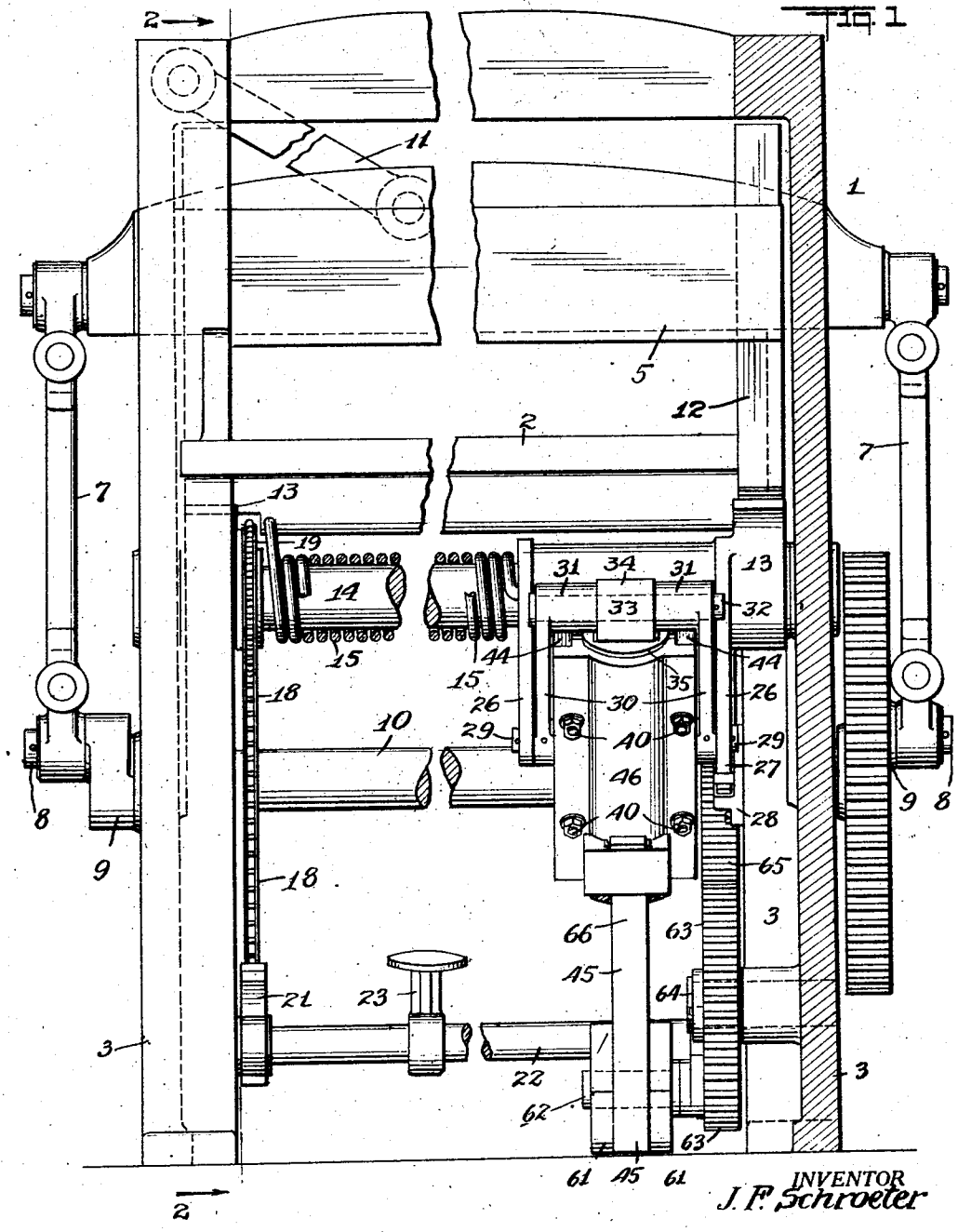
July 28, 1925. 1,547,828

J. F. SCHROETER

AUTOMATIC CLAMPING DEVICE FOR PAPER CUTTING AND OTHER MACHINES

Filed May 28, 1923 4 Sheets-Sheet 1

Fig. 1



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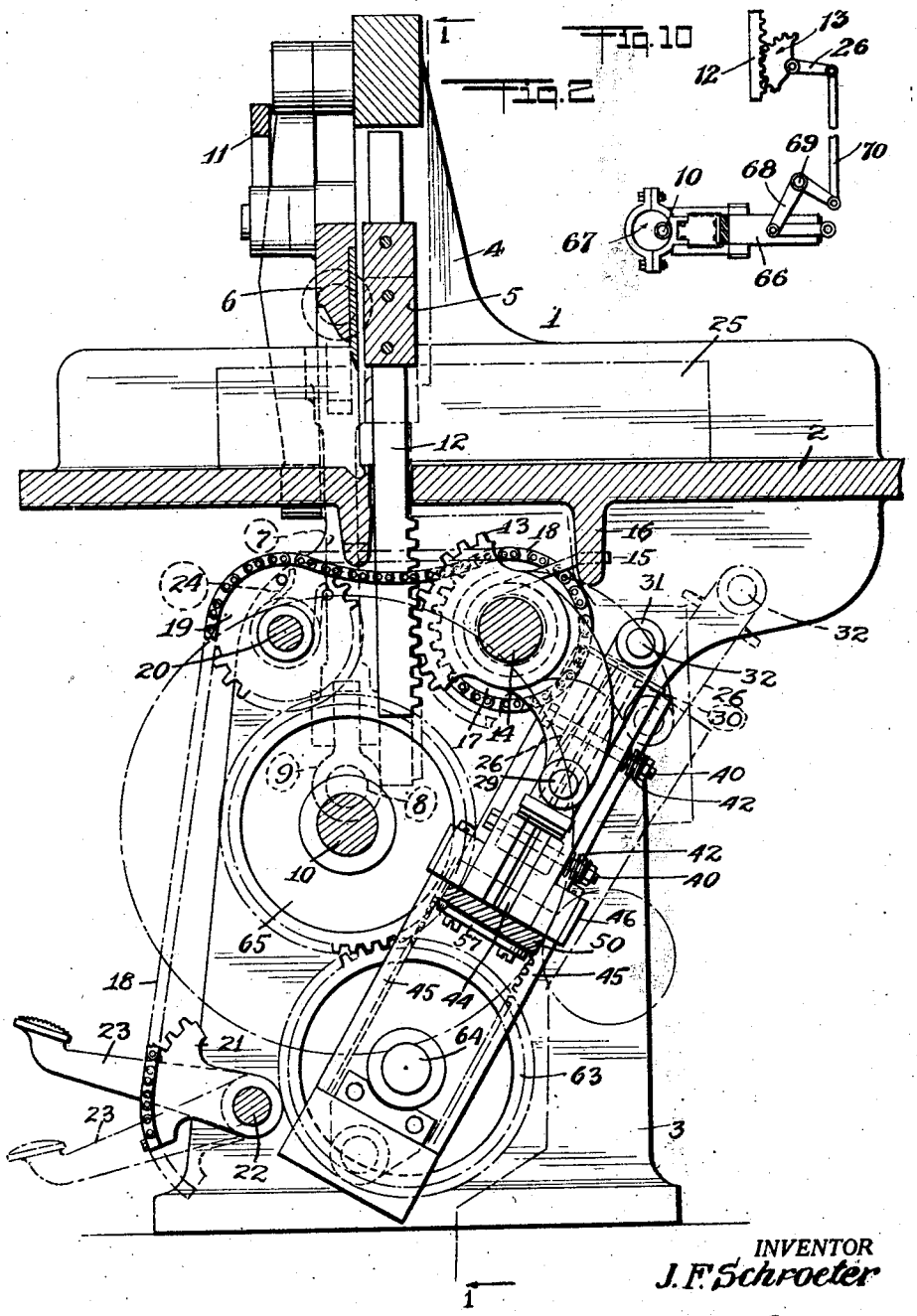
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AUTOMATIC CLAMPING DEVICE FOR PAPER CUTTING AND OTHER MACHINES

Filed May 28, 1923 4 Sheets-Sheet 2



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AUTOMATIC CLAMPING DEVICE FOR PAPER CUTTING AND OTHER MACHINES

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FIG. 7

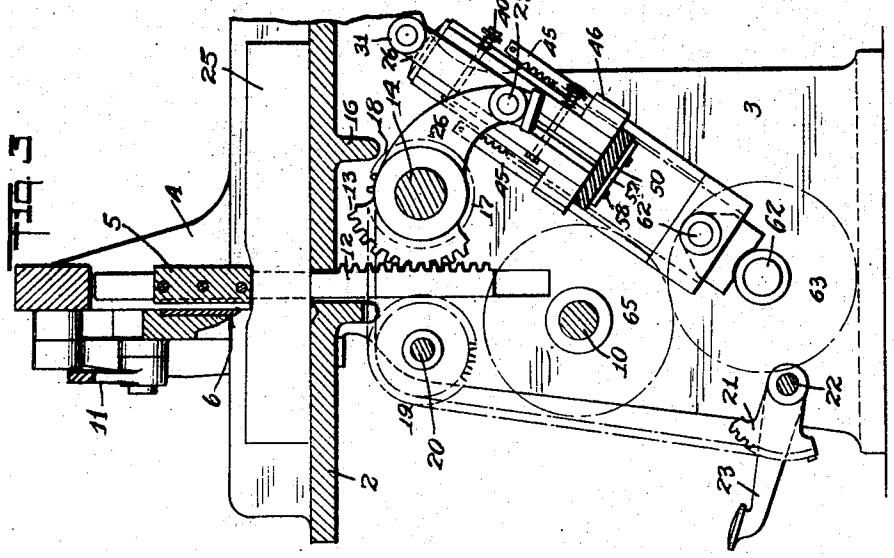


FIG. 5

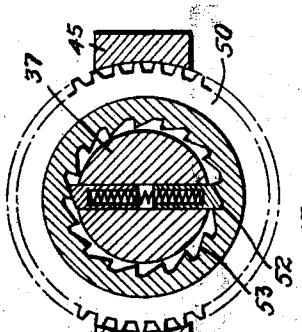


FIG. 4

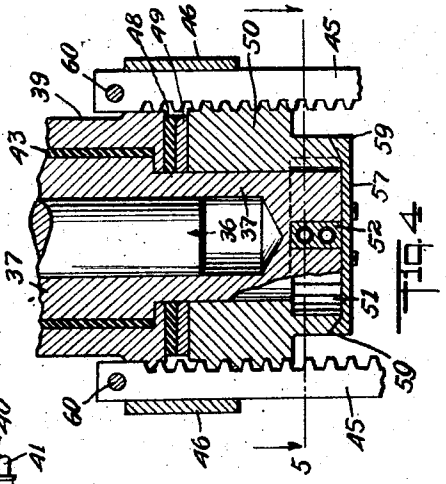
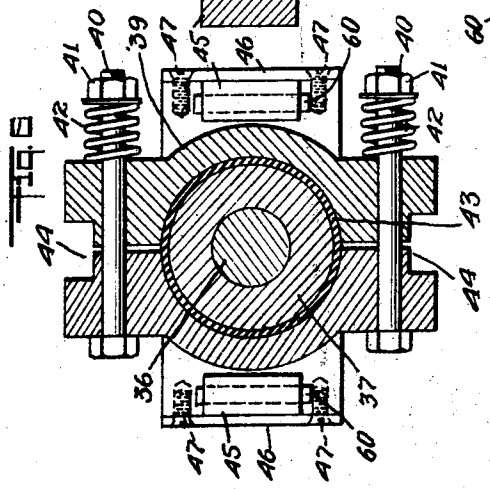


FIG. 6



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Fig. 7

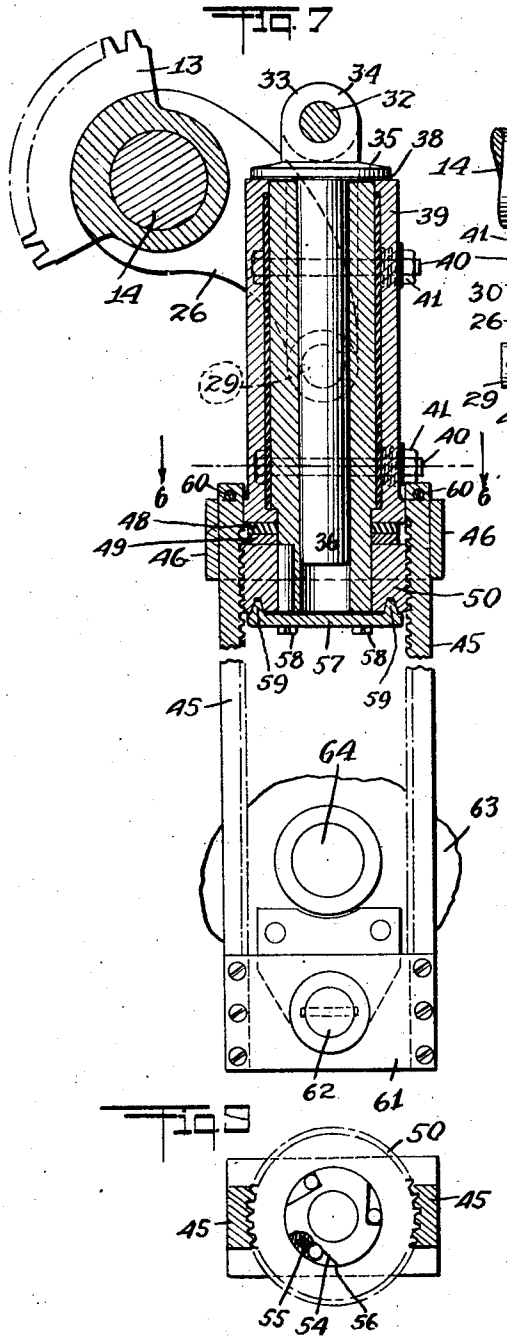


Fig. 8

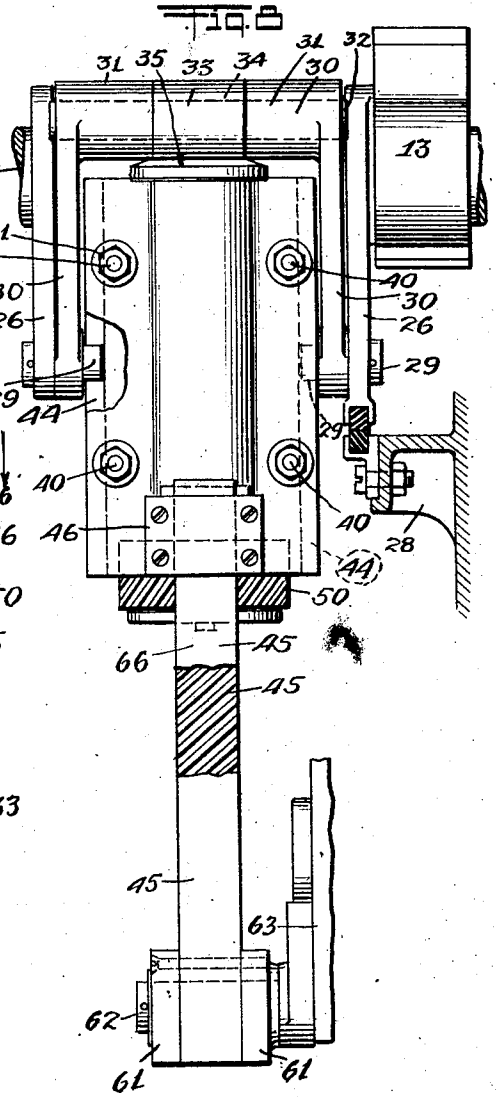


Fig. 9

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UNITED STATES PATENT OFFICE.

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AUTOMATIC CLAMPING DEVICE FOR PAPER-CUTTING AND OTHER MACHINES.

Application filed May 28, 1923. Serial No. 641,881.

To all whom it may concern:

Be it known that I, JOHN F. SCHROETER, a citizen of the United States, and a resident of the city of Atlanta, county of Fulton, and State of Georgia, have invented a new and useful Improvement in Automatic Clamping Devices for Paper-Cutting and Other Machines, of which the following is a specification.

The object of my invention is to provide a machine of this class, or any similar class, wherein a clamp is employed for holding material on a table or other support either manually or automatically or both, and which will be simple in construction, easily assembled or taken down and which will be reliable in operation. This and other objects are accomplished by my invention, one embodiment of which is hereinafter more particularly set forth.

For a more particular description of my invention, reference is to be had to the accompanying drawings, forming a part hereof, in which

Figure 1 is a rear section of a paper cutter provided with my improved clamping mechanism, a part being sectionally taken on the line 1—1 of Figure 2, looking in the direction of the arrows.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1, looking in the direction of the arrows.

Figure 3 is a reduced sectional view with parts omitted which shows the clamp in operation.

Figure 4 is a longitudinal sectional view of a portion of a pitman, a ratchet and spiral gear and connecting parts being shown.

Figure 5 is a sectional view taken on the line 5—5 of Figure 4, looking in the direction of the arrows.

Figure 6 is a sectional view taken on the line 6—6 of Figure 7, looking in the direction of the arrows.

Figures 7 and 8 show the pitman and connected parts, the two views being taken at right angles to each other and parts being shown in section.

Figure 9 shows a second form of ratchet corresponding to the ratchet shown in Figures 4 and 5, and Figure 10 shows a modified structure.

Throughout the various views of the drawings, similar reference characters designate similar parts.

Where cutters are employed, or similar instruments, it is necessary to clamp the paper or other material firmly while it is being operated upon. The thickness of this material will vary within the limits of the apparatus and in many instances it is also necessary to have either an automatic power clamp which will accommodate itself to any thickness within the scope of the machine, and a manual clamping which will be under the control of an operator so that the machine may be used either way. Furthermore, this machine must always be reliable and accurate in its operation as any failure in the machine may be disastrous to the operator, the material or the machine. One embodiment of my invention which meets these conditions will now be described.

A machine 1 of the type in question is provided with a table 2 carried by any suitable support 3 as side frames with parts 4 above the table which carry a clamp 5 and a knife 6 in the conventional manner. This knife 6 may be driven in any suitable way as by links 7, crank pins 8 and cranks 9 secured to a shaft 10 which may be driven by any suitable source of power, not shown, and all of which is conventional. The knife may also be guided by a diagonal link 11 which causes it to make a shear cut.

Of course, the knife mechanism may be varied, as desired and modifications are not shown, as all such structures are old and well known in the art and form no part of this invention. It may be that a punch may be substituted for the knife in which case there would be no draw cut. These or any other desired devices may be used, as will be understood, without further reference or description.

The clamp 5 is actuated by mechanism which will now be described. In the embodiment shown this clamp is secured at each end to racks 12 which mesh with segmental gears 13 which are fixed to a shaft 14 and this shaft is surrounded in part by a coil spring 15 which has one end fixed in the gear 13 and the other end is fixed in a flange 16 which depends from the table 2. This spring acts as a counterweight so as

to keep the clamp 5 raised under normal conditions, and when this clamp is lowered to function as a clamp in a manner which will be described below, this spring 15 is in tension with sufficient power to raise the clamp whenever the lowering mechanism is released. If desired, a counterweight could be substituted for this spring 15, as is obvious.

At one end, or any other convenient location, the shaft 14 is provided with a sprocket wheel 17 which carries a sprocket chain 18 which runs over an idle sprocket wheel 19 mounted on a stud shaft 20 which extends from one of the supports 3 and from the wheel 19 the chain 18 runs to a segmental sprocket wheel 21 fixed on the pedal shaft 22 which is pivotally mounted in the pedestals 3 of the machine. This shaft 22 carries a foot pedal 23 of the conventional kind. Normally this foot pedal is kept raised by a suitable spring 24 mounted on the stud shaft 20 and secured at one end to a frame 3 and at the other to the wheel 19. When the foot pedal 23 is depressed the tension of this spring 24 is overcome and also the tension of the spring 15 and the shaft 14 is turned so as to drive the segmental gears 13 which in turn lower the racks 12 and cause the clamp 5 to function on any material 25 that may be placed on the table 2.

One segmental gear 13 has curved arms 26 spaced at any convenient distance apart, and one of these arms is extended at 27 to engage a stop 28 on a side frame 3 so as to limit the upward movement of the clamp 5. Both of these arms have a suitable pivotal connection 29 with the arms 30 of a yoke 31 which is composed of these arms and a connecting shaft 32. Between the arms 30 the shaft 32 passes through a bearing 33 which forms an integral part of a member 34 which has a collar 35 and a plunger 36. The plunger extends into a cylinder or body 37 and the collar 35 normally rests on a washer 38 which is sandwiched in between this collar and the body 37 and just above the body 37 so as not to rest thereon, but it does rest on the top of a sleeve 39. This sleeve is preferably made in two parts which are held in proper relation by means of clamping bolts 40 with nuts 41 which may be adjusted thereon so as to put more or less pressure on the tension springs 42 which are placed on said bolts. To maintain a proper connection between the body 37 and the sleeve 39, I provide a suitable lining 43 of leather or any other suitable material, which is preferably put in a recess formed for the purpose so that it will lie true and remain true at all times. This sleeve is also provided with two sets of guides at right angles to each other. One set 44 permits the pivots 29 to slide freely therein and the other set receives the spiral racks 45 which move freely therein and are kept in place by the cover plates 46 which are held by screws 47 or any other suitable means. The lower end of the sleeve 39 rests on a suitable fibre washer 48 which rests on a hardened steel washer 49 and both of these surround the reduced lower end of the body 37 and the lower washer 49 rests on a spiral gear 50 which engages the spiral rack bars 45 and is turned by them as it rises and falls in a manner which will be described below. If desired, the washers 48 and 49 may be replaced by a ball bearing or a roller bearing. The lower end of the spiral gear 50 has a pawl and ratchet connection 51 with the body 37. In the embodiment of my invention shown in Figures 4 and 5 the body 37 has spring pressed pawls 52 extending in opposite directions along the same diameter so as to engage the teeth 53 which are fixed so as to project inwardly into a recess at the bottom of the gear 50. These ratchet teeth are preferably given an odd number so that one of the pawls 52 will be in engagement with the teeth twice as often as they would be in engagement if an even number of teeth were employed. In Figure 9 is shown an ordinary roller ratchet 54 with springs 55 to force the rollers into engagement with the smooth interior 56 which takes the place of the teeth 53. The advantage of this ratchet is that it will instantly engage at any point and permit no lost motion of any kind whatsoever and so this is the preferred embodiment of my invention. However, while I have shown two ratchets, it is obvious that any suitable form of ratchet may be employed.

The lower end of the body 37 and the lower end of the spiral gear 50 are closed by means of a suitable cover plate 57 which is secured to the body 37 by screws 58, or other suitable means, so as to conceal and protect the ratchet 51 with a working joint and this cover plate 57 has a conical collar 59 which enters a corresponding recess in the bottom of the spiral gear 50 so that on the return movement this spiral gear when turned by the rack bars 45 will not turn too freely on the body.

The spiral racks 45 slide freely in the recesses under the cover plates 46, as above stated, and they are provided at their upper ends with stop pins 60 which prevent a separation of these rack bars 45 from the sleeve 39 as might occur when the clamp is manually operated, as described above, if these pins were omitted. The lower ends of these rack bars 45 are secured to a bearing 61 which engages a crank pin 62 on a gear 63 which is mounted on a stud shaft 64 which extends from a frame 3 and this gear 63 meshes with a gear 65 with the same number of teeth which is fixed to the main shaft 10 of the machine. Of course, this is only one

way of driving the pitman 66 which connects the crank pin 62 with the yoke 31 which has been described in detail above. Any other suitable mechanism may be used for driving. It is essential that it be driven so as to elongate and contract in a manner which will be described below, and provided this occurs it may be connected and driven in any suitable manner.

In the embodiment of my invention shown in Figure 10 the pitman 66 is driven by an eccentric 67 on the main shaft 10 and the yoke 31 drives a bell crank lever 68 mounted on a rocker shaft 69 and this lever drives links 70 that runs to arms 26 of the gears 13 through which the racks 12 are driven as above described.

Operation.

In view of the foregoing, the operation of my improved clamp will be readily understood. If the operator wishes first to bring the clamp down on the material to be clamped by manual effort, he depresses the foot pedal 23 in the conventional manner and then the sprocket chain 18 functions so as to draw the clamp down on the work, as above described. The operator then applies power in the usual manner and the shaft 10 is driven and brings down the knife through the connections above described and simultaneously drives the gears 65 and 63 and the greater part of the pitman 66 so as to raise this greater part until the shoulder 35 and washer 38 of the plunger rest on the sleeve 39 and then the resistance due to the material 25 is encountered and as soon as this resistance is encountered the spiral racks 45 begin to turn the spiral gear 50 thereby causing friction between the leather 43 in the sleeve 39 and the body 37 which is proportional to the tension of the springs 42 which is imposed by the nuts 41 and may be whatever is desirable for proper clamping. This permits a proper pressure of the clamp for any thickness of material, the lost motion being taken up by the spiral racks 45 and the frictional engagement above mentioned, and this continues until the limit to the stroke is reached, it being understood that the body 37 must turn because it is positively driven from the gear 50 through the ratchet 51. As soon as the limit of the movement of the pitman 66 is reached and that is as soon as the knife 6 has finished cutting or operating, the pitman begins its reverse movement and the instant it starts to reverse the knife 6 rises also and the clamp 5 rises under the influence of the spring 15 while the pitman releases at the ratchet 51 and allows the racks to turn the spiral 50 on the return movement without in any way turning the body 37 and as this turning occurs, the only resistance to the turning of the gear 50 is the conical collar 59 secured in the cover 57 which is fixed to the body 37 so that during the return movement, the pitman 66 assumes its most extended position and then when its movement is finished the automatic mechanism which is generally employed in such machines brings both the clamp and the knife to rest and the clamp rests at the upper limit of its movement, as determined by the position of the stop 38. It is apparent that the resistance of the spiral gear to its reverse movement causes a resistance to an elongation of the pitman 66 and this resistance causes additional stresses on the parts 31 and 62 connected to the pitman and so removes a part or all of the clamp lifting load from the spring 15 to the crank pin 62 so that if desired, by tightening the screws 58 and making the plunger 36 tight in the body 37, the spring 15 may be dispensed with. Of course, this limit should be below the lower edge of the knife which should never be in a position to cut the hand of the operator.

The unit system.

In the foregoing has been described some automatic devices including the pitman for a cutting machine. These are suitable for small machines, say thirty-two inch machines. Where machines are larger, as forty, fifty, or ninety or one hundred and twenty-eight inch machines, it is obvious that the clamp must be operated with more clamping power and then it is necessary to employ one or more pitmans, all of which may be connected in any suitable manner, as in duplication of the manner shown, so that this invention can be applied either singly or in multiple units.

From the foregoing, it is apparent that the essence of this invention resides in the pitman and connected parts which pitman may be supplied for connection in any conventional machine by suitable connections and it is not in any way limited to the precise connections herein shown and described, nor is it limited in any way to the precise form herein shown and described, but is broad enough to cover all structures that come within the scope of the annexed claims.

Having thus described my invention, what I claim is:

1. In a machine of the class described, a table, a clamp adapted to hold a substance on the table and means for actuating said clamp including in its construction a spiral gear device which shortens and elongates while functioning and has parts in frictional engagement while clamping and free while releasing.

2. In a machine of the class described, a table, a clamp adapted to hold a substance against said table and mechanism for actuating said clamp automatically embodying in its construction a pitman which shortens

and elongates while functioning and clamps itself so as to be nearly rigid while shortening and releases while elongating.

3. In a machine of the class described, a table adapted to hold a substance and a clamp adapted to force the substance against the table and means for actuating said clamp embodying in its construction a pitman which moves in two directions and is provided with reciprocating and rotating parts which are adapted to function so as to clamp while on one movement and to release while on the other movement.

4. In a machine of the class described, a table, a clamp adapted to force a substance against said table and hold the same and means for actuating said clamp embodying in its construction a pitman with reciprocating parts, rotary parts and frictional parts, these three parts being so arranged and disposed that the pitman functions while clamping with a force proportional to the frictional resistance of the parts and freely releases when not clamping.

5. In a machine of the class described, a table, a clamp adapted to hold a substance on the table and means including a pitman moving in two directions for actuating said clamp, such pitman being provided with relatively movable parts which engage with frictional contact while moving in one direction and while the clamp is clamping and without such contact when moving in the other direction, thus allowing a free release of the clamp when not functioning as a clamp.

6. In a machine of the class described, a table, a clamp adapted to hold a substance on the table, means including a pitman moving in two directions for actuating said clamp, such pitman being provided with relatively movable parts which engage with frictional contact while moving in one direction and while the clamp is clamping and without such contact when moving in the other direction, thus allowing a free release of the clamp when not functioning as a clamp and manually controlled means for actuating the clamp and releasing the same from the first mentioned means while actuated by the manually controlled means.

7. In a machine of the class described, a table, a clamp adapted to hold a substance on the table and means for actuating said clamp including in its construction a pitman which shortens and elongates while functioning and has parts in frictional engagement while clamping and free while releasing, one of said frictional parts of said pitman being provided with a spiral gear with a ratchet connected thereto, said gear being driven by at least one corresponding rack which also forms a part of the pitman.

8. In a machine of the class described, a table, a clamp adapted to hold a substance on the table and means for actuating said clamp including in its construction a pitman which shortens and elongates while functioning, said pitman being provided with relatively movable parts one of which is a sleeve with a suitable frictional surface such as leather, a body with a second surface engaging said frictional surface, a spiral gear connected to said body with a ratchet connection and means for rotating said spiral gear.

9. In a machine of the class described, a table, a clamp adapted to hold a substance on the table and means for actuating said clamp including in its construction a device which shortens and elongates while functioning and has parts in frictional engagement while clamping and free while releasing, said parts having spring controlled means subject to adjustment, whereby the tension of the clamping means may be varied within limits, as desired, by varying the pressure of the frictional contact of said parts and means for causing one of said parts to move with regard to the other while the clamp is functioning and means for permitting a free release from such driving means when the clamp is not functioning.

10. In a machine of the class described, a table, a clamp adapted to hold a substance on the table and means for actuating said clamp including in its construction a spiral device which shortens and elongates while functioning and has parts in frictional engagement while clamping and free while releasing and a central plunger in said frictional parts which is provided with a yoke, a link connected with other parts of the clamping mechanism so that when the clamp is driven by other means than the actuating means above mentioned, this plunger may shift without causing such actuating means to function.

11. In a machine of the class described, a table, a clamp adapted to hold a substance on the table, means for actuating said clamp including in its construction a spiral device which shortens and elongates while functioning and has parts in frictional engagement while clamping and free while releasing and a stop for limiting the upward movement of said clamp upon releasing.

12. In a machine of the class described, a pitman provided with one or more spiral rack bars, a spiral gear engaging said bar or bars, a ratchet connected to said spiral gear, a frictional body driven by said ratchet in said spiral, a sleeve with a frictional surface engaging said body and also said rack or racks and means for connecting said body with mechanism to be driven.

13. In a machine of the class described, a pitman comprising one or more spiral rack bars, a spiral gear driven by said bar or bars, a body having a ratchet connection

with said spiral gear, a sleeve with a frictional surface engaging said body and also said bar or bars, means for varying the pressure of said frictional parts and means for connecting said body with mechanism to be driven by the pitman.

14. In a machine of the class described, a pitman provided with one or more spiral racks, a spiral gear engaging said rack or racks, a body connected to said spiral gear by means of a ratchet connection, a sleeve with a frictional surface engaging said body and also said rack or racks, a plunger adapted to move in said body, a yoke with depending arms pivotally mounted in said plunger and driven mechanism connected with said yoke, said driven mechanism forming also a guide for said yoke and one end of the pitman.

15. In a machine of the class described, a table, a clamp adapted to hold a substance on the table and means for actuating said clamp including in its construction a spiral device to be used in multiple units which shortens and elongates while functioning and has parts in frictional engagement while clamping and free while releasing.

In testimony whereof, I have hereunto set my hand this 25th day of May, 1923.

JOHN F. SCHROETER.