May 2, 1950 F. W. SEYBOLD 2,506,436

CUTTING KNIFE CLAMP ADJUSTMENT

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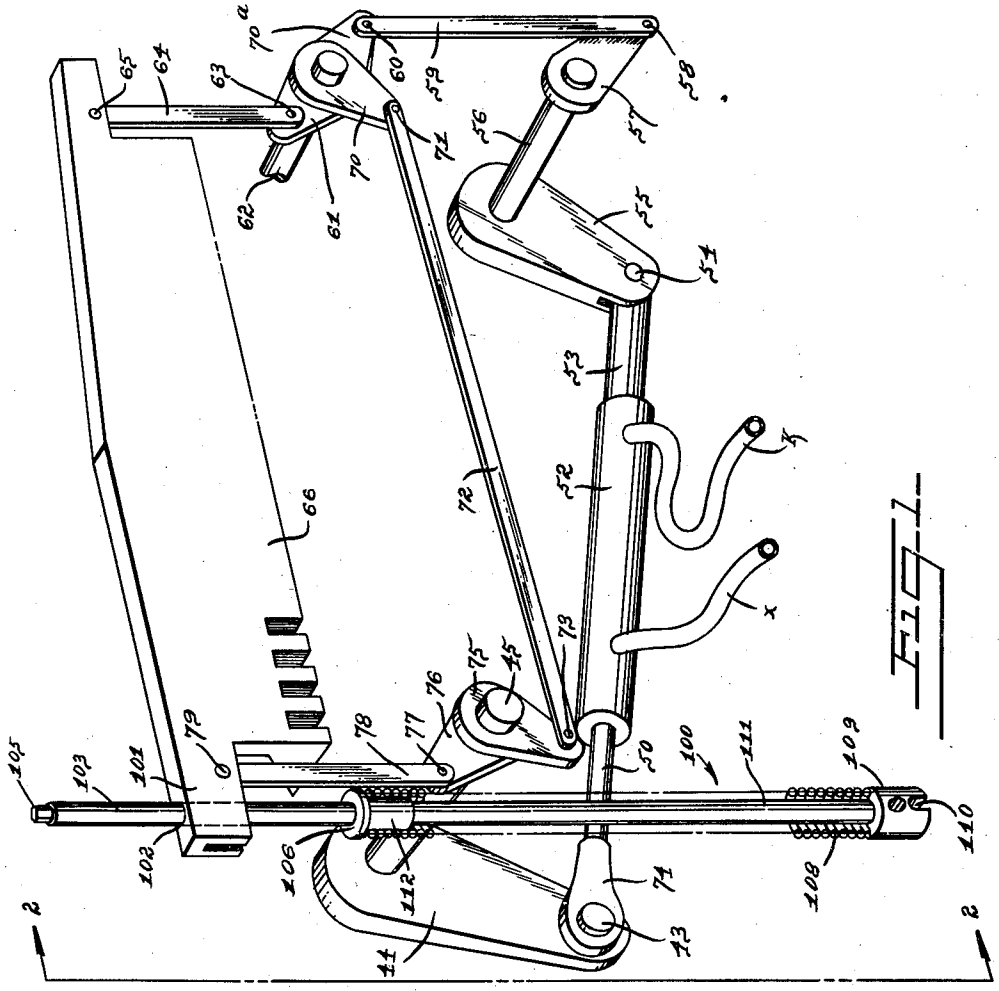


FIG. 1

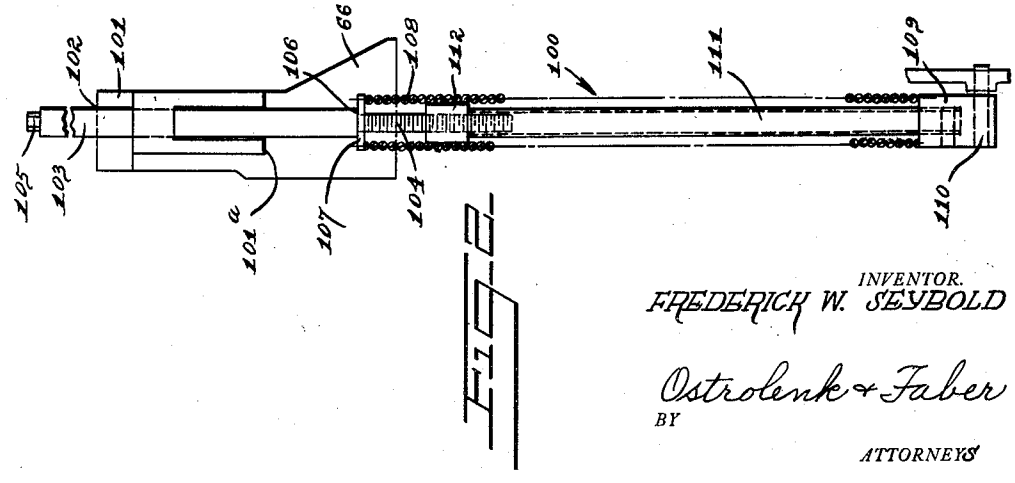


FIG. 2

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CUTTING KNIFE CLAMP ADJUSTMENT

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5 Claims. (Cl. 164—52)

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My present invention relates to an improvement of the guillotine type paper cutter described in my application Serial No. 45,285, filed August 20, 1948, and relates especially to a clamp stop spring assembly for utilization especially with hydraulically operated clamps.

In hydraulically operated clamps of the type described in the aforesaid application, it requires considerable skill on the part of the operator to bring the hydraulically operated clamp down by foot treadle and to stop it just short of touching the stack of paper which the operator desires accurately to locate in relation to a printed line or mark using the front edge of the clamp as the cutting indicator.

As the descent and ascent of the clamp is controlled by a valve or valves, the closing or opening of this valve for proper stopping must, therefore, be done at the correct time so that this requires extreme skill or feel and different operators possess this skill in varying degrees. Considerable time is thereby lost in stopping the clamp just above the paper pile so that no pressure is exerted on the pile and the latter may still be shifted into position.

An object of the present invention is to overcome the aforesaid difficulty by the utilization of a spring mechanism wherein the length of the spring may be adjusted to the various heights of piles so that the weight of the clamp is supported by the spring. That is, the operator adjusts the upper end of the spring to a level just above the upper surface of the pile so that when he permits the clamp to descend, it will come to rest on the spring just above the upper level of the pile, and the pile may then be shifted to be lined up with the clamp.

Thereafter, when a cutting operation is to be made, the hydraulic mechanism utilized to operate the clamp will exert sufficient force to pull down the clamp against the compression of the spring and thereby operate the clamp as if the spring were no longer present.

The type of counterbalancing mechanism which permits adjustment of the pile is made possible by the controlled force exerted by the hydraulic mechanism which can overcome the spring after the spring has served its purpose of determining the lower limit of free descent of a clamp.

While in hydraulically operated clamp mechanisms the valves may be operated to permit the clamp to descend slowly, the skill of the operator may not be sufficient to close or otherwise operate the valves at the correct instant to bring the clamp to a stop at the correct level.

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By including the clamp stop spring assembly in the mechanism, the operator need merely operate the valves to permit the clamp to descend by gravity. The clamp will then automatically come to rest on the stop spring without the necessity for further operation of the valves by the operator. Thereafter when a cut is to be made, the operator controls the normal elements of the machine for initiating a cut and the hydraulically operated clamping mechanism will bring the clamp down with sufficient force to clamp the paper pile and also with sufficient force to compress the spring to enable the clamp to perform this operation.

It should here be noted that the height of the clamp when adjusted as a gauge against the stop spring is a small fraction of an inch above the paper pile so that its registry with the mark or line on the paper pile can be determined.

When, therefore, the clamp is thereafter driven down hydraulically, the spring need only be compressed by the same fraction of an inch before the clamp contacts the paper pile and need thereafter be compressed only by the distance to which the paper pile is compressed, which distance in the ordinary paper pile is only an additional fraction of an inch.

Therefore, by making the spring relatively very long, it can be made sufficiently strong to support the weight of the clamp at the adjusted position while the spring does not, however, exert appreciable additional counterbalancing force when the clamp is driven down hydraulically.

The foregoing primary object and many other objects of my invention will become apparent in the following description and drawings in which:

Figure 1 is a schematic view of a hydraulic clamp for a guillotine type paper cutter with my novel clamp stop spring assembly.

Figure 2 is a side view taken from line 2—2 of Figure 1.

Referring now to the figures, the schematic view of Figure 1 corresponds substantially to the schematic view of Figure 8 of the above-mentioned application with the addition of the clamp stop spring assembly.

The operation of the clamp is also identical with that described in the above application.

The clamp 66 is connected by the pins 79 and 65 on its opposite sides to the pull bars 78 and 64, respectively. The lower ends of pull bars 78 and 64 are connected, respectively, by pins 77 and 63 to crank arms 76 and 61 on shafts 45 and 62, respectively. Crank arms 75 and 70 on shafts 45 and 62 form essentially bell crank levers with cranks 76 and 61, respectively.

The bell crank levers 76—75 and 61—70 are preferably freely rotatable about their respective shafts 45 and 62. Bell crank lever 61—70 also has connected thereto the additional lever 70*a* forming essentially an integral casting therewith, the lever 70*a* being connected by pin 60 to the clamp operating link 59, the opposite end of which is connected by pin 58 to crank 57 on shaft 56.

Crank 55 on shaft 56 is connected by pin 54 to the rod 53 of the hydraulic cylinder 52. Piston rod 50 of the hydraulic cylinder is connected by its extension 74 to pin 43 of the drive crank 44 on the drive shaft 45, the drive shaft 45 being connected to the knife driving mechanism. Hydraulic fluid is supplied to the cylinder 52 through the conduits *x* and *k* in accordance with the system described in the above-mentioned application.

Thus, bell crank lever 61—70 is driven by the hydraulic mechanism. Bell crank level 76—75 is connected for simultaneous operation by the link 72 connected by the pins 73 on bell crank lever 76—75 and pin 71 on bell crank lever 61—70 so that the pull bars 78 and 64 are pulled down simultaneously to pull down the clamp 66 evenly.

As previously pointed out, the hydraulic mechanism acting on cylinder 52 and the piston contained therein connected to piston rod 50 act as a link in the connection between the drive shaft 45 and bell crank lever 61—70 to drive the clamp 66 down.

Shaft 45 is not a continuously rotating shaft but an oscillating rotating shaft rotating in one direction when the knife moves down and in the opposite direction when the knife moves up. Consequently, the hydraulic cylinder 52 is a link in the connection from drive shaft 45 to the driven bell crank lever 61—70 to raise the clamp 66 after the knife leaves the pile in its upward movement.

In addition, valve elements which are provided as described in the above application may permit the shift or movement of the hydraulic fluid with respect to the cylinder 52 to permit the clamp 66 to descend.

The difficulty which arises is that the operator may not be sufficiently skilled to operate these valves in time to halt the descent of the clamp.

Accordingly, the clamp stop spring assembly 100 is provided. The left hand extension 101 of clamp 66 is provided with a bore 102 through which the rod 103 passes. The lower end of the rod is threaded at 104 while the upper end of the rod which is accessible to the operator is provided with a square end 105 which may be engaged by a ratchet wrench to rotate the rod 103. The lower end of rod 103 is shouldered at 106 where it is threaded to provide a seat or bearing for washer 107 against which the upper end of the compression spring 108 rests. The lower end of compression spring 108 rests on the block 109 which is pivoted on the pin 110 extending from the frame of the machine. Pipe 111 connected to the block 109 guides the compression spring 108. The upper end of pipe 111 has secured thereto so that it is not rotatable with respect thereto the nut 112 having an internal thread in threaded engagement with the threaded extension 104 of the rod 103.

As the square end 105 of the adjustment rod 103 is rotated, the rod 103 moves up or down with respect to the stationary nut 112. When the rod 103 is rotated so that it moves upwardly, then the compression 108 also forces the washer 107 upwardly. When the rod 103 is rotated to move downwardly, then it forces the washer 107 down to compress the spring 108.

Figure 1 shows the adjustment of washer 107 and compression spring 108 for a very low pile while Figure 2 shows the adjustment for a relatively high pile.

When the rod 103 is adjusted for a relatively high pile, then as seen in Figure 2 the compression spring 108 raises the washer 107. When now the clamp 66 is permitted to descend, the under surface 101*a* of extension 101 moves down to the washer 107 and comes to rest thereon, the washer 107 and compression spring 108 supporting the weight of the clamp 66.

When thereafter the clamp operating mechanism is operated to bring the clamp down, then clamp 66 may move downwardly with the additional force imparted thereto by the clamp operating mechanism, and extension 101 of the clamp pushes down on the washer 107 compressing the spring 108 and moving the washer 107 downwardly away from the shoulder 106.

Thus, the operator may rotate the squared end 105 of adjustment rod 103 to adjust the washer 107 to the desired height at which clamp 66 is to come to rest. He then operates his valves to permit the clamp to descend by gravity and the clamp then comes to rest on washer 107 supported by compression spring 108.

Rod 103 and its squared end 105 are controlled by the operator to cause the clamp to come to rest at a position just above the paper pile and sufficiently close thereto so that the edge of the clamp may be used as a gauge in connection with a line or mark on the paper. This adjustment is preferably made before the paper pile is placed in the machine, but it may be made at any time even after the paper pile is placed in the machine. Preferably the adjustment is made with respect to the first pile of paper in any run of piles of similar height.

When the operator is to cut a smaller pile, then he rotates the rod 103 so that it moves downwardly, forcing the washer 107 and the upper end of spring 108 downwardly to a point where again the clamp will come to rest above the paper pile.

By the utilization of the simple clamp stop spring assembly herein disclosed, extreme skill on the part of the operator in bringing the clamp to a stop at the gauging point just above the paper pile is made unnecessary.

The operator adjusts the stopping point and then permits the clamp to descend to the stopping point. The stop element supports the weight of the clamp at the stopping point. Since, however, the stop element is compressible, it does not interfere, whatever its adjustment, with the operation of the clamp towards and away from clamping position by the driving apparatus.

In the foregoing I have described my invention solely in connection with specific illustrative embodiments thereof. Since many variations and modifications of my invention will now be obvious to those skilled in the art. I prefer to be bound not by the specific disclosures herein contained but only by the appended claims.

I claim:

1. In a paper cutter having a vertically reciprocal clamping member; drive apparatus for driving the clamp downwardly; means for permitting the clamp to descend by gravity; and a resilient stop member in the path of downward movement

of the clamp for halting the clamp when it descends by gravity; said driving apparatus having sufficient force to overcome and resiliently displace said stop downwardly when the driving apparatus drives the clamp downwardly.

2. In a paper cutter having a vertically reciprocal clamping member; drive apparatus for driving the clamp downwardly; means for permitting the clamp to descend by gravity; and a resilient vertically adjustable stop member in the path of downward movement of the clamp for halting the clamp when it descends by gravity; said driving apparatus having sufficient force to overcome and resiliently displace said stop downwardly when the driving apparatus drives the clamp downwardly.

3. In a paper cutter having a vertically reciprocal clamping member; drive apparatus for driving the clamp downwardly; means for permitting the clamp to descend by gravity; and a resilient vertically adjustable stop member in the path of downward movement of the clamp for halting the clamp when it descends by gravity; said driving apparatus having sufficient force to overcome and resiliently displace said stop downwardly when the driving apparatus drives the clamp downwardly; said stop comprising a washer; a vertical compression spring supporting said washer and biasing the same upward; a guide for said washer; said guide extending through said washer and vertically through a portion of said clamp.

4. In a paper cutter having a vertically reciprocal clamping member; drive apparatus for driving the clamp downwardly; means for permitting the clamp to descend by gravity; and a resilient vertically adjustable stop member in the path of downward movement of the clamp for halting the clamp when it descends by gravity; said driving apparatus having sufficient force to overcome and resiliently displace said stop downwardly when the driving apparatus drives the clamp downwardly; said stop comprising a washer; a vertical compression spring supporting said washer and biasing the same upward; a guide for said washer; said guide extending through said washer and vertically through a portion of said clamp; said guide having a shoulder bearing against the upper surface of said washer; and means for moving said shoulder vertically to adjust the vertical position of said washer.

5. In a paper cutter having a vertically reciprocal clamping member; drive apparatus for driving the clamp downwardly; means for permitting the clamp to descend by gravity; and a resilient vertically adjustable stop member in the path of downward movement of the clamp for halting the clamp when it descends by gravity; said driving apparatus having sufficient force to overcome and resiliently displace said stop downwardly when the driving apparatus drives the clamp downwardly; said stop comprising a washer; a vertical compression spring supporting said washer and biasing the same upward; a guide for said washer; said guide extending through said washer and vertically through a portion of said clamp; said guide having a shoulder bearing against the upper surface of said washer; and means for moving said shoulder vertically to adjust the vertical position of said washer; said means comprising a threaded extension of said guide; a stationary nut; said extension being in threaded engagement with said nut; said guide being rotatable to cause the same to move vertically in said nut.

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No references cited.