Sept. 6, 1927. 1,641,300

F. C. SPENCER

MATERIAL DISTRIBUTING DEVICE

Filed Dec. 29, 1924 3 Sheets-Sheet 1

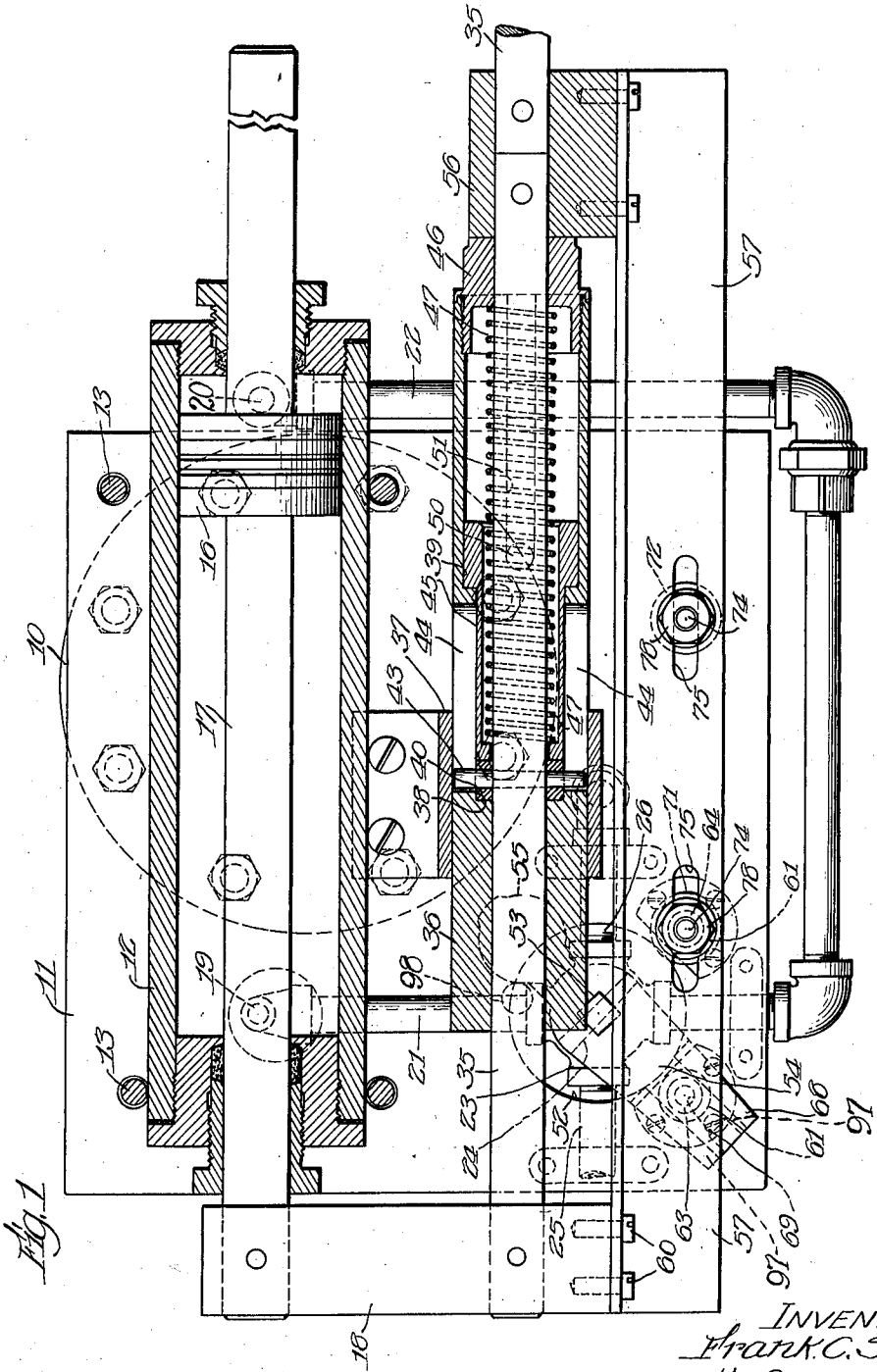


Fig. 1

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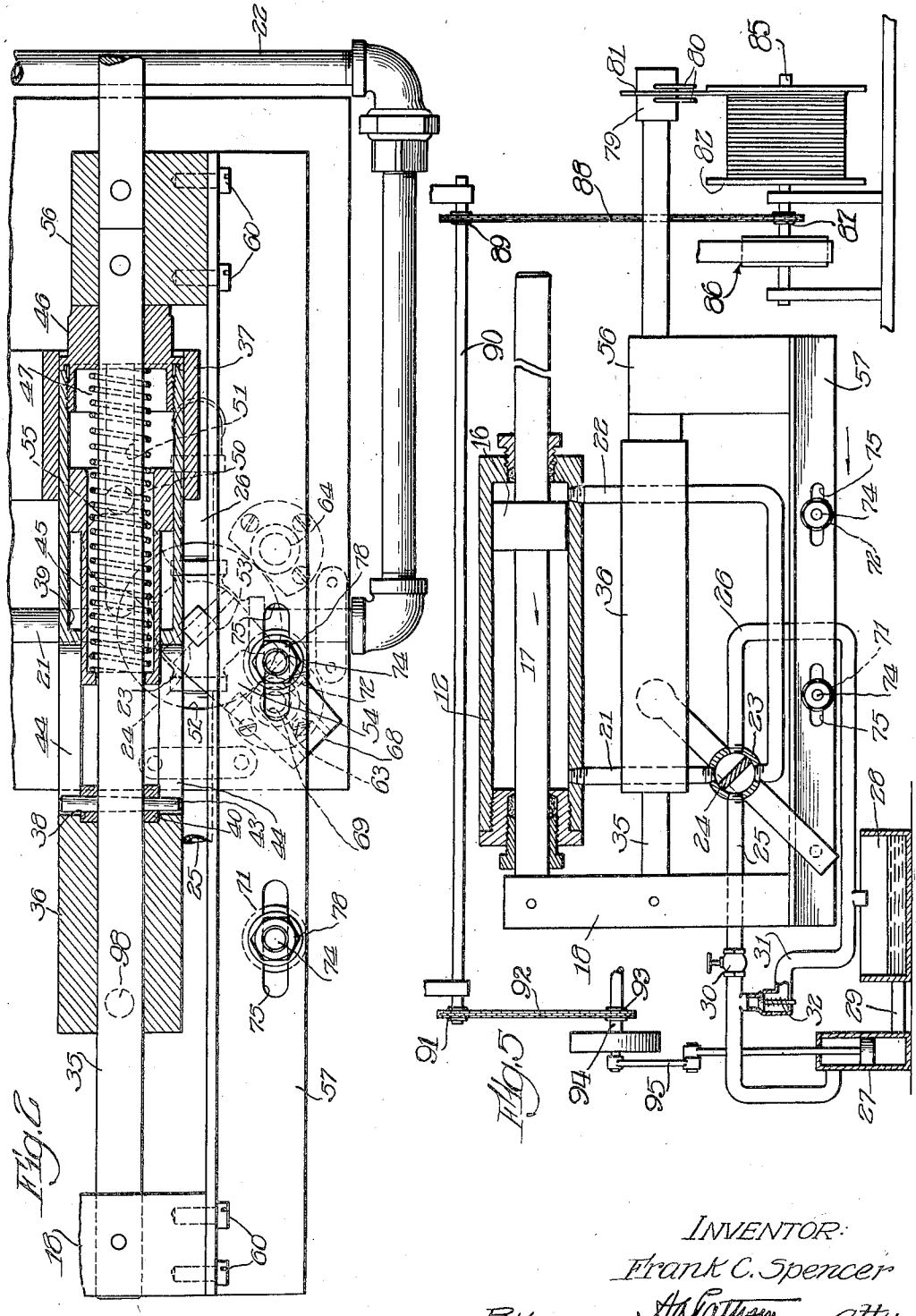


Fig. 5

Fig. 6

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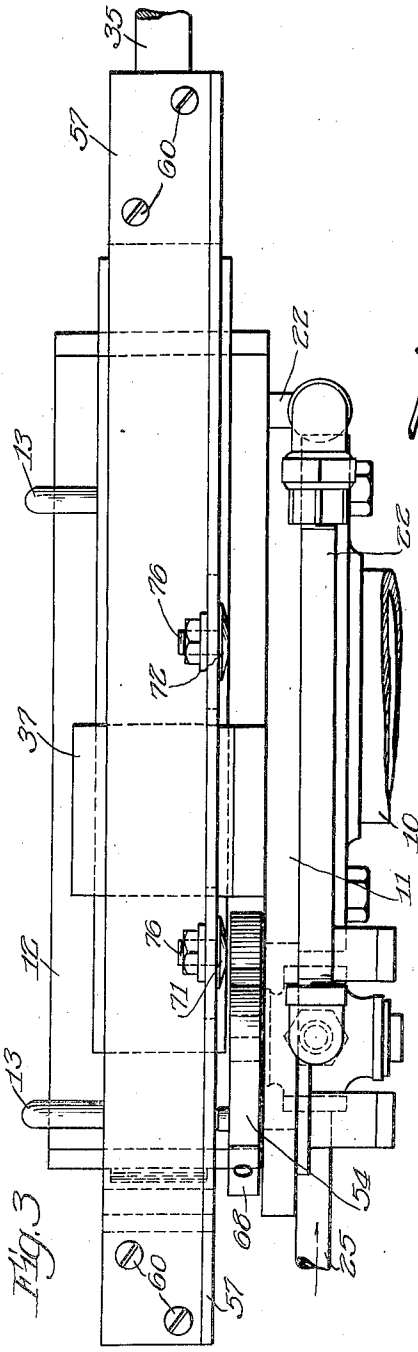


Fig. 3

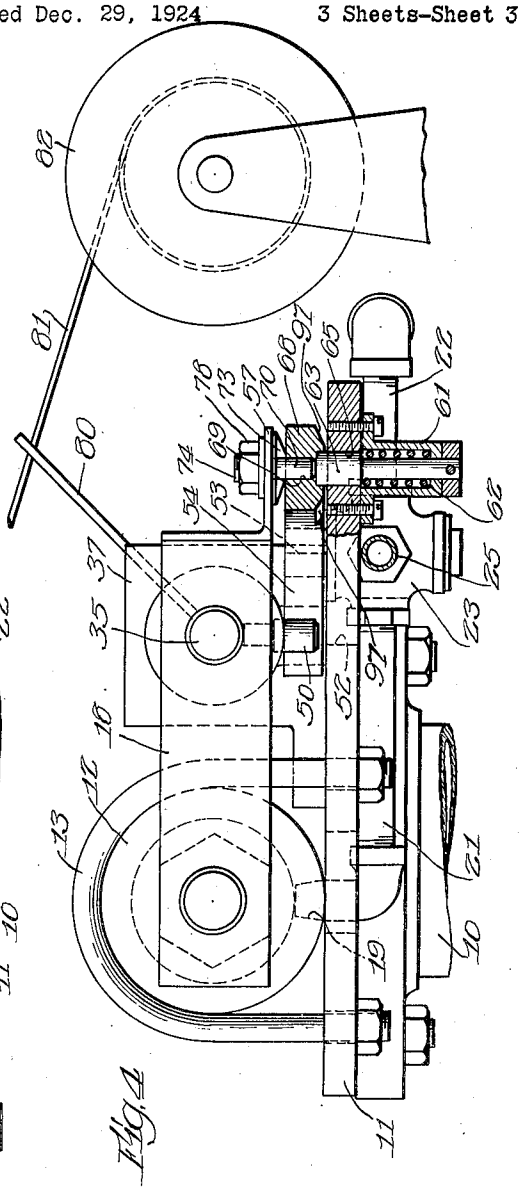


Fig. 4

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UNITED STATES PATENT OFFICE.

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MATERIAL-DISTRIBUTING DEVICE.

Application filed December 29, 1924. Serial No. 758,573.

This invention relates to material distributing devices, and more particularly to fluid actuated mechanism for distributing material in strand form on reels.

The object of the invention is to provide a fluid actuated mechanism for distributing material in strand form.

In accordance with the general features of the invention there is provided a strand distributor adapted to be given a reciprocatory motion by a double acting hydraulic motor, the distributor upon reaching the limit of its travel in either direction releasing a latched lever which operates a four-way valve controlling the flow of a fluid, which may be oil, to the opposite end of the cylinder, the valve lever upon being released instantly moves, due to energy stored in a coil spring during the travel of the distributor, and becomes locked in its new position. The length of the travel of the distributor is regulated by the position of adjustably mounted latch tripping buttons movable with the distributor and the speed of reciprocation thereof is governed by the speed of the take-up means.

It is believed that the invention will be clearly understood from the following description taken in connection with the accompanying drawings illustrating one embodiment of the invention, in which—

Fig. 1 is a plan view, partly in section, of a strand distributor embodying the features of the invention;

Fig. 2 is a fragmentary plan view, partly in section, showing the mechanism in another position;

Fig. 3 is a side view thereof;

Fig. 4 is an end view, partly in section, and

Fig. 5 is a diagrammatic view illustrating the invention, particularly the means for supplying oil under pressure to the cylinder.

Referring to the drawings illustrating one embodiment of the invention, a vertically disposed standard, which may be supported from the floor, is partially indicated at 10 (Fig. 3), upon which is mounted a base plate 11. Supported upon the plate 11 is a double acting hydraulic cylinder 12 retained in position upon the plate 11 by a pair of U-bolts indicated at 13. Mounted within the cylinder 12 is a piston 16 (Figs. 1, 2 and 5) connected to a piston rod 17, which rod at its one end is connected to a cross head 18, the opposite end passing through the other end of the cylinder. The cylinder is provided with ports 19 and 20 at opposite ends, which in the operation of the cylinder 12, act alternately as inlet and outlet ports for the hydraulic medium. The ports 19 and 20 are connected by pipes 21 and 22, respectively, to a four-way hydraulic valve casing 23. By means of a valve 24 mounted in the casing 23, the pipes 21 and 22 serve alternately as supply and exhaust pipes for the motive fluid passing into and out of the valve casing 23 through pipes 25 and 26, respectively.

The hydraulic fluid, which may be oil, supplied by any suitable means, for instance, a pump 27 indicated diagrammatically in Fig. 5, is connected to an open reservoir indicated at 28 containing a supply of oil. The pipe 25 is connected to the outlet end of the pump 27, while the pipe 26 is arranged to drain into the open reservoir 28. The inlet end of the pump 27 is connected to the reservoir by a pipe 29. A throttle valve 30 is included in the fluid supply line 25 for regulating the flow of the fluid to the cylinder 12. A by-pass is indicated at 31 in the supply pipe 25 between the valve 24 and the outlet end of the pump 27 and is provided with a suitable relief valve 32 for limiting the pressure. The by-pass 31 may also connect to the exhaust pipe 26 as shown in Fig. 5 for draining jointly therewith into the reservoir.

Secured to the cross head 18 below the cylinder 12 and parallel thereto, as viewed in Figs. 1 and 4, is a distributor rod 35 which is reciprocably mounted in a sleeve 36, the sleeve in turn being reciprocably mounted in a stationary bracket 37 secured to the base plate 11. The bore of the sleeve 36 is stepped as indicated at 38 and 39, thus providing three different diameters along its length. Fitting within the step 38 of the sleeve 36 is a collar 40 which is secured to the rod 35 by a pin 43, the opposite ends of the pin projecting into oppositely disposed slots 44 formed longitudinally in the sleeve 36, the pin being flush with the outside surface of the sleeve. Normally in contact with the end wall of the step 39 of the sleeve 36, as viewed in Fig. 1, is a second sleeve 45 serving as a spring barrel, which is reciprocably mounted between the sleeve 36 and rod 35. The end of the rod 35 opposite the cross head

18 projects from the sleeve 36 and through a plug or bearing 46 screw threaded into the sleeve 36, in which it is slidably mounted, the outside diameter of the bearing 46 being the same as the diameter of the sleeve 36, so that it may move into the bracket 37 in the operation of the mechanism as shown in Fig. 2. Mounted upon the rod 35 between the barrel 45 and the bearing 46 is a coiled compression spring 47. In the normal position of the mechanism, as viewed in Fig. 1, at the beginning of a movement in one direction, the spring 47 is under a minimum amount of compression. Suitably secured to the sleeve 45 (Figs. 1 and 4) is a stud 50, which is slidable in a longitudinal slot 51 formed in the sleeve 36, the stud projecting rearwardly therefrom as viewed in Fig. 1. The valve casing 23 is suitably mounted at the rear of the base plate 11, a portion of the valve casing being entered within an opening 52 formed in the plate 11 so that the valve stem 53 will be positioned at the top side of the plate 11 (Fig. 4). Mounted upon the valve stem 53 is an operating lever 54, the upper end 55 (Fig. 1 and 2) of which lies in the path of the stud 50, carried by the sleeve 45, and is suitably shaped for a sliding contact therewith. Fixed to the rod 35 and adjoining the bearing 46 is a block 56, the lower end of which, as viewed in Figs. 1 and 3, lies in the same plane as the lower end of the cross head 18.

Spanning the space between the cross head 18 and the block 56 is an angle 57 which is secured to the ends of the cross head 18 and block 56 by screws 60. Mounted upon the bottom face of the plate 11, as viewed in Fig. 1 and clearly shown in Fig. 4, are two spring plunger housings 61. Carried within the housings 61 and arranged to be normally moved outwardly by coiled compression springs 62 are plungers 63 and 64. The heads of the plungers 63 and 64 project, as clearly shown in Fig. 4, through openings 65 formed in the plate 11 and above the top surface thereof. As viewed in Fig. 1, the plungers 63 and 64 are arranged equi-distant from the axis of the valve 24. The free end 68 of the valve operating lever 54, as viewed in Fig. 1, is provided with a shouldered opening 69 within which is slidably mounted a pin 70 (Fig. 4) which normally is positioned directly over one or the other of the plungers 63 and 64. The plungers 63 and 64 are adapted to alternately engage within the shouldered portion of the opening 69. As shown in Figs. 3 and 4, the pin 70 normally projects above the top surface of the lever 54 and is moved downwardly to a position where it lies flush with the top surface thereof by one or the other of a pair of lever releasing or tripping buttons 71 and 72. The pin 70 in moving downwardly presses one or the other of the plungers 63 and 64 out of the shouldered opening 69, thereby freeing the lever 54. The buttons 71 and 72 each comprise a comparatively thin disc, the engaging face of which is cone-shaped, as indicated at 73, and formed integrally therewith upon the opposite face is a threaded stem 74 which is passed through a slot 75 (one for each stem) formed in the angle 57 and adapted to be clamped in position by a nut 78 at different points along the slot. The purpose of providing an adjustable mounting for the buttons 71 and 72 will be pointed out hereinafter.

Secured to the extreme right-hand end of the distributor rod 35 is a collar 79 (Fig. 5) mounting a pair of strand guiding fingers 80 disposed at a suitable angle and between which the strand indicated at 81 travels in passing from a supply source (not shown) to a suitably driven take-up spool 82.

It is sometimes the practice in reeling strand to provide means for automatically reducing the speed of rotation of the reel upon which the strand is being coiled as the diameter of the coiled material upon the reel increases, thereby providing a substantially uniform tension upon the material during the reeling thereof. In the drawings, referring to Fig. 5, means is illustrated diagrammatically for operating the pump in synchronism with the variable speed of the reel 82. The reel is suitably secured to a shaft 85 driven by a belt and pulley 86 in turn connected to a suitable source of power (not shown), the speed of which pulley is automatically varied as hereinbefore mentioned. Carried upon the shaft 85 is a sprocket wheel 87 connected by a chain 88, sprocket wheel 89, shaft 90, sprocket wheel 91, chain 92, sprocket wheel 93, and a shaft 94 to a suitable crank or eccentric means indicated at 95 which is connected to the pitman of the pump 27. The driving ratio between the various sprocket wheels is such that the pump is driven at the desired speed. It will thus be seen that the speed of reciprocation of the piston 16 of the cylinder 12 and in turn the strand guiding fingers 80, through the mechanism hereinbefore described will move back and forth across the space between the flanges of the reel at a slower speed as the diameter of the coiled material upon the reel increases. Thus the speed of distribution of the strand upon the reel is in synchronism with the speed of rotation of the reel.

The operation of this device is as follows: With the parts in the position illustrated in Figs. 1 and 5, in which the valve operating lever 54 has just moved to the position shown, the left-hand end of the cylinder 12 has consequently been connected with the exhaust pipe 26 and the right-hand end with the supply pipe 25 through the valve 23. The motive fluid now passes through the

pipe 22 at the right, driving the piston 16 to the left and forcing out the fluid through the pipe 21. Carried along with the piston through the rod 17 and cross head 18 is the distributor rod 35 carrying the strand guiding fingers 80. Through the pin 43 and collar 40 the sleeve 36 also moves and in doing so compresses the spring 47 between the bearing 46 and the barrel 45 as hereinbefore described. The stud 50 mounted in the barrel 45 and projecting through the slot 51 formed in the sleeve 36 finally engages the upper end 55 of the lever 54 as clearly shown in Fig. 2. During the movement of the stud 50 as just described the tripping button 71 moving in unison with the rod 35 has engaged and passed over the pin 70 associated with the plunger 63 and to the left thereof as viewed in Fig. 2. The button 71 in passing over the pin 70 moves the plunger 63 to a position where the top surface thereof will lie flush with the top surface of the plate 11 as viewed in Figs. 3 and 4, but due to the fact that the spring pressed stud 50 is not in engagement with the upper end of the lever 54 at this time, no movement of the lever occurs. With the stud 50 in engagement with one end of the lever 54 and the plunger 63 still within the shouldered opening 69 in the opposite end of the lever the continuing movement of the distributor rod 35 will further compress the spring 47, the barrel remaining stationary due to the stud 50 carried thereby engaging the lever 54, thereby storing up energy behind the stud 50 which will act to move the stud to the left as viewed in Fig. 2 upon the release of the lower end 68 of the lever 54. As the piston 16 nears the end of its movement to the left, the tripping button 72 moving with the rod 35 will engage the pin 70, thereby causing the plunger 63 to be moved flush with the top surface of the plate 11 (Fig. 4) and releasing the lever 54 which will be quickly rotated counter-clockwise as viewed in Figs. 1, 2 and 5. The lower end of the lever 54, as viewed in Figs. 1 and 2, is provided with oppositely disposed cam-like portions 97 upon the bottom surfaces thereof, as best shown in Fig. 4, which upon actuation of the lever in one direction or the other alternately engage the plungers 64 and 63 and move them downwardly, thereby permitting the shouldered opening 69 in the lever to be concentrically aligned with one or the other of the plungers 63 and 64. In the counter-clockwise rotation of the lever just described it will engage the plunger 64 and be locked thereby in its reversed position. The buttons 71 and 72 now positioned at the left of the lever will bear the same relation to the plungers 63 and 64 as they did at the right of the lever, as shown in Fig. 1. The position of the valve 24 now being reversed the pipes 21 and 22 now become inlet and exhaust pipes, respectively, for the fluid to and from the cylinder 12, the piston 16 will thereby be moved toward the opposite or right end of the cylinder. The sleeve 36 has secured thereto a stud 98 indicated in dotted outline in Figs. 1 and 2, which is so positioned upon the sleeve that it has the same relationship with the left side of the upper end 55 of the lever 54 when the lever has been moved to the position just described as the stud 50 bears to the right side thereof as illustrated in Fig. 1. The cylinder 16 in moving to the left moves the sleeve 36 and due to the engagement of the left end of the barrel 45 with the collar 40 the barrel also moves and thereby compresses the spring 47. The stud 98 mounted in the sleeve 36 finally engages the upper end 55 of the lever 54 upon its left side as viewed in Figs. 1 and 2. During this movement and before the stud 98 engages the lever, the button 72 freely passes over the plunger 64 without causing a movement of the lever 54 in the same manner as described in connection with the movement of the piston 16 to the left as hereinbefore described. Upon engagement of the stud 98 with the lever, the rod 35 continues to move toward the right and further compresses the spring 47, the barrel 45 remaining stationary. As the piston nears the end of its movement to the right, the tripping button 71 will engage the pin 70, thereby actuating the plunger 64 in the manner described in connection with the plunger 63, thereby releasing the lever 54 which will quickly rotate clockwise as viewed in Figs. 1, 2 and 5, due to the energy stored in the spring 47. Upon completion of this reciprocation the mechanism will appear as shown in Fig. 1, and this action is automatically repeated with each arrival of the guiding fingers 80 at the limit of their travel in either direction, as will be obvious. It will also be noted that this mechanism can be easily adjusted to vary the length of travel of the guiding fingers 80 within the range of the mechanism by adjusting the position of the tripping buttons 71 and 72 along the slots 75.

The advantages of the hydraulically actuated device, as hereinbefore described, for distributing strand or wire in spooling or reeling operations over the usual type of distributing mechanism wherein a right and left hand screw is used, are that a very quick and accurate adjustment of the feeding pitch of the distributing element regardless of the diameter of wire or strand may be had, as will readily be understood.

What is claimed is:

1. A device for distributing material in strand form, comprising a reciprocable strand distributing and guiding rod, a fluid operated motor operatively connected to said rod for causing a movement thereof, means

including a latchable member for controlling the admission of fluid to said motor, a coiled spring on the rod for actuating the member adapted to be similarly charged during each movement of the rod, and means movable with said rod for releasing said controlling member upon said rod reaching a predetermined point during its movement.

2. A distributing device for a strand reeling mechanism, comprising a reciprocable strand distributing and guiding rod, a double acting fluid operated motor operatively connected to said rod for causing a reciprocation thereof, means including a latchable member for controlling the admission of fluid to said motor, a coiled spring on the rod for actuating the member adapted to be similarly charged during each movement of the rod, and means movable with said rod for releasing said controlling member upon said rod reaching a predetermined point during its movement in either direction to cause a movement thereof in the reverse direction.

3. A distributing device for a strand reeling mechanism, comprising a reciprocable distributing rod having a strand guiding portion thereon, a fluid operated motor operatively connected to said rod for causing a reciprocation thereof, a valve for controlling the admission of fluid to said motor, a latchable lever for operating said valve, means including a coiled spring associated with said rod for moving said lever, said spring adapted to be similarly charged upon each movement of the rod, and means movable with said rod for unlatching said lever upon said rod reaching a predetermined point during its movement.

4. A distributing device for strand reeling mechanism, comprising a reciprocable distributing rod, strand guiding fingers mounted thereon, a double acting motive fluid motor operatively connected to said rod for causing a reciprocation thereof, a valve for controlling the admission of the motive fluid to said motor, a lever for operating said valve, means for retaining said lever in a plurality of set positions, a coil spring around said rod, means carried by said rod adapted to compress said spring during a portion of the movement of said rod in either direction and into operative relation with one end of said lever, and means movable with said rod for releasing said lever from said retaining means upon said rod reaching a predetermined point during its movement in either direction, said spring then acting to actuate said lever and thereby cause a movement of the rod in a reverse direction.

5. A device for distributing material in strand form, comprising a reciprocable distributing rod having a strand guiding portion thereon, a double acting fluid operated motor operatively connected to said rod for causing a reciprocation thereof, a valve for controlling the admission of fluid to said motor, a lever for operating said valve, latching means cooperating with one arm of said lever for retaining said lever in a plurality of set positions, a coiled spring associated with said rod and adapted to be charged during the movement thereof in either direction to exert energy against another arm of the lever, and means movable with said rod for releasing said latched lever upon said rod reaching a predetermined point during its movement in either direction to cause a movement thereof in the reverse direction through the action of the coiled spring.

6. The combination with a strand reeling mechanism, comprising a take-up reel and means for driving the reel to wind material in strand form thereon of means for distributing the strand on the reel, fluid operated means for actuating the distributing means, and means responsive to variations in the speed of the reel driving means to control the speed of the distributing means.

7. The combination with a strand reeling mechanism, comprising a take-up reel and means for driving the reel to wind material in strand form thereon of means for distributing the strand on the reel, fluid operated means for actuating the distributing means, and means operated by the reel driving means to supply fluid to the actuating means.

8. In a strand reeling mechanism, a take-up reel, means for driving the reel to wind material in strand form thereon, means for distributing the strand on the reel, fluid operated means for actuating the distributing means, a fluid reservoir, means for causing fluid to pass therefrom and be effective to actuate said fluid operated means, and means for operatively connecting the reel driving means with the means for causing fluid to pass from the reservoir.

9. In a strand reeling mechanism, a take-up reel, means for driving the reel to wind material in strand form thereon, means for distributing the strand on the reel, fluid operated means for actuating the distributing means, a fluid reservoir, a pump designed to draw fluid therefrom and cause the fluid to become effective to actuate said fluid operated means, and means for operatively connecting the reel driving means with the pump whereby the speed of distribution of the strand upon the reel is in synchronism with the speed or rotation of the reel.

In witness whereof, I hereunto subscribe my name this 19 day of Dec., A. D., 1924.

FRANK CALVIN SPENCER.