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C. SEYBOLD.

PAPER CUTTING MACHINE.

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NO MODEL.

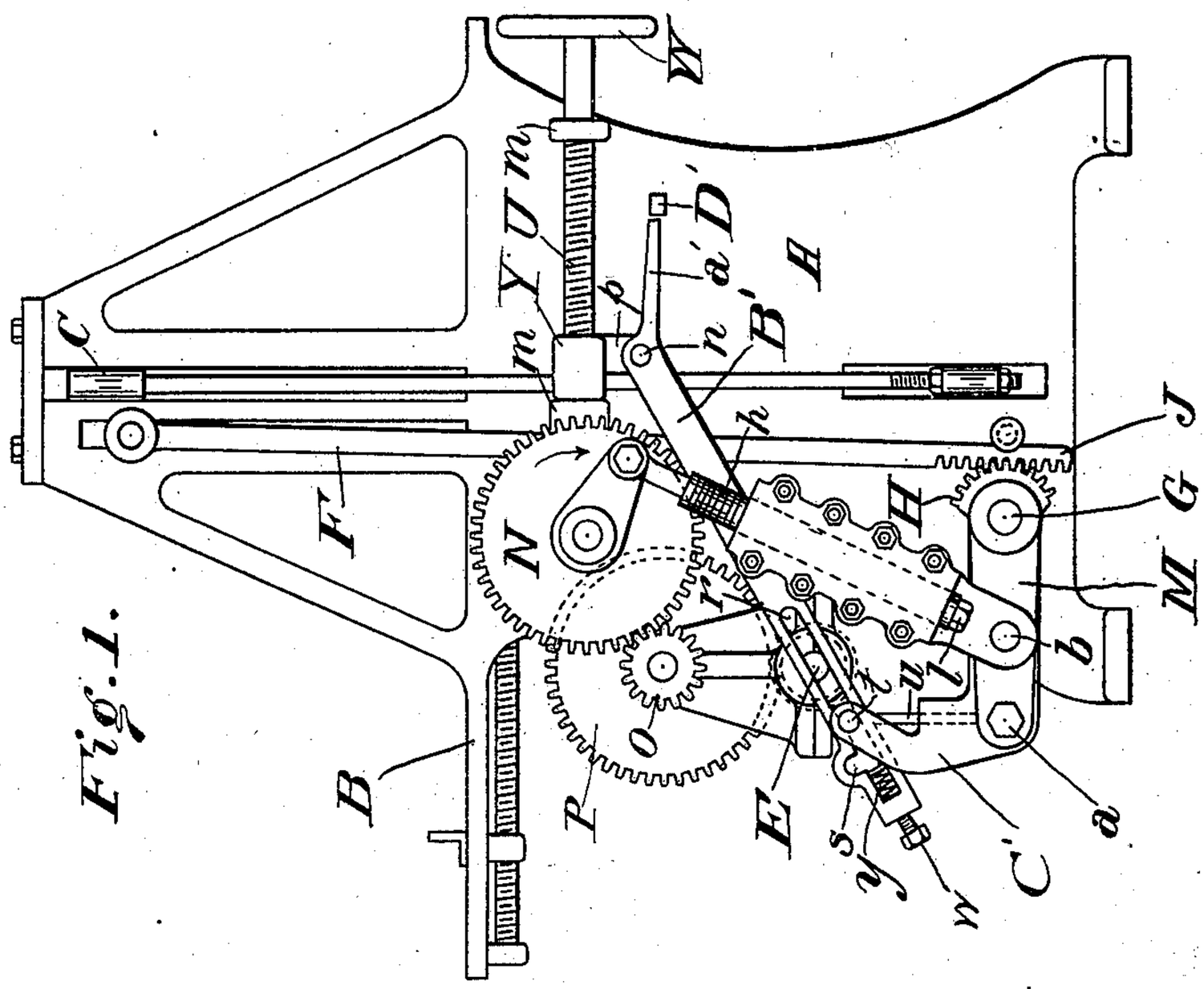


Fig. 1.

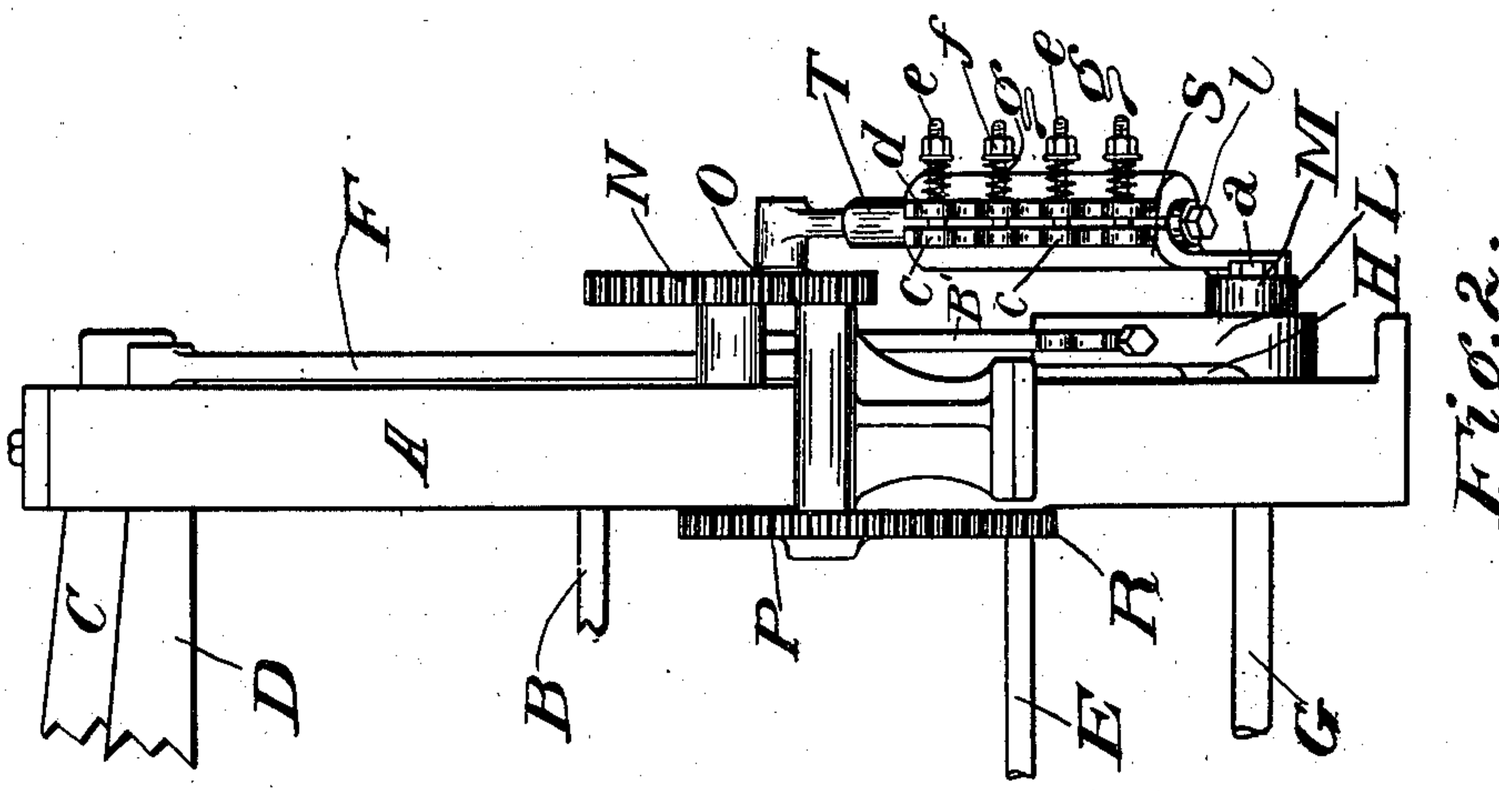


Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## PAPER-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 724,130, dated March 31, 1903.

Application filed March 19, 1902. Renewed February 27, 1903. Serial No. 145,447. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES SEYBOLD, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Paper-Cutting Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to improvements in the construction of paper-cutting machines whereby the effective capacity of the machine may be very largely increased.

The first part of my improvements relates to a certain novel and useful friction-clutch applicable for coupling together rotating shafts, pulleys, and the like generally, but more particularly designed for automatic paper-cutting machines where it is desired to frictionally connect the clamp-operating mechanism with the main driving power of the machine.

In machines of the automatic paper-cutting class it has long been customary to connect by a frictional clutch the main power for driving the knife with the clamp in order that the clamp may be brought into play to hold the paper rigid under the stroke of the knife and so as to permit the knife to continue its work while the clamp retains its full pressure on the paper within the limits of the frictional connection. Two difficulties have been particularly met with, however, in the use of the ordinary friction-clutch. In the first place the strength of the clutch depends, of course, on the frictional surface exposed and with the ordinary expansion-band clutch the surface is limited to the area of the periphery of the band. To make this surface sufficiently large to obtain readily the frictional grasp required would necessitate a band of entirely too great a diameter and width to be practicable. In the second place in machines of the character of paper-cutting machines where the power drives both the cutting-knife and the clamp while the clamp is in use the force expended in holding the clamp in operation is constant—that is to say, as long as the clamp is frictionally connected with the knife and from the moment of frictional connection as soon as the clamp begins its work the power of the machine consumed in operating the clamp is constant. As long as the frictional clutch holds the clamp has the same connection with the power-driving mechanism as the knife. Now in paper-cutting machines and the like the desideratum is that the clamp shall take hold of the paper with a crushing or smashing pressure at the start, so that the knife in beginning to cut shall act upon a substantial, solid, and rigid pile. After the knife begins its work, however, it is not so essential that the same rigidity of pile should be maintained. As the knife passes through the paper there is no objection to a decreasing clamp-pressure, and, in fact, it is desirable with a given power capacity that the power should be increasingly utilized in driving the knife and decreasingly employed in holding the clamp to its work. In other words, we wish to obtain maximum clamping power to the full limit of the machine at the start and minimum cutting power, the cutting power increasing and the clamp power decreasing as the knife passes through the pile of paper to be cut.

It is the purpose, therefore, of my invention in this particular to provide such a friction-clutch, and the device in its essential consists in a compressible cylinder as one member of the clutch and a piston-rod or plunger working in the cylinder as the other member. The area of the cylindrical surface gives the frictional capacity, and as the plunger is drawn out from the cylinder the amount of frictional surface under control of the clutch is gradually decreased.

The second feature of my invention relates to the hand-clamp to be used in connection with my improved clutch mechanism, whereby the hand-clamp may be thrown into operation in a moment's notice without in any way disconnecting the friction-clutch. Heretofore, so far as I know, to use a hand-clamp in connection with an automatic paper-cutter it has been necessary to disconnect the friction-clutch—a matter of considerable disadvantage, as the friction-clutch when again to be used must be again set and adjusted. With my improvements, however, when the friction-clutch has once been adjusted it

is not affected or changed by the bringing into use the mechanism for adjusting the clamp by.

There are other improvements in the details of construction which will be hereinafter more particularly pointed out.

In the drawings, Figure 1 is a side elevation of a paper-cutting machine with my improvements. Fig. 2 is a rear elevation of one side of the machine.

In illustrating the novel features of my present invention I have only shown one side of the machine sufficient to make clear my improvements, which relate, as above set forth, more particularly to the friction-clutch and hand-clamp mechanism.

My improvements are illustrated and applied to that class of paper-cutting machines which is fully shown and described in my prior patent, No. 511,972, of June 2, 1894, and I have not considered it necessary to illustrate or describe the details of such a paper-cutting machine other than to say that A is one of the end standards of the machine, B the table, C the knife-carrier frame, and D the clamp. The knife-carrier and its knife are driven in any well-known way, preferably by driving-shaft E and gearing such as is shown in my aforesaid patent. The clamp D is connected by the pulling-bars F, one on each side, with its driving mechanism.

G is a clamp-driving shaft carrying the segment-gear H, which meshes with the rack J on the lower end of the pulling-bars, so that the rotation or oscillation of the clamp-driving shaft will, through the medium of the segment-gear and rack, actuate the pulling-bars F to raise and lower the clamp as required.

L is a crank integral with the segment-gear H, which is keyed to the clamp-shaft G, and M is a second crank mounted loosely on the clamp-shaft outside of the segment-gear and coupled to the crank L by the pin *t*. The cranks on the clamp-shaft are connected with the gear N by the friction-clutch device, which will be hereinafter fully described in detail; but as a whole this friction-clutch device acts as a connecting-rod or pitman connection between the gear N and the cranks on the clamp-shaft. The gear N meshes with the pinion O, whose shaft is journaled in suitable bearings on the frame and carries at its inner end, just within the side standard, the gear P, which in turn meshes with the pinion R, mounted on the driving-shaft E of the machine. The size and number of teeth in the several pinions and gear-wheels connecting the driving-shaft of the machine with the friction-clutch are so arranged that a complete stroke of the clamp shall be obtained for each complete throw of the knife and so that the movement of the clamp shall be slightly ahead of the knife movement, as it is of course essential that the clamp should reach and compress the paper before the knife begins its work.

The pitman connection between the gear N and the cranks on the crank-shaft is made up of two members to form the friction-clutch between these parts. S is the cylindrical portion, which is divided into two parts and pivoted by the pin *b* to the crank M, and T is the plunger portion, which works inside of the divided cylinder. The two plates of the divided cylinder are provided with ears *c d*, and by means of bolts *e* and nuts *f* the divided cylinder is clamped around the plunger T. Coiled springs *g* are mounted on the bolts *e* between the nuts *f* and the plate, and by tightening these nuts any desired pressure can be brought to bear upon the plunger T, it being of course understood that the diameter of the plunger is somewhat larger than the diameter of the cylindrical portion, so that the outer cylindrical plate is never clamped tight against the inner plate. To obtain a proper frictional contact in the divided cylinder and the plunger, I form the surface of the plunger of hard-leather washers *h*, driven on the rod and held tightly pressed together by the nut *l* at the lower end of the plunger. Any suitable material can be used for covering the plunger; but I have found that leather washers tightly pressed together produce very good results. The parts are so arranged that when the cranks L N are at the bottom of their stroke the plunger T will be entirely inside the cylinder S.

It will be evident that when the divided cylindrical plate has been properly adjusted to exert the necessary pressure on the plunger T as the gear N is rotated by the driving-shaft E and connecting-gearing the cranks on the clamp-shaft will be oscillated to lower the clamp to the pile of paper to be cut. As soon as the clamp reaches the paper the paper will be pressed by the clamp under the further rotation of the gear N within the limit of the frictional grasp between the divided cylindrical plates and the plunger, and also it will be evident that the maximum clutch will be had when the clamp first reaches the paper. When the limit of the frictional clutch is reached, the further rotation of the gear N will begin to draw the plunger from out the cylindrical plates, and consequently the amount of clutch surface will be gradually reduced, so that the power required to rotate the gear N will be decreased gradually after the maximum tension of the clamp has been obtained, so that the power of the machine exerted through the driving-shaft E may be directed more and more to the cutting mechanism.

The arrangement which I have described of two cranks for the clamp-shaft L M is provided for the purpose of utilizing the hand-clamp mechanism to be now described, and it will be understood that when the hand-clamp arrangement is not employed the friction-clutch-connecting mechanism is applied directly between the gear N and the segment gear-crank L.

Mounted in suitable journal-boxes *m m*, secured to the side standard A at a convenient height, is the screw U, operated by the hand-wheel W. Mounted on this screw U is a screw-threaded follower Y, so that the turning of the screw by the hand-wheel will cause the follower Y to travel back and forth between the journal-boxes. Pivoted at *n* to the depending lug of this follower is the lever-bar B′. A slot *r* is provided in the outer end of this bar B′, by means of which the bar is coupled to the upright arm C′, integrally connected with the crank L.

*s* is a notch near the outer end of the slot *r* of the bar B′. The pin *t*, which connects the head C′ with the bar B′, is normally, when the machine is intended to work automatically, held out of the notch *s* as the pin traverses the slot under the movement of the cranks by the pin *u*, which extends between the under surface of the bar B′ and the tapered end of the pin *t*. Under these circumstances when the clamp is being operated automatically the arm C′ can move freely back and forth in the slot *r*. When it is desired to make use of the hand-clamp, the pin *t* is simply removed. This allows the pin *u* to drop down, so that the pin *t* can engage within the notch *s* of the lever-bar B′, and the bar will then be connected with the crank L and segment-gear H, so that the segment-gear can be operated by turning the hand-wheel. At the same time the removal of the pin *t* has disconnected the loose crank M from the fixed crank L, and the friction-clutch connection will merely oscillate the loose crank M and have no effect on the crank-shaft. In this way by merely removing the pin *t* without disturbing in any way the adjustment of the friction-clutch I am able to put in use the hand-clamp mechanism.

The outer end of the slot *r* is provided with a coiled spring *y*, adjusted by set-screw *w*, to serve as a stop for the arm C′ of the crank L. This stop for the crank L, which carries the arm or head C′, with the pin *t* engaging in the slot *r*, is provided in order to serve as a stop for the clamp D, and the stop is so adjusted by the set-screw *w* that the pin *t* will contact with the resilient stop just before the clamp reaches the top of its stroke. As the crank L is oscillated downward the pulling-bars will be raised to raise the clamp and the pin *t* will contact with the stop *y* to serve as a cushion as the clamp reaches the top of its stroke. Such a stop is necessary, because it will be evident that the divided pitman will be drawn out under the rotation of the gear N when the clamp has reached and clamped the paper, and it will be necessary to have some stop for the clamp at the top of its stroke in order to enable the plunger of the pitman to close into the cylinder before beginning a new cut.

In order that the hand-clamp may not be tampered with when the machine is operating automatically and the follower Y carried to the wrong end of the screw, and thus render inoperative the automatic working of the clamp mechanism, I secure the block D′ to the standard at a convenient distance underneath the screw U and extend the lever-bar B′ by an arm *a′*, which when the lever-bar is held up by the pin *u* will prevent the follower Y from being drawn to the front of the machine, but when the pin *u* is dropped down by removing the bolt *a* and the pin *t* enters the notch *s* the arm *a′* will just clear the block B′, and thus permit the hand-clamp to operate.

In describing my friction-clutch device I have shown the clamping-plates as cylindrical and the plunger as circular in cross-section; but as the parts do not rotate on each other any desired shape in cross-section may be employed, as will be readily understood.

The operation of the machine is as follows: As has already been stated, the parts are so arranged that when the cranks L M are at the bottom of their stroke the plunger T will be entirely inside the cylinder S. In this position the clamp and cutting-knife will be at the top of their strokes. The rotation of the gear N in the direction of the arrow (shown in Fig. 1) will oscillate the crank L and segment-gear H to draw down the pulling-bars F until the clamp comes in contact with the paper, when the power of the machine will be exerted on the clamp to the limit of the frictional grasp between the plunger and cylinder of the pitman. At this limit the further rotation of the gear N will draw out the plunger of the pitman from the cylinder. The mechanism for oscillating the knife is so arranged that the knife-stroke will follow immediately the stroke of the clamp, and the parts are also so arranged that the knife shall complete its stroke before the gear N has made a half-rotation, so that the clamp continues to impress the paper, but with decreasing force. As soon as the gear N has made a half-rotation, with the pitman connecting the gear N and crank L drawn out, the further rotation of the gear N will oscillate the crank L downward and raise the pulling-bars and clamp. The pin *t* will during this movement ride down in the slot *r* until it comes in contact with the yielding stop *y*. The clamp will then be at the top of its stroke and these parts will continue in that position, while the completion of the rotation of the gear N will push the plunger T of the pitman into its cylinder, and the pitman will be contracted to its normal position, with the plunger T entirely inside the cylinder S, for the beginning of the next operation.

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

1. In a paper-cutter, for connecting the clamp and driving mechanism, a pitman made in two parts, with a frictional connection therefor, substantially as described.

2. In a paper-cutter, a pitman made in two parts for connecting the clamp and driving

mechanism, with means for frictionally connecting the two parts, substantially as described.

3. In a paper-cutter, a plunger coupled to one member to be connected, and a divided casing coupled to the other member, with means for clamping the casing around the plunger to provide a clutch between the two, substantially as described.

4. In a paper-cutter, a plunger coupled to one member to be connected, and a divided casing coupled to the other member, with means for yieldingly clamping the casing around the plunger, to provide a clutch between the two, substantially as described.

5. In a paper-cutter, a rotating and an oscillating shaft with cranks for same, and connecting mechanism consisting of a plunger and a divided casing coupled each to one of the cranks, with means for yieldingly clamping the casing around the plunger, to provide a frictional-clutch connection, substantially as described.

6. In a paper-cutter, a main driving-shaft, a clamp-shaft, with means for connecting same to the clamp, train of gearing in connection with said main driving-shaft, and pitman connection between the gearing and clamp-shaft, said pitman made in two parts frictionally connected, substantially as described.

7. In a paper-cutter, a main driving-shaft, a clamp-shaft, with means for connecting same to the clamp, train of gearing in connection with said main driving-shaft, and pitman connection between the gearing and clamp-shaft, said pitman connection consisting of a plunger and a divided casing, with means for yieldingly clamping the casing around the plunger, to provide a frictional-clutch connection, substantially as described.

8. In a paper-cutter, a main driving-shaft, a clamp-shaft, and a pair of cranks, one keyed to and the other loosely mounted on the clamp-shaft, a friction-clutch connection between the main driving-shaft and the loosely-mounted crank, means for connecting the two cranks, a hand-screw, with lever operated thereby, and means for coupling same to the clamp-shaft crank whereby upon disconnecting the cranks the clamp may be operated by hand without disturbing the friction-clutch, substantially as described.

9. In a paper-cutter, a main driving-shaft, a clamp-shaft, with means for connecting same to the clamp, a pair of cranks on said clamp-shaft, one loosely mounted thereon, with a bolt to couple said cranks together, a pitman in two parts frictionally connected, coupling said loosely-mounted crank and the main driving-shaft, a hand-operated screw and follower, with a connecting-lever between said follower and clamp-shaft crank, whereby upon uncoupling the cranks the hand-clamp mechanism can be operated without disturbing the friction-clutch, substantially as described.

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