Nov. 16, 1954 H. N. BUSS 2,694,424

HYDRAULICALLY OPERATED PLANER

Filed May 10, 1951 3 Sheets-Sheet 1

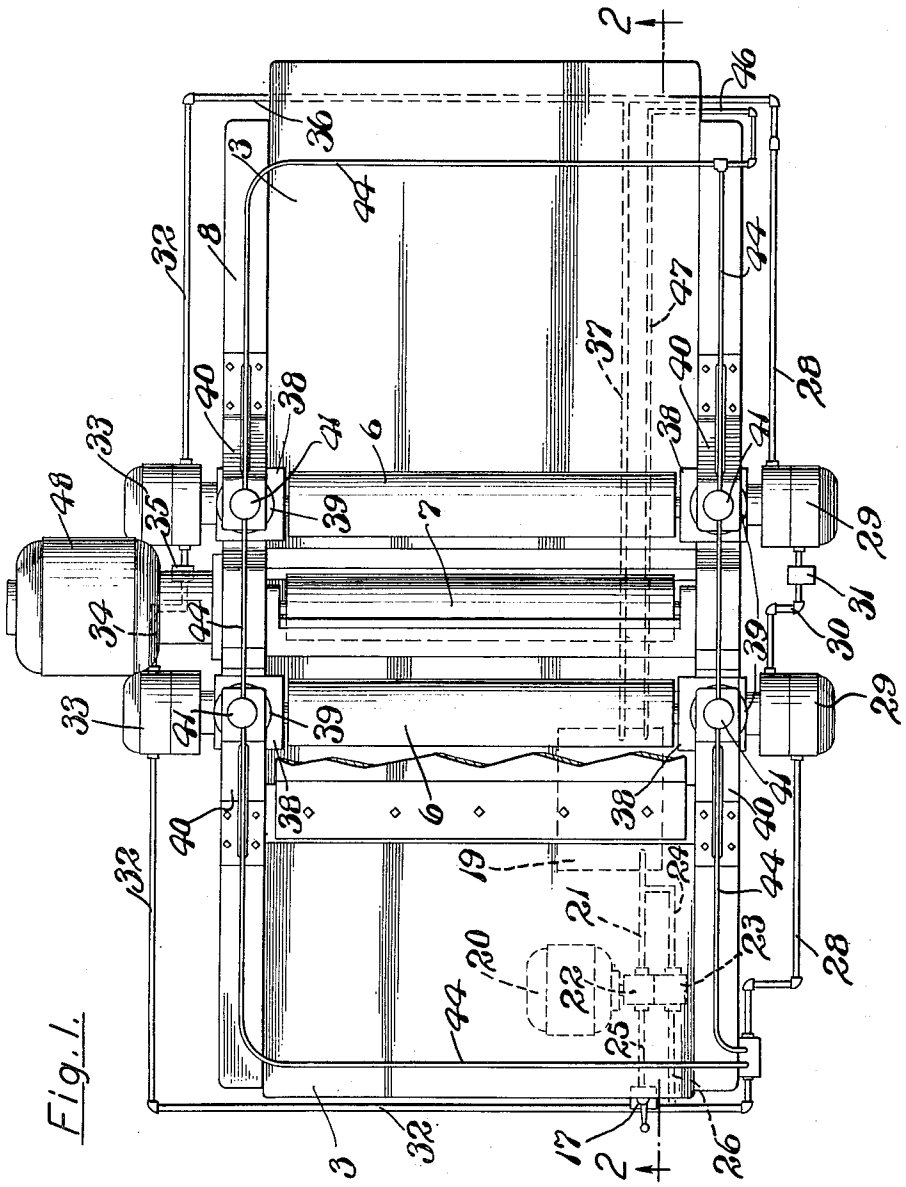


Fig. 1.

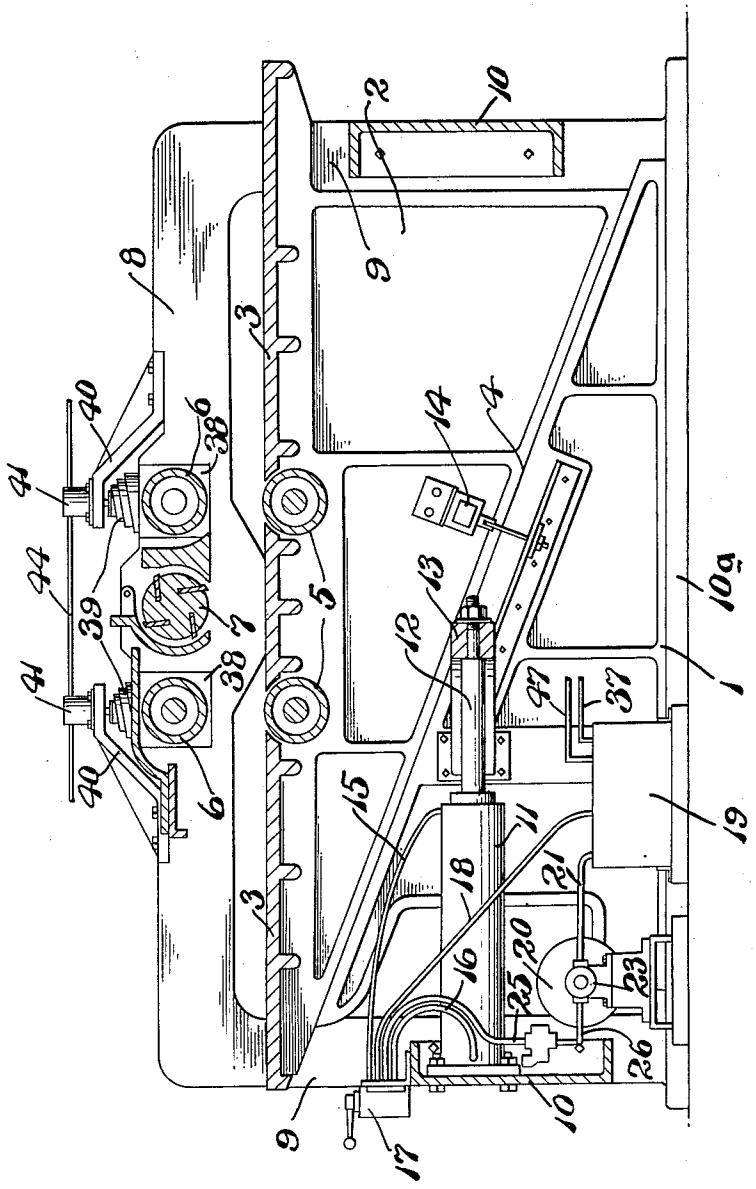
INVENTOR.
Hadley N. Buss
BY
Frank E. Liverance, Jr.
Attorney

Nov. 16, 1954 H. N. BUSS 2,694,424

HYDRAULICALLY OPERATED PLANER

Filed May 10, 1951 3 Sheets-Sheet 2

Fig. 2.



INVENTOR.
Hadley N. Buss
BY
Frank E. Liverance, Jr.
Attorney

Nov. 16, 1954 H. N. BUSS 2,694,424

HYDRAULICALLY OPERATED PLANER

Filed May 10, 1951 3 Sheets-Sheet 3

Fig. 3.

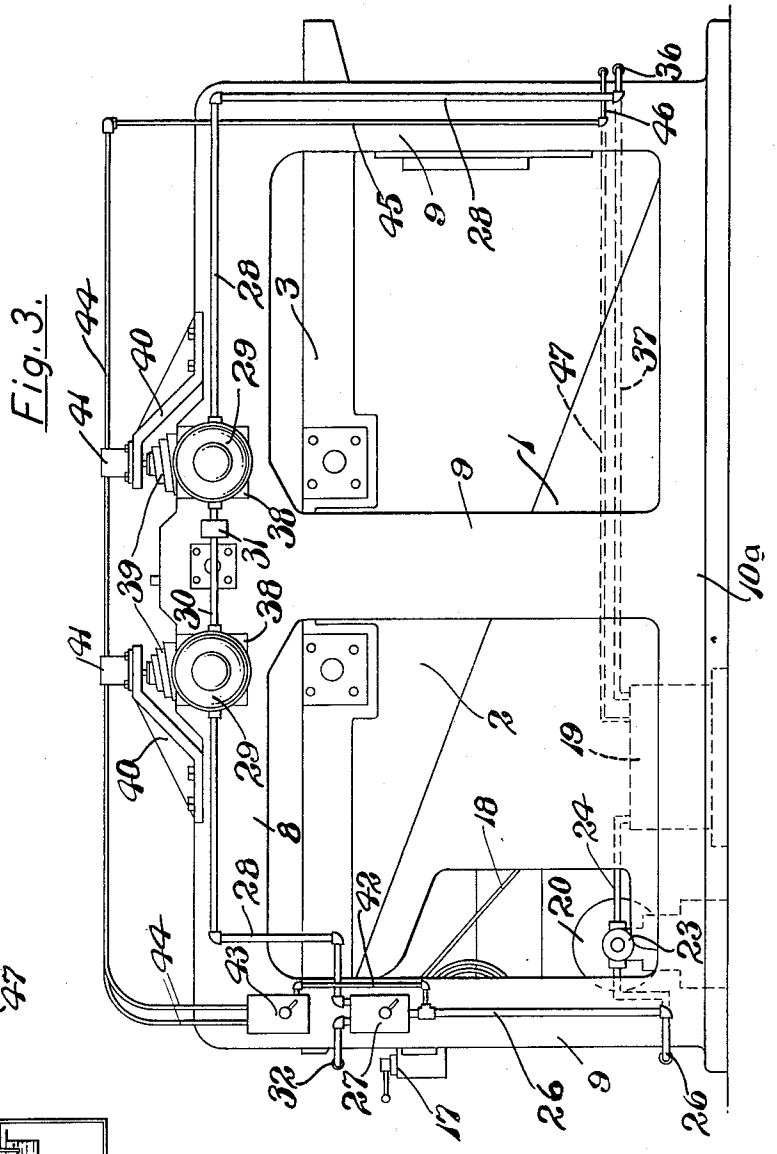
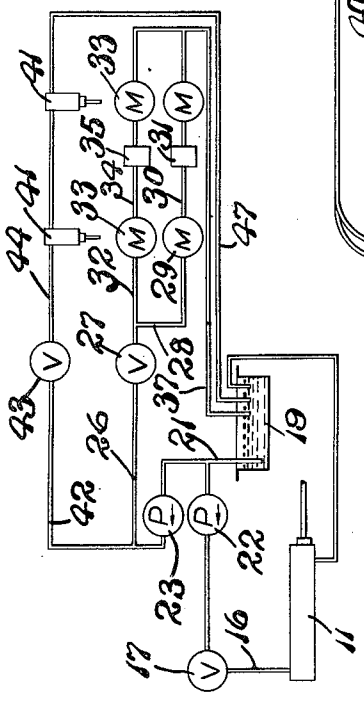


Fig. 4.



INVENTOR.
Hadley N. Buss
BY
Frank E. Liverance, Jr.
Attorney

United States Patent Office

2,694,424

Patented Nov. 16, 1954

2,694,424

HYDRAULICALLY OPERATED PLANER

Hadley N. Buss, Base Line, Mich.

Application May 10, 1951, Serial No. 225,569

8 Claims. (Cl. 144—114)

The present invention relates to wood planers and is primarily concerned with, in the main, the hydraulic operation of table adjustment and of driving the feed rollers of the boards which are planed on being moved past a high speed driven cutter head between the upper feed rollers.

The mechanism for vertically adjusting the table over which the boards pass, so as to properly position the table for a desired thickness of the planed board from the cutter head, the vertical movement of the table likewise carrying with it the lower feed rollers, in practice is substantially uniformly accomplished by mechanical means in present practices having gearing, screws and the like which are not only complicated and expensive to manufacture, but are liable to wear in the course of time which may render the table adjustment and the feed roller operation imperfect and unsatisfactory.

With my invention, each feed roller is driven by a hydraulic motor which is supplied with liquid under pressure to operate the motors, the motors being driven by a uniform hydraulic pressure so that their turning is simultaneous and equal in amount. At the same time, yielding pressure of the upper feed rollers upon the board is likewise maintained by springs subjected to hydraulic pressure which may be readily controlled, which pressure is uniform upon the journals or bearings at both ends of the upper feed rollers. The adjustment for raising and lowering the table and the lower feed rollers is likewise hydraulically controlled. The pumps which supply the liquid under pressure for feed roller operation and for the vertical adjustment of the table are driven from a single source of power, thereby simplifying and rendering more economical my practical structure which secures the desirable functions and results of the invention.

An understanding of the invention may be had from the following description, taken in connection with the accompanying drawings, in which,

Fig. 1 is a plan view of a planer equipped with my invention, with a part of the covering hood of the machine removed and broken away, it forming no part nor being essential to the invention.

Fig. 2 is a longitudinal vertical section substantially on the plane of line 2—2 of Fig. 1, looking in the direction indicated.

Fig. 3 is a side elevation of the planer shown in Fig. 1, and

Fig. 4 is a diagrammatic representation of the tubular lines of flow of the hydraulic pressure liquid.

Like reference characters refer to like parts in the different figures of the drawings.

In the usual wood surface planer, upon the frame of the machine, at the lower part of it, is an adjustable or movably mounted member 1, one at each side of the planer, having a horizontal under side and an inclined plane at its upper side. Resting thereon are complementary supports 2 for the horizontal table 3 of the planer, the under sides of the support 2 likewise being inclined planes resting against the inclined planes of the upper sides of the members 1 so that when said members 1 are forced in one direction, as to the right in Fig. 2, the table 3 is lifted and when moved in the opposite direction it is lowered. The complementary inclined surfaces of members 1 and 2 are indicated at 4 in Fig. 2.

Lower feed rollers 5 spaced from each other and mounted for rotation upon horizontal axes are mounted upon the under supports 2 of the table 3, at their upper portions extending through elongated transverse openings in such table so as to be, at their uppermost points, slightly above the upper side of the table. Upper horizontal feed rollers 6, spaced from each other, and lying over the lower rollers 5, with the rotating cutter head 7 between them supplied with the usual chip breaker and other accessories of such cutter head, are mounted to turn on horizontal axes being carried in journals mounted upon and supported by upper horizontal rails 8 at opposite sides of the frame of the planer, which frame is completed by downwardly extending end and intermediate posts 9. The end posts are connected by heavy cross channels 10 as shown, and such posts 9, at their lower ends have integral connection, preferably, with a bottom or base 10a of the machine frame, on the upper side of which the lower horizontal sides of the movable adjustable wedge members 1 bear.

At one end of the machine and permanently connected with the cross frame member 10 at such end, a horizontal cylinder 11 is permanently bolted at one end, extending inwardly and having within it a piston to which a piston rod 12 is connected. The rod 12 extends outwardly from the free inner end of the cylinder 11 and is connected to a yoke 13, at its outer ends permanently secured to the adjusting wedge members 1, it being understood that from opposite sides of the table 3 the under supports 2 thereof extend downwardly, and under each of said supports 2 an adjusting member 1 is located, with the inclined sides 4 in riding contact.

At opposite ends of the cylinder 11 are tubular leads 15 and 16 for selectively carrying liquid under pressure to either end of the cylinder. Such tubular or hose connections 15 are operatively connected and associated with a manual valve control 17 which in one position will direct oil, coming under pressure to such valve, through the pipe 16 so that the rod 12 will be projected from the cylinder 11. In another position it will direct the oil or other hydraulic liquid used under pressure through the conduit 15 for withdrawal of the piston rod 12; and at a neutral position the oil which is forced under pressure to the valve housing at 17 will be returned through return pipe 18 to a receptacle or reservoir for oil 19. Thus the elevating adjusting members 1 may be moved to raise or lower the table 3 to a pre-selected desired position and when the desired elevation is reached, the control valve apparatus at 17 is placed in neutral so that the pump which is supplying the oil under pressure continues to run without doing more than circulating oil taken from the oil supply at 19 back thereto. In practice, when an adjustment of the table has been completed an auxiliary clamping means, indicated at 14 details of which may be greatly varied, but which is practice, preferably is electrically solenoid operated may be used to clamp the inclined surfaces at 4 of the members 1 and 2 together so that there will be no change in position under vibration of the machine in operation.

The pumps which are used with my invention are driven by an electric motor 20. It is located adjacent the oil supply receptacle or tank 19, which has a supply pipe 21 leading from the tank to one of the rotary hydraulic motors 22 (Fig. 2) driven by the electric motor. A second like hydraulic motor 23 is mounted on the shaft of the motor 20, and the two pumps 22 and 23 are driven simultaneously and in unison. The second motor 23 has an oil supply pipe, indicated in dash lines at 24 in Fig. 1, connected with the supply line 21 so that both motors will simultaneously receive the oil or other hydraulic liquid from the tank.

At the outlet side of the motor 22 is a pipe 25 which carries the liquid under compression to the control valve at 17, the function of which to selectively direct the liquid pumped to pass through either the pipes 15 or 16, or through the return pipe 18 has been previously described.

From the outlet side of the hydraulic driven motor 23 an outlet pipe 26 extends, which is carried to an end of the machine and thence around it and is continued in a vertical conduit pipe (Fig. 3) at a side of the machine and adjacent one end thereof, liquid under pressure being conducted to a control valve and housing at 27. At the upper side of the valve housing 27 are two liquid carrying conduits, one at 28 being disposed for the interme-

diate portion of its length at a side of the upper horizontal frame member 8, in which two hydraulic motors 29, spaced from each other, one at the adjacent end of each of the lower feed rolls 5 are mounted, and are connected by an intermediate conduit 30 interposed in which is a pressure regulator valve 31. The liquid forced through the pipes 28 and 30 will drive the hydraulic motors 29 secured to the adjacent ends of the shafts of the feed rollers 5.

The other outlet 32 at the upper end of the control valve housing 27 is carried across one end of the machine (Fig. 1) and thence along the opposite side of the frame, two like hydraulic motors 33 being interposed in the length thereof and connected by a connecting conduit 34, with a pressure regulating valve mechanism at 35 similar to that at 31 between the motors. At the opposite end of the machine both pipes 28 and 32 which are extended downwardly at such end of the machine, as shown in Fig. 3, and connect with opposite ends of a transverse pipe 36 which, between its ends, has a return pipe 37 leading to the oil reservoir 19. Thus both upper and lower feed rollers are driven by the motors 29 and 33 under hydraulic pressure, the rotation of said feed rollers 5 and 6 being started and stopped simultaneously and driven at the same speed.

The shafts of the upper feed rollers 6 are carried in end journals 38 on the upper horizontal members 8 of the planer frame. At the upper side of each of the journals 38 is a relatively heavy spiral band spring 39. Over the upper ends of the springs, the free ends of brackets 40 lie (Fig. 3). Such brackets are permanently bolted to the frame members 8 and are of a sturdy structure. Over the free end portion of each bracket 40 a short, vertically positioned, hydraulic cylinder 41 is placed and secured. Each cylinder 41 has a piston in it, from which a piston rod extends downwardly through the bracket 40 and is supplied with a head at its lower end to bear against the spring 39 below it. By introducing and supplying liquid under pressure to the cylinders 41 at their upper ends, the springs 39 are compressed and transmit the force of their compression to the journals 38. It is to be understood that the upper feed rollers are required to yield upwardly when roughened or upwardly projecting portions of the boards passing underneath them necessitates such elevation, so that the board may pass and not be jammed and wedged between the upper and lower feed rollers.

From the valve 27 which is supplied with liquid from the pump 23, a by-pass connection 42, below the control valve at 27, leads to an upper control valve and housing 43 from which, at its upper side, two pipes 44 lead to the pistons 41, one pipe at each side of the machine for supplying the liquid under pressure to be transmitted through cylinders 41 to the springs 39. Said pipes 44 are joined together adjacent the opposite end of the machine (Fig. 1) and connect with a vertical pipe or conduit 45 which, at its lower end, joins with a change direction conduit 46 which connects with a return pipe 47 lying alongside of and parallel to the pipe 37, carrying the liquid which flows therethrough back to the oil supply tank or reservoir 19.

The cutter head 7 is rotated at very high speed by direct connection to an electric motor 48. By operating the manual control valve at 27 liquid may be simultaneously directed through the pipes 28 and 32 to drive the motors 28 and 33 and thus drive the feed rollers 5 and 6. The speed of rotation of the motors is controlled by the operation of the control or regulating valve at 27 which will pass more or less of the liquid under pressure in accordance with the regulation which is given to the valve 27, under manual control. Likewise the manual control of the valve at 43 may regulate the amount of liquid passed and its pressure which is transmitted through the pistons in the cylinders 41 to the springs 39. It is of course to be understood that the hydraulic pump at 23 is of the type which, when the pressure therein reaches a predetermined amount, has an automatic by-pass come into play which will return liquid to the liquid supply at 19 but which, at all lower pressures which will occur when the valve at 27 is operated to pass the liquid under pressure, will pass through the pipes 28 and 32 to operate the feed roller driving hydraulic motors 28 and 33.

The structure described, while relatively simple is very practical and useful, doing away with gearings, screws and other machine elements which are subject to slack or play therein, particularly after wear has occurred. Speeds and pressures are readily controlled and varied as wanted.

The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. In a wood planer having spaced upper feed rollers, and spaced lower feed rollers, the improvement which consists in connecting a hydraulic motor to each of said feed rollers, a conduit connecting the motors of the upper feed rollers, a second conduit connecting the motors of the lower feed rollers, a pump for pumping hydraulic liquid, an outlet conduit leading therefrom, a valve housing to which the outlet conduit leads, separate conduits connecting the hydraulic motors of the upper and the lower feed rollers with said valve housing, and a manually controllable valve in said valve housing interposed between the outlet to the pump and said two conduits conducting hydraulic liquid to the motors, for closing off passage of liquid to said hydraulic motors, or for controlling passing of liquid under pressure to said motors with equal pressure.

2. The improvements set forth in claim 1, the motors connected with the lower feed rollers being at one end of each of said rollers, and those connected with the upper feed rollers being at the opposite end of each of said rollers, and conduits leading from one of each of the hydraulic motors connected to the upper and lower feed rollers, said conduits being connected together and having a common conduit leading therefrom to return hydraulic liquid to the pump.

3. In a wood planer having two spaced upper horizontal feed rollers, and two spaced horizontal lower feed rollers said rollers being located in two pairs, one of each pair directly over the other, the improvement which consists in connecting a hydraulic motor at one end of each of the feed rollers, means for conducting hydraulic liquid to one of each of the motors connected with the upper and lower feed rollers, means for conducting the hydraulic liquid from said one of each of said motors to the other of said hydraulic motors of the upper and lower feed rollers, means for conducting said liquid away from the last mentioned motors, a liquid supply to which the liquid is returned, a pump receiving liquid from said liquid supply, means for driving said pump, an outlet for liquid pumped by said pump, a valve housing to which said outlet leads, and a manually controlled valve in said housing for stopping passage of liquid pumped to said motors, or for controlling liquid pumped to said motors in equal amounts under equal pressure.

4. In a wood planer having two spaced upper feed rollers, a support therefor and journals for said feed rollers carried by said support said journals being adapted to have a limited upward movement on said support, the improvement which consists in a pair of brackets secured to said support at one end and extending at their other free ends one over each of said journals, a compression spring at the upper side of each of said journals, a hydraulic cylinder secured to and extending above the free end portion of each bracket, having a piston rod provided with means at its lower end to engage the adjacent spring at its upper end, means for conducting liquid under pressure into said cylinders to act upon each of said piston rods to put said springs under compression, and means for manually controlling said passage of liquid to said cylinders and for selectively maintaining pressure therein.

5. In a wood planer having spaced upper horizontal feed rollers, journals between which said feed rollers are rotatably mounted, supports for said journals, for mounting said journals to maintain them against horizontal movement and permit a limited upward movement and springs one over each journal at the upper side thereof, the improvement comprising, means for transmitting hydraulic pressure to said springs to compress them, means for pumping liquid continuously to said last mentioned means to supply said hydraulic pressure, and manually operable means for controlling the supply of hydraulic liquid to maintain pressure acting upon said springs at a preselected amount.

6. In a wood planer having a plurality of upper and lower feed rollers, one over the other, horizontally mounted, a fixed support upon which the upper feed

rollers are carried, a movable support for carrying the lower feed rollers, the improvement comprising piston cylinder apparatus connected to said movable support, hydraulic means for actuating said piston cylinder apparatus to raise and lower the support to vertically adjust the lower feed rollers, a pump, operation of which supplies liquid under pressure for said piston cylinder apparatus, a hydraulic motor connected with each of said upper and lower feed rollers, a second pump for supplying liquid under pressure to said hydraulic motors, and a single prime mover for simultaneously operating both pumps.

7. The improvement defined in claim 6, and manually operable means, one for the piston cylinder apparatus, and one for said hydraulic motors, for controlling the operation of said piston cylinder apparatus and said hydraulic motors independently of each other.

8. The improvement defined in claim 6, and compression spring means normally holding the upper feed

rollers in a lowermost position and yieldable for permitting limited upward movement thereof, of means for applying hydraulic pressure upon said springs including connections with the second mentioned of said pumps for simultaneously supplying hydraulic pressure to said springs, and for supplying liquid under pressure to said hydraulic motors, combined with a third manually operable means for controlling hydraulic pressure supplied to said springs.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,651,013	Buss et al.	Nov. 29, 1927
1,736,641	Zimmerman	Nov. 19, 1929
2,118,098	Meranda	May 24, 1938
2,397,106	Haller	Mar. 26, 1946