No. 819,718. PATENTED MAY 8, 1906.

A. BREDENBERG.

PAPER CUTTING MACHINE.

APPLICATION FILED OCT. 8, 1904.

2 SHEETS—SHEET 1.

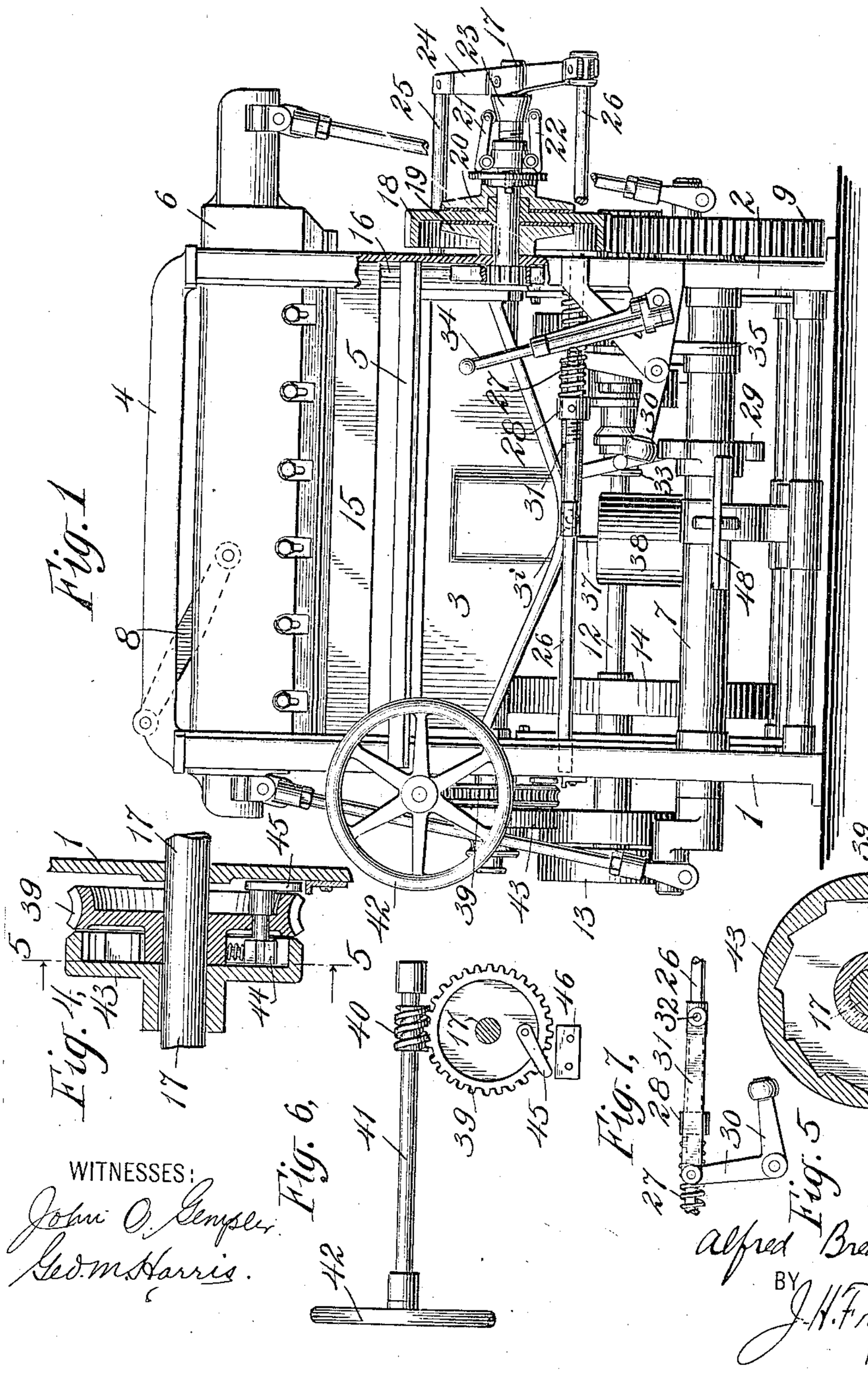

Fig. 1.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

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2 SHEETS—SHEET 2.

Fig. 3,

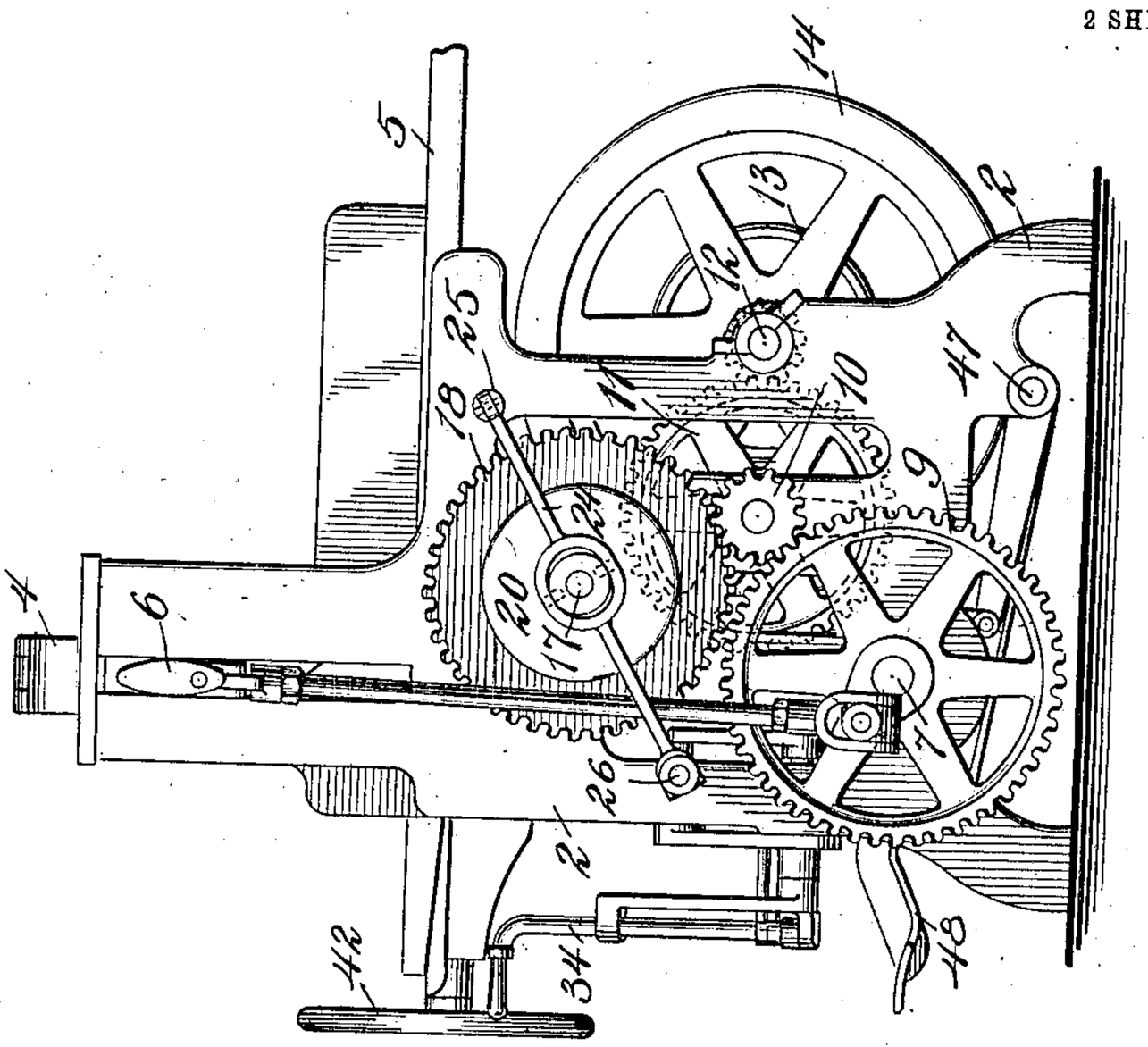
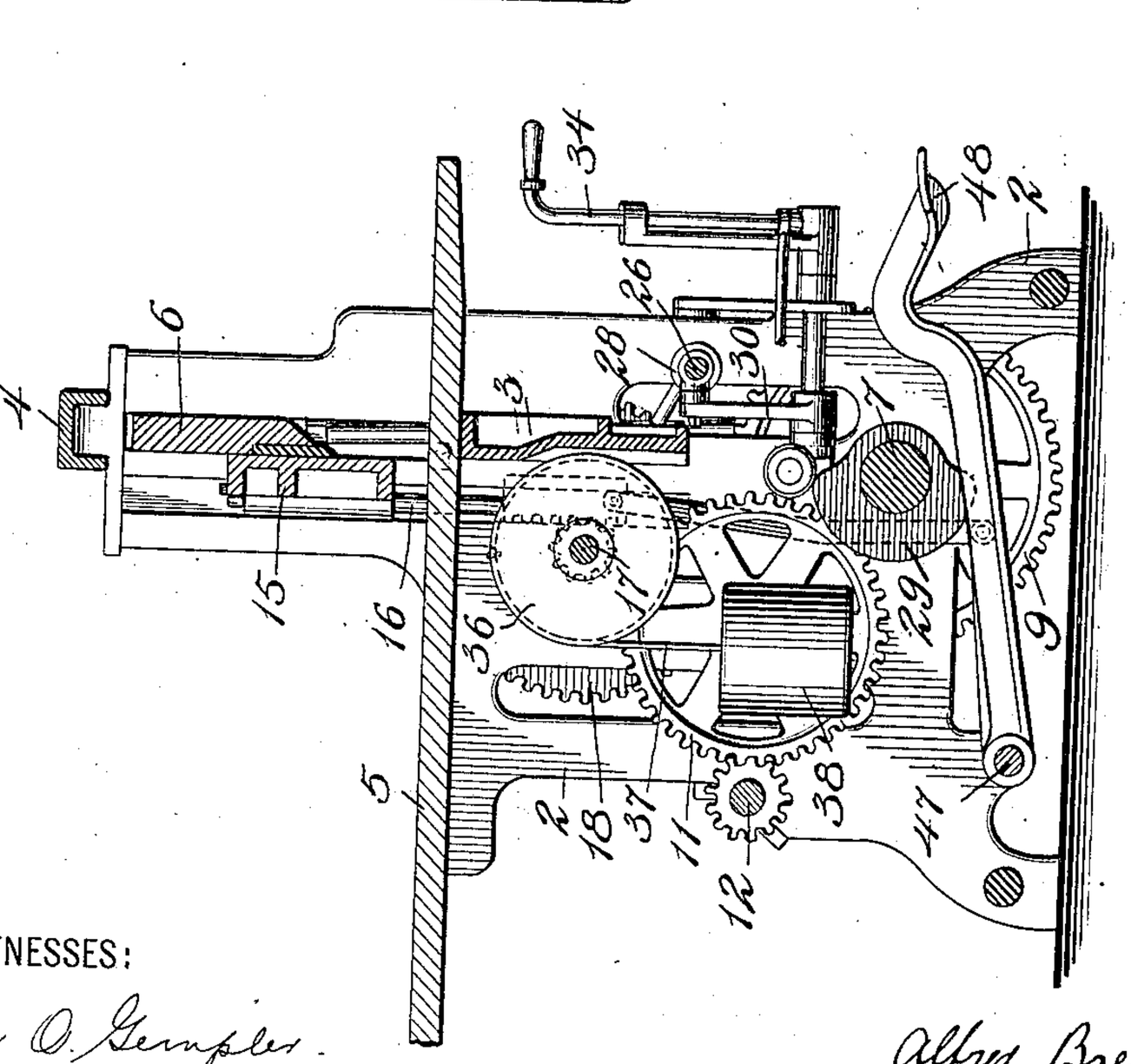


Fig. 2,



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PAPER-CUTTING MACHINE.

No. 819,718. Specification of Letters Patent. Patented May 8, 1906.

Application filed October 8, 1904. Serial No. 227,631.

To all whom it may concern:

Be it known that I, ALFRED BREDENBERG, a citizen of the United States, and a resident of Champlain, Clinton county, New York, have invented certain new and useful Improvements in Paper-Cutting Machines, of which the following is a specification.

My invention relates to paper-cutting machines, and more particularly to the mechanism employed in such machines for clamping and holding the paper during the time that the cutter is operated thereon.

An object of my invention is to provide an automatically-actuated clamp-operating mechanism which may be easily and quickly adjusted to exert different degrees of clamping force to suit different sizes and characters of stock and also to provide an automatically-actuated clamp-operating mechanism which for a given adjustment will always operate to apply the same clamping force.

A further object of my invention is to provide with an automatically-actuated clamp-operating mechanism a manually-operated clamp-actuating mechanism which is normally in operative relation and may be operated either separately or in conjunction with the automatic clamp-actuating mechanism, so that the clamping force exerted by the automatic clamp-actuating mechanism may be increased by the manually-operated clamp-actuating mechanism at the will of the operator and quickly so increased without interrupting the operation of the machine and without special manipulation—as, for example, the actuation of the clutch or other connecting device.

It is also an object of my invention to provide clamp-actuating mechanism which is simple and durable in construction and reliable and effective in operation.

These and other objects of my invention will more fully appear from the following description.

My invention consists in the novel parts, improvements, and combinations herein shown and described.

In the accompanying drawings, which are referred to herein and form a part hereof, is illustrated one embodiment of my invention, the same serving in connection with the description herein to explain the principles of the invention.

Of the drawings, Figure 1 is a front elevation of a paper-cutting machine constructed in accordance with my invention, certain parts of the mechanism being shown in section to illustrate more clearly the construction thereof. Fig. 2 is a vertical central longitudinal section of the machine shown in Fig. 1. Fig. 3 is an end elevation of the same. Fig. 4 is a vertical central section, on an enlarged scale, illustrating a detail of the construction. Fig. 5 is a transverse section of the same, taken on the line 5 5 of Fig. 4 and looking in the direction of the arrows; and Figs. 6 and 7 are side elevations illustrating details.

Referring now in detail to the particular construction illustrated by way of example in the drawings, the same will be seen to consist of a pair of side frames 1 and 2, suitably connected by girders 3 and 4 and by a work-supporting table 5, which parts may be of the ordinary construction. The cutting mechanism may be constructed and operated in any suitable way. As shown, a cutter-bar 6 is arranged to reciprocate in vertical slots in the side frames 1 and 2, the same being reciprocated vertically by means of a link connection with a pair of cranks arranged on the opposite ends of the main shaft 7 and moved in the direction of its length to effect a shear cut by means of a link 8, pivotally connected at one end to the girder 4 and at the other end to the cutter-bar 6. The crank-shaft 7 may be driven in any suitable way. As shown, one of the cranks is formed on a gear-wheel 9, which meshes with a pinion 10, fixed to one end of a short shaft journaled in the side frame 2 and provided at its inner end with a gear-wheel 11, arranged to mesh with a pinion on the driving-shaft 12. The shaft 12 may be driven in any suitable way, as by means of tight and loose pulleys 13, and said shaft is preferably also provided with a heavy fly-wheel 14 to overcome any sudden strains to which the mechanism is subjected and insure evenness of operation.

The clamp by which the paper is firmly held on the table during the cutting operation may be of any suitable construction. As

shown, it consists of a transverse bar 15, arranged to slide in vertical grooves formed on the inner surface of the side frames 1 and 2, so as always to remain in parallel relation with the cutter-bar 6. The means whereby the clamp-bar is connected with the clamp-actuating mechanism may be varied widely in construction and arrangement without departing from the principles of my invention. Preferably and as shown, however, the clamp-bar is provided at or near each end with a depending rod 16, each of said rods being provided at its lower end with a rack, as shown in Fig. 2, which is arranged to mesh with a pinion on a clamp-actuating shaft 17, suitably journaled at its opposite ends in the side frames 1 and 2. So far as some of the features of my invention are concerned the clamp-actuating shaft 17 may be driven from the power-shaft 12 by any suitable mechanism, permitting the shaft to be connected and disconnected intermittently or temporarily at will and permitting a slip or lost motion between the clamp-shaft and the driving-shaft when the clamp-bar shall have been brought down upon the paper to be cut with a suitable force. Preferably, however, and in accordance with one feature of my invention a friction-operated driving mechanism is mounted directly on the shaft 17. In accordance with the construction shown a driving-gear 18 is loosely journaled on the shaft 17, and on the opposite sides of this gear is arranged a pair of disks 19 and 20, the former being rigidly fixed on the shaft 17 and the latter being splined thereon, so as to rotate therewith, but capable of slight longitudinal movement thereon. Preferably and as shown these disks are constructed to make frictional contact with the opposite sides of the web of the driving-gear 18, suitable friction material being arranged between the metallic surfaces to provide a more effective and uniform frictional engagement thereof. thereof.

So far as some of the features of my invention are concerned any suitable driving connection may be provided between the gear 18 and the driving-shaft 12. Preferably, however, and as shown the gear 18 is arranged to mesh directly with the pinion 10, by which the crank driving-gear 9 is actuated. So far as some of the features of my invention are concerned, moreover, any suitable means may be provided for actuating the sliding friction-disk 20 so as to effect a frictional driving connection between the gear 18 and the shaft whenever it is desired to operate the paper-clamp by power. In accordance with one feature of my invention, however, the frictional connection between the driving mechanism and the shaft 17 is effected by connections including a spring which serves to apply a predetermined amount of force to said frictional connections, and preferably said connections include also means whereby the force of the spring may be readily adjusted to vary the amount of force with which the said frictional engagement is effected. In accordance with the particular construction illustrated in the drawings the friction-disk 20 is forced into engagement with the gear 18, so as to clamp the web of the latter between the disks 19 and 20 by means of a pair of oppositely-arranged cam-levers 21 and 22, carried by a collar fixed on the shaft 17, preferably by means permitting longitudinal adjustment of the levers along the shaft, so as to make provision for the taking up of any wear that may occur between the gear and the friction-disks. In accordance with the construction shown also the cam-levers 21 and 22 are actuated by means of a cone-shaped collar 23, arranged to slide longitudinally on the shaft 17 and having operative connection with a lever 24, fixed at one end to a stud 25, projecting from the side frame 2, and connected at its opposite end to a rod 26, mounted to slide longitudinally in the side frames 1 and 2. In accordance with the construction shown also the rod 26 is moved in the direction required to move the disk 20 into frictional engagement with the gear 18 by means of a compression-spring 27, surrounding the rod 26 and confined between the side frame 2 and a collar 28 on the rod 26. For the purpose of varying readily the compression of the spring 27, and thereby varying the force with which the friction-disk 20 is brought into contact with the gear 18, the collar 28 is threaded onto the rod 26 and is provided, when desired, with means to facilitate its being turned on the rod, such as a series of pin-holes adapted to receive a pin-wrench.

Any suitable means may be provided to move the rod 26 outwardly against the force of the spring 27, so as to release the frictional connection between the clamp-actuating shaft 17 and its driving-gear 18. In accordance with the preferred construction and as shown the crank-shaft 7 is provided with a cam 29, arranged to make contact with one end of a bell-crank lever 30, pivotally mounted on a suitable bracket fixed to the side frame 2. The opposite arm of the lever 30 is connected by a link 31 (clearly shown in Fig. 7) with a pivot-block 32, fixed on the rod 26. As is usual in power-driven cutting-machines, a clutch mechanism is provided between the driving-shaft 12 and the gearing by which the cutter-bar is driven, as indicated at 33 in Fig. 1, and, as usual, also this clutch mechanism is operated to connect the gearing with the power-shaft by a handle 34 and is automatically disconnected by a suitable trip device 35, mounted on the cutter-operating crank-shaft 7 in such position as to stop the machine when the cutter-bar is at the upward limit of its stroke. The cam 29, which

controls the clamp-actuating mechanism, is so adjusted on the shaft 7 that when the latter is at rest the driving-gear 18 is disconnected from the clamp-actuating shaft 17; but as soon as the shaft 7 starts to rotate the lever 30 is released, thus allowing the spring 27 to effect the frictional connection between the gear 18 and the clamp-actuating shaft. It follows from this construction that the clamp-bar will begin to move downwardly at substantially the same time as the cutter-bar begins to move downwardly; but it is to be noted that the clamp-bar will start down more rapidly than the cutter-bar for the reason that the clamp is moved at full speed by the driving-gear, whereas the cutter-bar is moved at the gradually-accelerating speed resulting from the curved paths of the cutter-actuating cranks. The clamp-bar will continue to move down until it meets the pile of paper and compresses the same with such force as to cause the gear 18 to slip between the friction-disks 19 and 20, and as the gear 18 continues to rotate the clamping force will be maintained until the cutter-bar completes its downward movement. The form of the cam 29 is such that at this instant the lever 30 will be operated to release the frictional connection between the gear 18 and the clamp-actuating shaft 17. Any suitable means may be provided for returning the clamp to its normal inoperative position. As shown, the shaft 17 is provided near the center of the machine with a drum 36, which is connected by a flexible strap 37 with a weight 38.

It has been found that stock of certain classes requires a greater clamping force than can readily be applied by a friction-operated clamp-actuating mechanism or that can be applied by a power-driven clamp without putting an undue strain upon the driving mechanism or otherwise interfering with the proper or efficient operation of the machine. In accordance with one feature of my invention, therefore, I have provided in the machine means whereby the clamping force applied by the automatically-operated or power-driven clamp-actuating mechanism may be effectively augmented or increased manually and at the will of the operator. The mechanism whereby this is accomplished may be varied widely in construction and arrangement without departing from the main principles of this feature of the invention. In accordance with the preferred construction, however, the manually-operated clamp-actuating mechanism is so constructed that it may be used either in conjunction with the automatically-operated clamp-actuating mechanism or separately, and preferably also the manually-operated clamp-actuating mechanism is so constructed that no special manipulation of the mechanism—such for example, as the operation of a clutch—is required to bring the said mechanism into operation. In accordance with the particular embodiment of this feature of the invention illustrated a worm-wheel 39 is loosely mounted in the clamp-actuating shaft 17 and preferably at the opposite end from that on which the driving-gear and friction-disks are located. For the purpose of driving the worm-gear 39 a worm 40 is employed, the same being fixed on a shaft 41, suitably journaled in bearings fixed on the side frame 1 and provided with a hand-wheel 42. As shown, a wheel 43, having internal ratchet-teeth, is fixed on the shaft 17 adjacent to the worm-wheel 39, and the worm-wheel is provided with a spring-held pawl 44, which is so located as to cause the wheel 43 and the shaft 17 to turn with the worm 39 when the latter is moved in a direction to move the clamp 15 downwardly. By reason of this construction it will be seen that the clamp-bar is free to be moved downwardly at any time by means of the automatically-operated clamp-actuating mechanism, and that by simply turning the hand-wheel 42 in the proper direction the shaft 17 may be driven with great force in the same direction as it is driven by the automatically-operated mechanism, and that the force of the manually-actuated worm-gear may be thus added to that of the automatically-operated mechanism almost instantly or as soon as the pawl 44 may be brought into engagement with one of the ratchet-teeth of the wheel 43.

In order that the manually-operated clamp-actuating mechanism may not interfere with the automatic return of the clamp-bar after the cutting operation is complete, means are preferably provided for effecting a normal disengagement between the hand-operated clamp-actuating mechanism and the clamp. This may be effected in various ways. In accordance with the construction shown means are provided for holding the pawl 44 normally out of engagement with the teeth of the wheel 43. This is accomplished by connecting the pawl 44 with an arm 45, arranged to project in an outward direction at the side of the wheel 39, and a stop 46 is fixed on the side frame 1 in the path of said arm 45. It follows from this construction that when the worm-wheel 39 is brought to a certain position the wheel 43 and shaft 17 will be free to turn in either direction independently of the worm-wheel. The same act of turning the hand-wheel 42, however, in a direction to move the clamp 15 downward will serve to effect immediately a connection between the worm-wheel 39 and the clamp. It will be seen, moreover, that to release the clamp from the manually-operated mechanism it will be only necessary to turn the hand-wheel 42 back the short distance through which it was turned forward or in a direction to increase the clamping

force. It is obvious that the manually-operated clamp-actuating mechanism may be used independently of the automatically-operated mechanism whenever desired and that this may be done without special manipulation of any part of the machine other than the mere actuation of the said mechanism itself. There is no time lost in connecting and disconnecting the manually-operated mechanism, and there is no danger of breaking or disarranging the parts by reason of neglect on the part of the operator in not disconnecting, as there might be if he were required to connect or disconnect such mechanism.

For the purpose of quickly bringing the clamp-bar down into contact with the surface of the paper to aid in properly locating the latter under the cutter means may be provided, as is usual in this class of machines, whereby the clamp may be actuated by a foot-lever. In the particular machine shown in the drawings the lower ends of the rod 16 are connected, by means of suitable links and arms, to a rock-shaft 47, having a centrally-arranged foot-lever 48 projecting therefrom to a convenient point near the front of the machine. It is to be noted that this mechanism is provided to effect a quick movement of the clamp and a movement, therefore, which is necessarily accompanied by a little force and not sufficient force to increase the effective clamping force materially, except possibly under extreme conditions, where little clamping force is required, under which conditions the clamping force produced by the automatically-operated mechanism will be ample and will not require augmentation. It is to be understood, therefore, that such clamp-actuating mechanism as that exemplified by the treadle 48 and connections described is not included in the expression "manually-operated clamp-actuating mechanism" as herein used.

The operation of the machine having been fully set forth in connection with the description of the construction thereof will require no further description.

My invention in its broader aspects is not limited to the particular construction shown in the drawings and herein described, as many changes may be made in the details thereof without departing from the main principles of the invention and without sacrificing its chief advantages.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a paper-cutting machine, the combination of a clamp, connections including a shaft for operating said clamp, a driving-wheel loosely journaled on said shaft and forming one member of a friction driving connection, means forming another member of said friction driving connection confined to rotate with said shaft, a spring for forcing said friction driving connections into operative engagement, and means for disengaging said friction driving connections.

2. In a paper-cutting machine, the combination of a clamp, means including a shaft for operating said clamp, a driving-wheel loosely journaled on said shaft, a friction driving connection between said wheel and said shaft, a spring for forcing said friction driving connections into operative engagement, means whereby the force of said spring may be readily varied, and means for disengaging said driving connections.

3. In a paper-cutting machine, the combination of a clamp, means including a shaft for operating said clamp, a driving-wheel loosely journaled on said shaft, a friction driving connection between said wheel and said shaft, a spring for forcing said friction driving connections into operative engagement, means whereby the force of said spring may be readily varied, means for disengaging said driving connections, and means independent of said gear and friction driving connections for returning the clamp.

4. In a paper-cutting machine, the combination of a clamp, rack-bars carried by said clamp, a shaft having pinions meshing with said rack-bars, a gear loosely journaled on said shaft, a friction driving connection between said gear and said shaft, a spring for forcing said friction driving connection into operative engagement, and means for automatically controlling the action of said spring.

5. In a paper-cutting machine, the combination of a clamp, means including a shaft for operating said clamp, a driving-wheel loosely journaled on said shaft, friction driving connections between said wheel and said shaft, a plurality of oppositely-arranged levers adjustably mounted on said shaft for actuating said friction driving connections, a spring for actuating said levers, and means for automatically controlling the action of said spring.

6. In a paper-cutting machine, the combination of a clamp, means including a shaft for operating said clamp, a driving-wheel loosely journaled on said shaft, friction driving connections between said wheel and said shaft, a plurality of oppositely-arranged levers adjustably mounted on said shaft for actuating said friction driving connections, a spring for actuating said levers, means for automatically controlling the action of said spring, and means independent of said driving-wheel and friction driving connections for returning the clamp.

7. In a paper-cutting machine, the combination of a clamp, a pair of racks connected with the opposite ends of said clamp, a shaft having pinions meshing with said racks, a gear loosely journaled on said shaft, a pair of

disks adapted to engage the opposite sides of said gear to form a friction driving connection between said gear and the shaft, a plurality of oppositely-arranged levers adjustably mounted on said shaft for operating said friction-disks, and means for operating said levers.

8. In a paper-cutting machine, the combination of a clamp, a pair of racks connected with the opposite ends of said clamp, a shaft having pinions meshing with said racks, a gear loosely journaled on said shaft, a pair of disks adapted to engage the opposite sides of said gear to form a friction driving connection between said gear and the shaft, a plurality of oppositely-arranged levers adjustably mounted on said shaft for operating said friction-disks, automatically-controlled means for operating said levers, and means independent of said gear and friction driving connections for returning the clamp.

9. In a paper-cutting machine, the combination of a clamp, a plurality of clamp-actuating devices adapted to apply effective clamping force, and means whereby two of said devices may be operated independently of each other or both of them operated together.

10. In a paper-cutting machine, the combination of automatically-operated clamp-actuating devices, manually-operated clamp-actuating devices operative independently of said automatically-operated clamp-actuating devices and adapted to apply effective clamping force, and means whereby the manually-operated clamp-actuating devices may be operated in conjunction with the power-operated clamp-actuating devices.

11. In a paper-cutting machine, the combination of automatically-operated clamp-actuating devices, manually-operated clamp-actuating devices operative independently of said automatically-operated clamp-actuating devices and adapted to apply effective clamping force, and means whereby the manually-operated clamp-actuating devices may be operated either singly or in conjunction with the automatically-operated clamp-actuating devices.

12. In a paper-cutting machine, the combination of a clamp, automatically-operated clamp-actuating devices, manually-operated clamp-actuating devices adapted to apply effective clamping force, and means whereby either of said clamp-actuating devices may be operated either singly or in conjunction with the other clamp-actuating device.

13. In a paper-cutting machine, the combination of automatically-operated clamp-actuating devices, manually-operated clamp-actuating devices operative independently of said automatically-operated clamp-actuating devices and including a worm and worm-wheel and connections between the worm-wheel and the clamp whereby the clamp is permitted to move in its clamping direction without the wheel being moved but is confined to move with the wheel when the latter is moved in one direction.

14. In a paper-cutting machine, the combination of a clamp, automatically-operated clamp-actuating devices for bringing the clamp into operation, means independent of said actuating devices for returning the clamp, manually-operated clamp-actuating devices, and means whereby the manually-operated clamp-actuating devices may be operated in conjunction with the said automatic clamp-actuating devices, said means being constructed so as not to interfere with the return movement of the clamp when the manually-operated clamp-actuating devices are not operated.

15. In a paper-cutting machine, the combination of a clamp, means including a shaft for operating said clamp, automatically-operated clamp-actuating devices connected with said shaft, manually-operated clamp-actuating devices operative independently of said automatically-operating clamp-actuating devices, said manually-operated clamp-actuating devices including a worm-wheel loosely mounted on said shaft, a hand-wheel and worm for driving said worm-wheel, and connections between said worm-wheel and said shaft, permitting free movement of the shaft in one direction independent of said worm-wheel but preventing movement of the shaft in the opposite direction with relation to the worm-wheel.

16. In a paper-cutting machine, the combination of a clamp, means including a shaft for operating said clamp, automatically-operated clamp-actuating devices connected with said shaft, manually-operated clamp-actuating devices operative independently of said automatically-operating clamp-actuating devices, said manually-operated clamp-actuating devices including a worm-wheel loosely mounted on said shaft, a hand-wheel and worm for driving said worm-wheel, and connections between said worm-wheel and said shaft, permitting free movement of the shaft in one direction independent of said worm-wheel but preventing movement of the shaft in the opposite direction with relation to the worm-wheel, and means whereby the shaft is permitted to turn freely in either direction with relation to the worm-wheel in one position of the latter.

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

ALFRED BREDENBERG.

Witnesses:
JAS. WERIN, Jr.,
GEO. H. CLARK.