Dec. 10, 1935. C. SEYBOLD 2,023,795

CLAMP OPERATING APPARATUS

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FIG. 1.

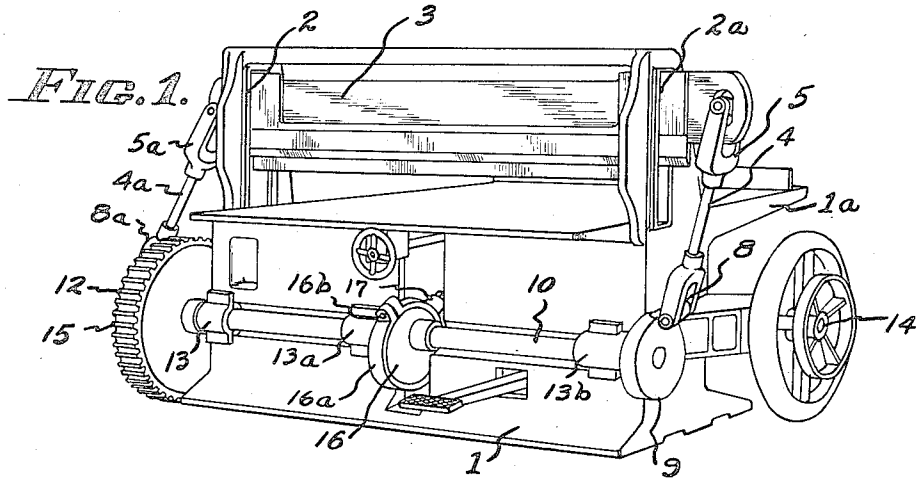
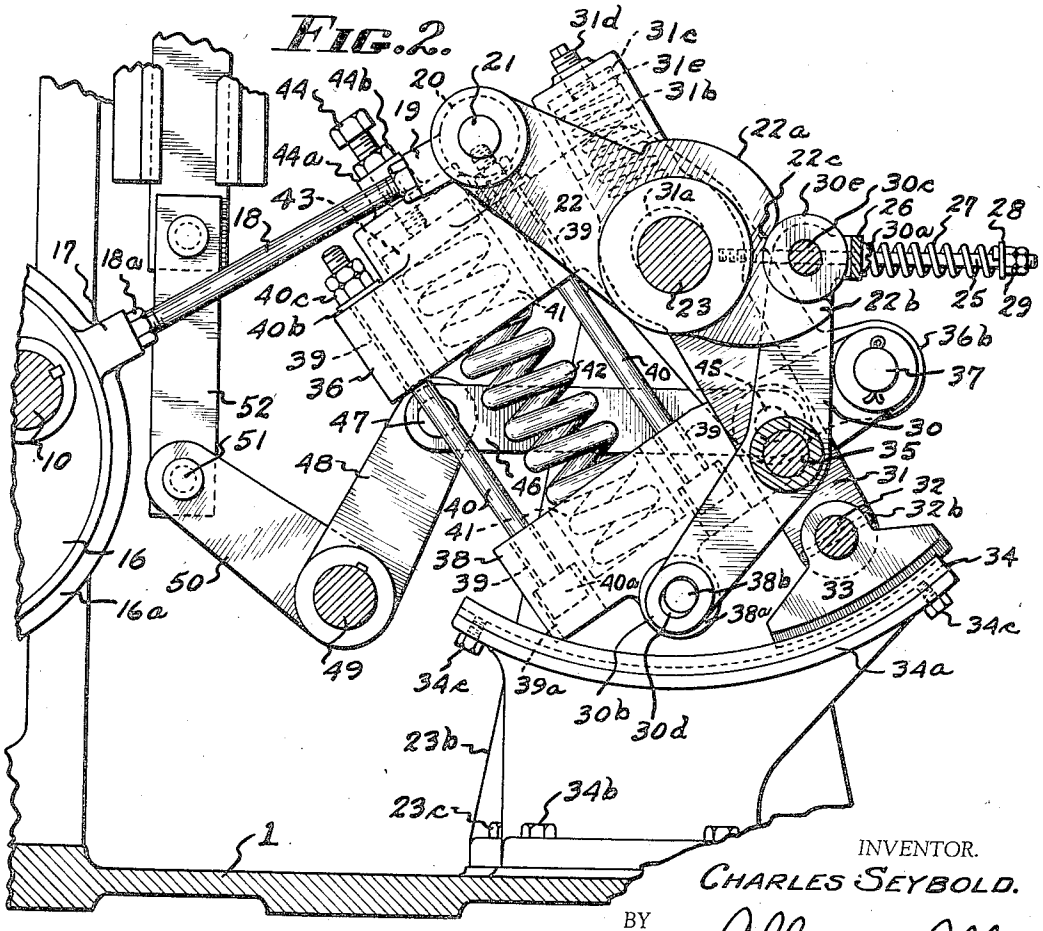


FIG. 2.



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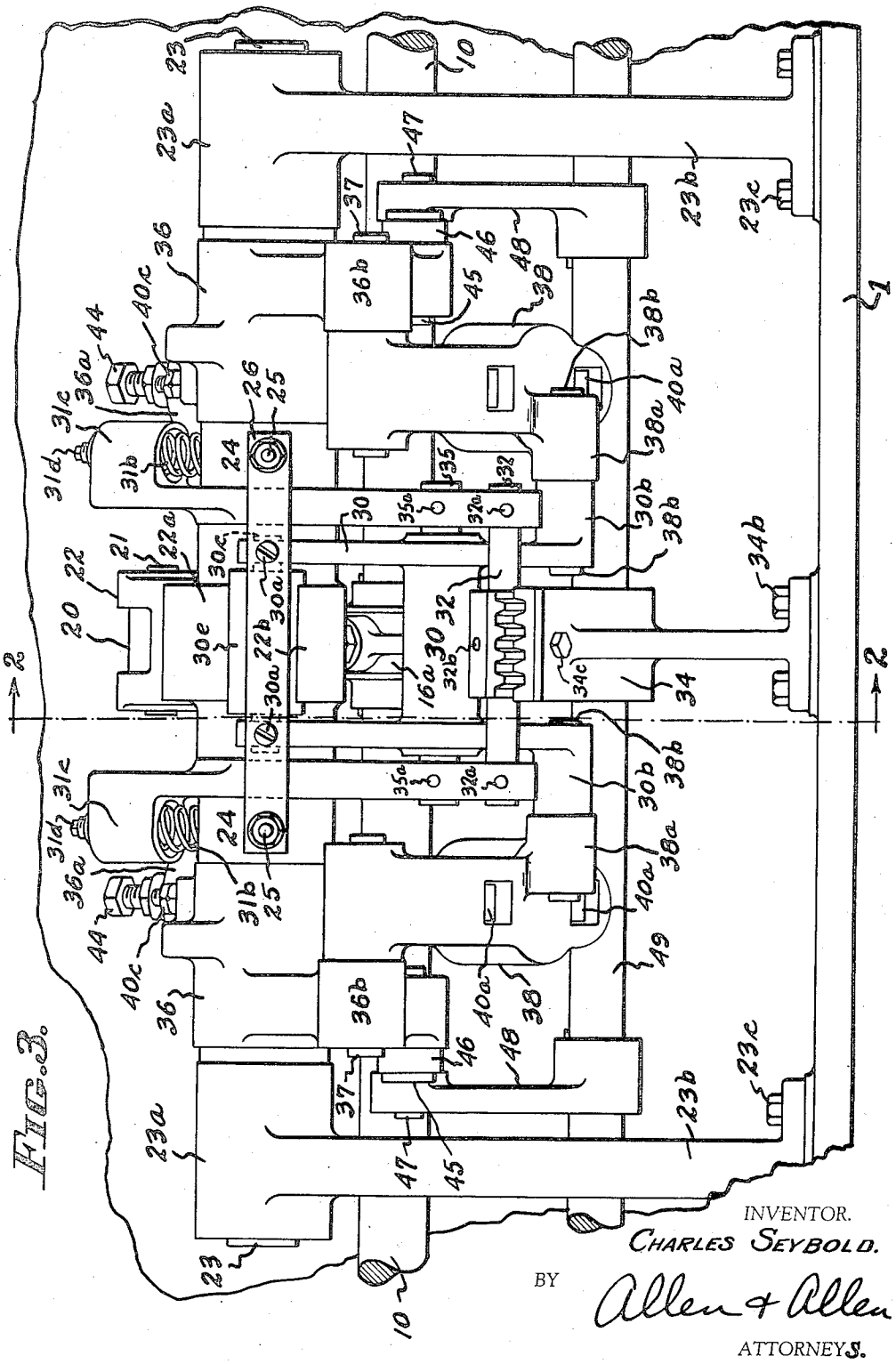


FIG. 3.

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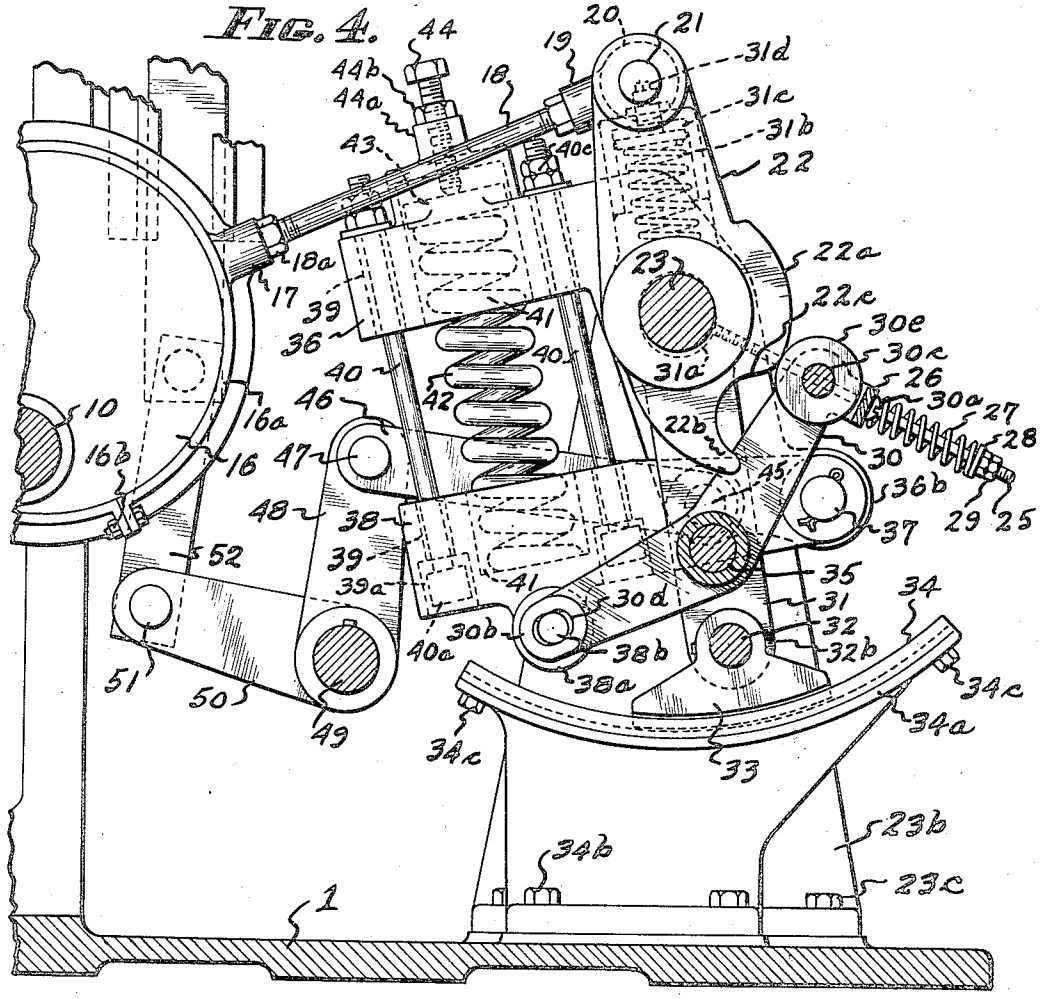
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CLAMP OPERATING APPARATUS

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FIG. 4.



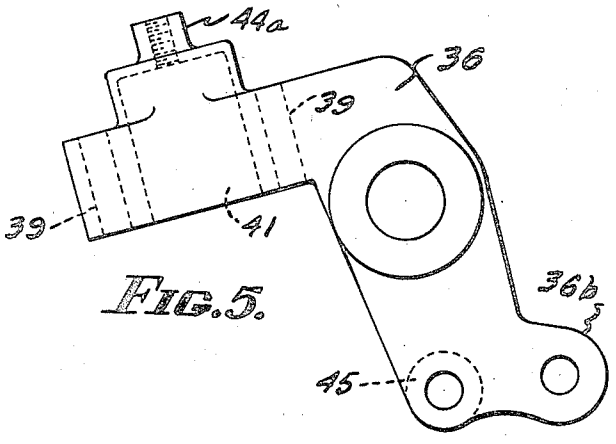


FIG. 5.

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UNITED STATES PATENT OFFICE

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CLAMP OPERATING APPARATUS

Charles Seybold, Oakwood, Ohio

Application August 7, 1935, Serial No. 35,160

11 Claims. (Cl. 164—51)

My invention relates to apparatus used to operate clamps for holding stacks of material during a cutting operation on a power cutting machine, and is an improvement upon the mechanism disclosed and claimed in my co-pending application Ser. No. 661,595, filed March 18, 1933.

In my co-pending application aforementioned, means were provided whereby the system of levers moved as a unit until the clamp bar came into contact with the material to be clamped. At this point the resistance offered by the material to be clamped caused a change in the operation of the mechanism and the axis of oscillation was shifted to another point. The new axis of oscillation was on a movable link whereby when great pressure was exerted on the system considerable chattering resulted.

It is therefore an object of the present invention to provide means for locking that portion of the system which bears the new pivot point whereby such chattering is eliminated.

It is further an object of my invention to provide a more smoothly working mechanism for the purpose described and one which will exert a standard amount of pressure on the work to be clamped regardless of the thickness of the latter.

Generally it is an object of my invention to provide a mechanism for clamping sheets in which a clamp bar is rapidly approached to clamping position and in which, after clamping position has been attained, a large amount of pressure is resiliently exerted upon the sheets. It is another object of my invention to provide a clamping mechanism as above described in which the clamping means become effective upon contact of the clamp bar with the work regardless of the height of the work to be clamped.

These and other objects will be more specifically pointed out in the specifications and drawings illustrating my device in its preferred form. In the drawings:—

Figure 1 is a perspective of a cutting machine.

Fig. 2 is a partial sectional side elevation of the mechanism as seen from the right in Fig. 1. In this view the parts are shown in the position which they occupy at the beginning of the clamping operation.

Fig. 3 is a rear elevation of the mechanism shown in Fig. 2.

Fig. 4 is a view similar to Fig. 2 except that the parts are shown in the position which they occupy at the end of the clamping stroke.

Fig. 5 is a detailed view of the upper hinge member.

Referring to Fig. 1 I have shown the base 1, which carries a cutting table 1*a* and from which extend the vertical cutter blade guides 2 and 2*a* in which the cutter 3 is slidable. The cutter blade is actuated by the pull rods 4 and 4*a* which are fastened to the cutter blade by means of the clevises 5 and 5*a*. At its lower ends the pull rod 4 is attached by means of the clevis 8 to a crank 9 which is fixed upon the shaft 10. The other end of the shaft 10 carries a bull wheel 12 and the pull rod 4*a* is attached by means of a clevis 8*a* to a crank 9 on the said bull wheel. The shaft 10 rotates in the bearings 13, 13*a* and 13*b*. At the rear of the machine is a jack shaft 14 which has at one end a gear (not shown) which meshes with the teeth 15 of the bull wheel 12.

At 16 I have shown an eccentric disc which is mounted upon the shaft 10. The yokes 16*a* surround this eccentric disc and are fastened together by the bolts 16*b*. One of the said yokes bears a boss 17 which is threaded to receive a threaded end of the push rod 18 and a lock nut 18*a* is provided to fix the position of the push rod 18. The other end of the push rod 18 is threaded into a boss 19 on the collar 20 which collar 20 carries a pin 21 which connects it with the cam member 22.

This cam member 22 is mounted on a fixed shaft 23 which is mounted in bearings 23*a* on the standards 23*b* which are fixed to the base 1 by means of the bolts 23*c*. The cam member 22 is provided with a partially circular cam surface 22*a* and a hook portion 22*b*. This hook portion in connection with the cam surface forms a notch 22*c* for purposes which will be described hereinafter. Loosely mounted upon the shaft 23 are the washers 24. Pins 25 are screwed into the said washers and a bar 26 is slidably mounted on these two pins 25. Compression springs 27 are held on these pins by washers 28 and lock nuts 29. The springs 27 thus bear against the washers 28 and tend to force the bar 26 toward the left as seen in Fig. 2. The upper arms of a double bell-crank 30 are screwed to the bar 26 by means of the screws 30*a*.

Also mounted upon the fixed shaft 23 are the members 31 having elongated holes 31*a*. The shaft 23 extends through these holes 31*a* and the members 31 are thus capable of both oscillatory and reciprocal motion. At their upper ends the members 31 are provided with spring cups 31*c* which carry the compression springs 31*b*. These springs 31*b* bear against the washers 31*e* which are adjustable by means of the studs 31*d*. The other ends of the springs 31*d* bear

against the washers 24. The purpose of this construction is to maintain the members 31 in the position shown in Fig. 2. A pin 32 connects the lower ends of the members 31 and is pinned to each of the members 31 by the pins 32a. The pin 32 at its center carries the compound wedge block 33 which is fixed to the pin 32 by means of the pin 32b. At 34 I have shown an arcuate compound wedge shoe which is fastened to an arcuate frame 34a by means of the bolts 34c. The frame 34a is fastened to the base of the machine by the bolts 34b.

Also extending across between the members 31 is a pivot pin 35 which is pinned to the respective members 31 by the pins 35a. The double bell-crank 30 is mounted on the pin 35 and carries at the ends of its lower arms the bosses 30b. Connecting the upper arms of the double bell-crank is the pin 30c which carries the roller 30e which is of a diameter to fit the notch 22c in the cam member 22. These bosses are provided with slots 30d.

Also pivoted on the shaft 23 are the upper hinges 36 which are shown in detail in Fig. 5. The upper hinges 36 have enlarged portions 36a within which the upper ends of the springs 42 are retained and at their other ends have extensions 36b which carry the pins 37. The lower hinge members are shown at 38 and have extensions 38a which carry pins 38b which ride in the slots 30d on the lower ends of the double bell-crank 30. These upper and lower hinge members have two holes 39, respectively, and the holes 39 and the lower hinge members have a square counterbore 39a to accommodate the heads of the bolts 40a which extend through the aligned holes 39. At their threaded ends the bolts 40 are provided with washers 40b and lock nuts 40c. Each of the upper and lower hinge members has spring cups 41 and the heavy compression springs 42 have their upper and lower ends, respectively, retained in these spring cups. The upper ends of the springs 42 bear against washers 43 the position of which is adjustable by means of the screws 44 which are threaded into the bosses 44a and locked by means of the lock nuts 44b. The upper hinge members 36 also carry pins 45 and bars 46 connect the pins 45 with the levers 48 at the pins 47. The levers 48 are carried on a shaft 49 carried in the side walls of the housing, and this shaft also carries the levers 50 which connect with the pull rods 52 at 51.

Operation

After placing a stack of material in position for a cut the operator steps on a foot treadle to set the bull wheel and shaft 10 into rotation. While the shaft is rotated the clamp and knife will both move down, the clamp being timed to be in advance of the knife so as to apply pressure and compression and hold the material before the knife begins to cut.

The eccentric is the prime mover for the clamp mechanism. As the eccentric moves from the position shown in Fig. 2 the rod 18 is pushed to the right. This causes an oscillation of the cam member 22 in a clockwise direction. As long as the movement of the clamp bar is not resisted by the material to be clamped the spring 27 will urge the bar 26 toward the left thus pressing the roller 30e into its notch 22c. Thus the whole system including the members 31 and the hinge members will be oscillated in a clockwise direction about the shaft 23 without relative movement of its parts.

As soon as the clamp bar encounters the material which is to be clamped the compression of the spring 27 is overcome and the double bell-crank 30 will be caused to rotate slightly in a clockwise direction about the pivot 38b by reason of the rise of the cam 22a. The result is that the pin 35 forces the members 31 downward against the compression of the springs 31b and causes the compound wedge block 33 to wedge against the shoe 34. It is to be understood that at the time this movement occurs the whole system has oscillated somewhat about its axis so that the members 31 are in the position shown in Fig. 4.

Now with the members 31 firmly locked any further movement of the push rod 18 through the cam member 22 causes a clockwise turning of the double bell-crank 30 about the pin 35 which now forms a fixed pivot. This relative movement of the parts puts a pressure on the springs 42 causing a clockwise rotation of the upper hinge members 36 about the shaft 23. This has the effect of moving the pins 45 toward the left and causes a counter clockwise movement of the members 48 and 50 thereby exerting a pull on the pull rods 52. It is to be noted that when the lower ends of the members 36 move toward the left the lower hinge members 38 are caused to move to the left and it is for this reason that the slots 30d are provided in the lower arms of the double bell-crank 30.

When the cutter has completed its cut and the eccentric tends to return the system to its original position the pull on the rod 18 causes a counter clockwise movement of the cam member 22 the hook portion 22b of which exerts an upward pull on the double bell-crank 30 thereby releasing the compound wedge block 33 from its shoe 34. The action of the various compression springs then immediately returns to the system to the position shown in Fig. 2.

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

1. A transmission mechanism comprising a shaft and a system of levers adapted to oscillate therein as a unit without relative movement of the members, means actuated upon a predetermined degree of resistance to said oscillation to lock a portion of said system against oscillation thereby causing a relative movement of the members for the purposes described, said means comprising a shaft, a first lever oscillatable upon said shaft, a wedging member oscillatable and reciprocable upon said shaft, a wedging surface with which said wedging member is adapted to be engaged, and a second lever oscillatable upon said wedging member and having a resilient latching engagement with a portion of said first lever.

2. A mechanism for transmitting a uniform linear force from a motive means to a clamp means in two phases, the first at relatively high speed and low power, and the second at relatively low speed but with a great amount of power, comprising a shaft, a first lever oscillatable on said shaft, a link oscillatable and reciprocable on said shaft and a second lever oscillatable on said link but having a resilient latching engagement with said first lever, said whole system adapted to oscillate about said shaft without relative movement of the parts, means actuated by a predetermined resistance to said oscillation to prevent further oscillation of said link and to cause oscillation of said second lever relative to said link and said first lever.

3. Clamp mechanism comprising a clamp, a shaft, a lever oscillatable about said shaft and a wedging member oscillatable and reciprocable on said shaft and a wedging surface with which said wedging member may engage, a second lever oscillatable on said wedging member and having a resilient latched engagement with said first mentioned lever whereby said entire mechanism oscillates as a unit about said shaft, a link mechanism actuated by said second lever and including reactionary means, to actuate said clamp and motive means to actuate said first mentioned lever, said second lever adapted to be displaced from said latching engagement upon resistance to the clamp, to force said wedging member against said surface, said second lever then transmitting power from said motive means to said clamp through said reactionary means by oscillation about its mounting on said wedging member.

4. Clamp mechanism comprising a clamp, a shaft, a first lever having a latching portion and adjacent cam means, oscillatable upon said shaft, a wedging member oscillatable and reciprocable on said shaft and a wedging surface with which said wedging member is adapted to engage, a second lever oscillatable on said wedging member and having a resilient latched engagement with the latching portion of said first lever whereby said entire mechanism oscillates as a unit upon said shaft, a link mechanism including reactionary means actuated by said second lever to actuate said clamp and motive means to actuate said first lever, said second lever adapted, upon resistance to the clamp, to be displaced from said latching engagement thereby forcing said wedging member against said surface, said second lever then being adapted to be further actuated by said cam means to transmit power from said motive means to said clamp through said reactionary means by oscillation about its mounting on said wedged wedging member.

5. In a clamp, for the purpose described, a lever system connected to the clamp and initially movable as a unit, said lever system including as part thereof relatively movable members, one of which is a cam, another a heavy compression spring, and another a member to engage the cam, connection from said relatively movable members to the clamp, and means for locking the system from moving as a unit upon initial building up of pressure by the clamp, whereby the relatively movable members will act to apply heavy pressure through the spring.

6. In a clamp for the purpose described, a lever system connected to the clamp and to an actuating member, said system spring held to operate as a unit on a single axis until initial pressure is developed by the clamp, the portion of said system connected to the clamp and the portion connected to the operating member, arranged for relative movement with respect to each other, and means for locking the lever system against unit movement upon giving way of the spring which holds it together under initial pressure, whereby the system portions named will move relatively to each other applying heavy pressure.

7. In a clamp for the purpose described, a lever system connected to the clamp and to an actuating member, said system spring held to operate as a unit on a single axis until initial pressure is developed by the clamp, the portion of said system connected to the clamp and the portion connected to the operating member, arranged for relative movement with respect to each other, and means for locking the lever system against unit movement upon giving way of the spring which holds it together under initial pressure, whereby the system portions named will move relatively to each other applying heavy pressure, said system portions having means transmitting power from one to the other including a cam on one member, and a compression spring through which the cam movement is applied.

8. In a clamping device an actuating means, a clamp, and a transmission system between them including a compression spring, the system arranged so that the spring is not compressed until the system has applied initial pressure to the clamp, said system arranged to operate as a unit until said initial pressure has been applied, and means to lock it against movement as a unit when same has been applied.

9. A power operated device for applying a clamp including a series of levers, a spring and a cam, said device arranged to pivot about a single axis, said spring normally preventing movement of the cam, so long as the device is free to move as a unit, and means for locking the system against movement on said single axis when the cam movement begins.

10. A power operated device for applying a clamp including a series of levers, a spring and a cam, said device arranged to pivot about a single axis, said spring normally preventing movement of the cam, so long as the device is free to move as a unit, and means operated by the cam for locking the system against movement on said single axis when the cam movement begins.

11. In combination with a clamp, transmission means to apply power to the clamp comprising a spring reactive means forming an intermediate part of said transmission means and through which force is applied to the clamp, and a sliding connection forming an intermediate part of said transmission means for applying pressure to said spring reactive means, and means adapted, upon actuation of said sliding connection, to lock said transmission means, exclusive of said spring reactive means and said connection.

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