *g h* are in engagement with the wheel *k* on the shaft I. When the clutches G H are both out of engagement with shaft F, then the shaft I will be at rest; but since the wheels *g h* both revolve in the same direction, but engage the wheel *k* on opposite sides, it follows when one of said clutches is in engagement said shaft I will be caused to revolve in one direction, and when the other of said clutches is in engagement, then the shaft I will revolve in the opposite direction. The clutch-rods *e f* are coupled to the tilting treadle, so that said clutches G H are simultaneously moved in opposite directions as to the wheel *k*, and therefore they cannot be both put in engagement with the shaft I at the same time.

L is the clamp, moving as usual in guides in the frame A. It is provided at its back with cog-racks in mesh with pinions *l* at each end of the shaft M, so that as said shaft is rotated the clamp will be uniformly moved up or down. At one end the shaft M is provided with a worm-wheel, N, which meshes with a worm-screw, O, the shaft whereof is provided with a bevel-pinion in mesh with a similar pinion, *u*, on the shaft P, which is provided with a hand-wheel, *m*. By revolving said hand-wheel the clamp may be moved up or down. The shaft P is also provided with a friction-drum, Q, provided with a clamp-screw, *n*, so that its frictional contact with the hub R may be varied as desired. The drum Q is provided with the two lugs *q q*, to engage an arm, S, which is keyed fast to the shaft P, so that when said drum is revolved the shaft P will be caused to rotate also. The hub R is loose upon the shaft P, and is provided with the sprocket-wheel *r*. A chain passes over said sprocket-wheel and over a similar sprocket-wheel, *t*, on the shaft I. Therefore, whenever said shaft I is caused to revolve, as hereinbefore described, motion will be transmitted to the screw O and clamp by means of said chain and friction-drum Q, and the clamp will thus be operated by power from the constantly-running shaft F, independent, as to time and power, of the mechanism which takes motion from the shaft F to actuate the knife.

The pinion *u* is keyed fast to the shaft, but is provided with ratchet-teeth, as shown in Figs. 5 and 6, to engage with a pawl, *v*, pivoted to the end of the hub R. Therefore the shaft P may be rotated backward by hand independent of hub R. The friction of hub R and drum Q will, however, be always sufficient to cause the rotation of shaft P under ordinary circumstances.

The slide *w* at one end of the frame has upon it a projecting eye, *y*, through which a rod, *j*, passes. Said rod *j* is connected at its upper end with a bell-crank, which is coupled with the clutch-rod *z*. On the upward stroke of the knife B the eye *y* engages the stop-button on the rod *j*, and causes the clutch-rod *z* to be pushed aside and the clutch *a* to be disengaged. The knife then comes to rest.

The direction in which the shaft F will be revolved when the machine is running depends upon the direction of revolution of the main line shaft with respect to the cutting-machine, and it is apparent that the clamp will be caused to descend by engagement of clutch G when shaft F revolves in one direction and by clutch H when said shaft revolves in the opposite direction.

In operation the procedure is as follows: The paper being adjusted on the cutting-table, the proper clutch, G or H, is moved into engagement, and the clamp is thereby caused to descend upon the paper with all the power of the running shaft, or until the resistance is sufficient to overcome the frictional contacts and cause the hub R to slip in the drum. When this has occurred, or the attendant thinks the pressure attained is sufficient, the clutch G or H is disengaged and the clamp is retained in the position attained. The clutch *a* is then moved into engagement, and the knife descends with all the power of the running shaft, or so much thereof as may be required to sever the paper. By these means the clamping and the cutting are independently effected by the same running shaft, and each may employ the entire power of the machine.

Having described my invention, I claim—

1. In a paper-cutting machine provided with a continuously-running shaft and a knife actuated thereby, the combination of a clamp, a friction-clutch, and gearing to transmit motion from said shaft to said clamp independent of the movement of said knife, whereby the clamp and knife may be separately and independently actuated by said shaft, substantially as set forth.

2. In a paper-cutting machine, a running shaft, F, provided with clutches *a* G H, a knife, B, and a clamp, L, combined with mechanism separately controlled by said clutches, whereby the knife and clamp may be independently actuated by said running shaft.

3. The running shaft F, provided with the clutches G H and wheels *g h*, combined with the wheel *k*, shaft I, and friction-connection Q on the shaft P, and its connections with the clamp, whereby the clamp may be actuated by power, substantially as set forth.

4. The combination of the shaft P, the pinion *u* and arm S, keyed fast thereon, the loose drum R, with its sprocket *r*, and the friction-drum Q, substantially as set forth.

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