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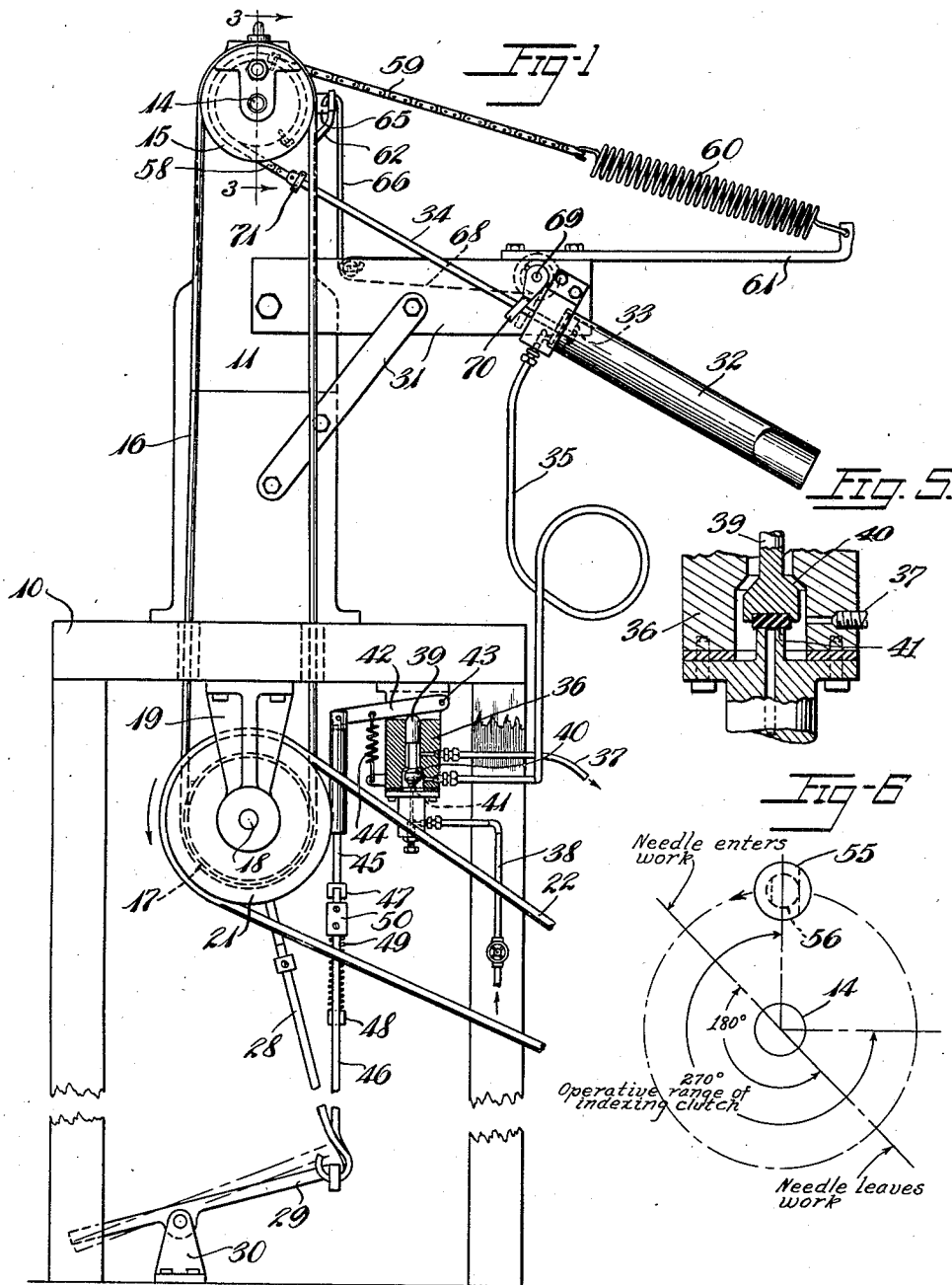
H. L. DAVIS

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SEWING MACHINE

Filed March 14, 1930

2 Sheets-Sheet 1



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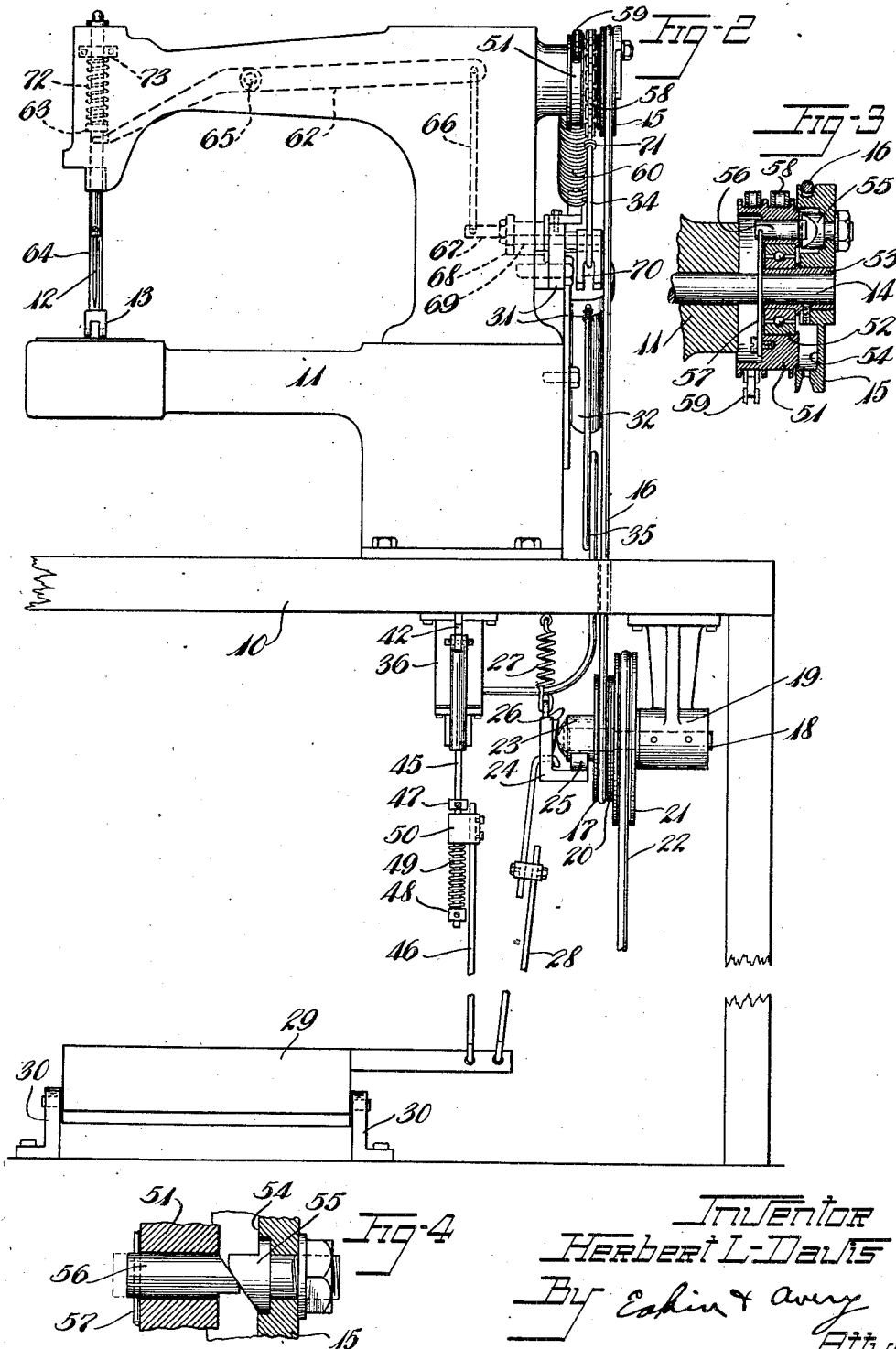
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SEWING MACHINE

Application filed March 14, 1930. Serial No. 435,808.

This invention relates to sewing machines, and more especially to sewing machines of the power driven type.

The chief objects of the invention are to effect improved quality of the work; to increase production; to render the sewing operation less laborious; and to provide a sewing machine by which the foregoing objects are accomplished.

Of the accompanying drawings:

Fig. 1 is an end elevation of my improved sewing machine in its preferred form, parts being broken away and in section.

Fig. 2 is a front elevation of the sewing machine shown in Fig. 1.

Fig. 3 is a section, on a larger scale, on line 3—3 of Fig. 1.

Fig. 4 is a detail sectional view, on a larger scale, of a portion of the clutch mechanism shown in Fig. 3.

Fig. 5 is a detail sectional view of valve 41 and associated parts.

Fig. 6 is a diagrammatic view showing the operative range of an indexing mechanism with relation to the angular positions of the drive shaft of the sewing machine.

Briefly stated, my invention comprises a power driven sewing machine in combination with indexing mechanism which automatically advances operative parts of the machine to determine positions when the driving power is disconnected. The indexing mechanism is associated with the mechanisms for operating the needle or needles of the machine and the presser-foot, and serves to lift the same out of engagement with the work whenever the machine is stopped.

Referring to the drawings, 10 is a bench or table upon which is mounted a power driven sewing machine 11 of the usual type used for heavy industrial work. The sewing machine is provided with the usual needle 12 (Fig. 2), presser-foot 13, and feed-pawl (not shown) co-operating with the latter for advancing the work. The aforesaid mechanisms are actuated by the usual drive-shaft 14, which is provided on its outer end with a pulley 15, and the latter is connected by a transmission belt 16 with a pulley 17 journaled on a stub-shaft 18, which stub-shaft is mounted in

a bracket 19 secured to the under side of the table 10.

One lateral face of the pulley 17 is provided with a friction disc 20 adapted frictionally to engage the adjacent lateral face of a constantly driven pulley 21 also journaled on the stub-shaft 18 and connected by a transmission belt 22 with a suitable source of motive power (not shown). The opposite lateral face of the pulley 17 is formed with a laterally extending hub portion 23 which has a rounded and closed end portion. An L-shaped member 24 mounted adjacent the end of the pulley-hub 23 is formed with a brake-shoe 25 adapted to engage the peripheral face of the hub, which thereby serves as a brake-drum, to stop the rotation of the pulley 17 quickly when it is desired to stop operation of the machine. The member 24 also is formed with a face-cam 26 adapted to engage the rounded end portion of the hub 23 for urging the pulley 17 into frictional driving engagement with the pulley 21 to actuate the operative parts of the sewing machine.

The member 24 is mounted for vertical movement, in the upper limit of which the brake shoe 25 is in engagement with the pulley-hub 23, the cam 26 is exerting no axial pressure against the end of the hub, and the operative parts of the machine are stationary. In the lowermost position of the member 24, which is the full-line position of the parts shown in Fig. 2, the brake-shoe 25 is retracted from the hub 23 and the cam 26 is urging the pulley 17 into frictional driving engagement with the constantly driven pulley 21. A tension spring 27 connected with the member 24 and to the under side of the table 10 normally urges the said member upwardly. An adjustable link 28 connects the member 24 with a foot-treadle 29 swivelled in brackets 30, 30 on the floor beneath the table 10, whereby the operator is enabled to depress the said member, against the tension of the spring 27, to start the operation of the machine in the usual manner.

A rearwardly extending bracket 31 is mounted upon the sewing machine 11 at the same end thereof as the pulley 15 and somewhat below the latter. The bracket 31 sup-

ports a fluid pressure cylinder 32 which is obliquely disposed at such an angle that its extended axis is substantially tangent to the pulley 15. The cylinder 32 is provided with the usual piston 33, and with a piston rod 34 which extends from its forward end. The rear end of the cylinder is open, and pressure fluid is admitted to and vented from the cylinder at its forward end, between the piston and the end wall, through an inlet and outlet pipe 35.

The pipe 35 communicates with the delivery port of a three-way plunger valve 36 mounted on the under side of the table 10, said valve also being provided with an exhaust pipe 37, a supply pipe 38 extending to a source of pressure fluid (not shown), and with a vertical, freely movable plunger 39. The lower end of the latter is formed with a tapered valve which is adapted to engage a tapered valve-seat 40, when the plunger is in its uppermost position, to close the passage leading to the exhaust pipe 37, leaving the pipes 35, 38 in communication with each other whereby the cylinder 32 is charged. In its lowermost position the bottom of the plunger 39 rests upon and closes the inlet port 41 of the supply pipe 38, putting the pipes 35, 37 in communication with each other through the open valve seat 40, as shown, whereby the cylinder 32 is vented or discharged.

A lever 42 pivoted at 43 in the casing of the valve 36 engages the upper end of the plunger 39, and a tension spring 44 of sufficient strength to depress the plunger 39 against the pressure of the fluid is connected to the lever 42 adjacent its free end and to the valve casing. The free end of the lever 42 is connected by a two-part lost-motion link to the foot-treadle 29, one portion 45 of said link being connected to the lever 42 and another portion 46 thereof being connected to the treadle. Secured to the lower end of the member 45 at spaced apart positions are respective collars 47 and 48, and a compression spring 49 is mounted upon the member between the lower collar 48 and a block 50 slidably mounted upon the member 45 and secured to the member 46.

The arrangement is such that when the foot-treadle 29 is in raised position the block 50 is in engagement with the collar 47 and lifts the link-member 45 and lever 42 against the tension of the spring 44 and permits the fluid pressure in the pipe 38 to lift the valve-plunger 39 and thereby to open the inlet port 41 and to charge the cylinder 32 through the pipe 35 with pressure fluid from said pipe 38. When the treadle is depressed the spring 44 effects the immediate depression of the lever 42 to lower the valve-plunger 39, and thereby to discharge the cylinder 32 through the pipes 35, 37, before the pulley 17 is fully in driving relation with the pulley 21 toward which it is moved by the cam 26. After the

lever 42 is in lowered position, further movement of the link-member 46 draws the block 50 away from the collar 47 against the force of the spring 49. Thus in the reverse or upward movement of the treadle the rotation of the pulley 17 is stopped before the cylinder is charged.

In a sewing machine of the character herein provided, one revolution of the drive-shaft 14 effects one operative cycle, that is, a downward and an upward movement of the needle, the needle being in engagement with the work during substantially half or 180° of the shaft's revolution and out of engagement therewith for the same period. My improved indexing means comprises clutch mechanism operating in an arc of 270° and adapted operatively to engage and rotate the drive-shaft, upon occasion, upon the stopping of the machine with the needle not at the maximum raised position denoted by the medial 90 degrees of the aforesaid 180° of the shaft's rotation during which the needle is raised from the work. Thus with the stopping of the sewing machine the indexing mechanism instantly rotates the drive-shaft forwardly and stops it at a position where the needle is raised sufficiently to permit manipulation of the work, if said drive-shaft, by chance, already is not in such position. The range of the indexing mechanism's operation with relation to the angular positions of the drive-shaft is graphically illustrated in Fig. 6.

The indexing mechanism comprises a disc or pulley 51 journaled on a suitable bearing 52 mounted upon a bushing 53 on the drive-shaft 14, said disc being positioned between the pulley 15 and the machine housing, and formed on its periphery with three flanges which define two grooves. The face of the pulley 15 adjacent the disc 51 is formed with a concentric groove 54, and projecting thereinto is a fixed stud 55 which has its leading edge beveled or tapered as shown in Figs. 3 and 4. Slidably mounted in the wall of the disc 51 parallel to the axis thereof is a pin or detent 56 the forward end or nose of which extends into the orbit of the stud 55, the detent being yieldingly maintained in this position by a leaf-spring 57 engaging its rear end-portion. The nose of the detent 56 is beveled complementary to the stud 55 as shown, the arrangement being such that when the disc 51 is stationary the stud 55 depresses and passes over the detent during each revolution of the pulley 15. The disc 51 is rotatable in either direction, and, when the pulley 15 is stationary and the disc rotated in a counter-clockwise direction, the detent 56 is adapted to engage the stud 55 and to rotate the pulley 15 and shaft 14 a limited distance depending upon the position at which the detent engages the stud.

For so rotating the disc 51, counter-clock-

wise through an angle of 270° , a cable or chain 58 is mounted in one of the peripheral grooves of the disc 51 and one end of the chain is secured to the disc and its other end is secured to the outer end of the piston-rod 34 of the fluid pressure cylinder 32. The length of the piston's stroke is such that charging of the cylinder 32 retracts the piston rod and pulls the chain 58 a sufficient distance to rotate the disc 51 through 270° . For rotating the disc 51 in the opposite or clockwise direction, and for moving the piston rod 34 outwardly during the discharging of the cylinder 32, a cable or chain 59 is mounted in the other peripheral groove of the disc 51 and one of its ends is secured to the disc and its other end is secured to one end of a tension spring 60, the other end of the tension spring being secured to an extension 61 of the bracket 31.

For raising the presser-foot 13 from the work substantially concurrently with the raising of the needle therefrom, the forked end of a lever 62 engages the under side of a collar 63 mounted upon the stem 64 of the presser-foot, said lever 62 being pivotally mounted at 65 on the machine frame and having its opposite end connected by a link 66 to a stud 67 extending laterally from one end of a lever 68. The other end of said lever is secured to one end of a rock-shaft 69 which is journaled in the bracket 31 and has its other end provided with a fork-end rocker-arm 70 straddling the piston-rod 34 adjacent the closed end of cylinder 32. The outer end of the piston-rod 34 is provided with a flange or collar 71 adapted to engage the rocker-arm 70 at substantially the limit of the piston-rod's inward movement during the charging of the cylinder 32, and by rocking said rocker-arm and the rock-shaft 69, to actuate the parts connected therewith comprising the lever 68, link 66 and lever 62 to raise the forked end of the latter and with it the presser-foot 13. A compression spring 72 is mounted upon the stem 64 of the presser-foot between the collar 63 thereon and a guide 73 in which said stem slides for normally urging the presser-foot downwardly toward operative position.

In the operation of the apparatus the operator uses both hands to manipulate the work at all times and operates the machine solely with her feet. When not in operation, the cylinder 32 is charged, the piston rod 34 is in retracted position within the cylinder, and the needle 12 and presser-foot 13 are in raised position permitting the work to be easily and quickly placed in position for sewing. To start the machine the operator depresses the toe portion of the treadle 29 to the full line position of the drawings, with the immediate result that the link 45-46 is lowered and the valve 36 operated to close the fluid-inlet port 41 therein and to discharge the cylinder 32 through the pipes 35 and 37.

This permits the spring 60 to contract, thereby rotating the disc 51 in a clockwise direction as viewed in Fig. 1, and drawing the piston-rod 34 to its projected position shown in said figure. As the collar 71 on the piston rod releases the rocker-arm 70, the spring 72 on the presser-foot stem moves said presser-foot downwardly to operative position upon the work. The foregoing operations are effected before continued downward movement of the treadle releases the brake 25 from the hub 23 and the cam 26 forces the pulley 17 into frictional driving engagement with the constantly driven pulley 21, to drive the machine.

To stop the machine, the toe of the treadle 29 is raised, permitting the spring 27 to draw the member 24 upwardly, thus moving the cam 26 from the hub 23 and applying the brake 25 thereto to stop the machine. The block 50 then engages the collar 47 on the link 45 and lifts the lever 42 against the tension of the spring 44, thereby permitting the pressure fluid in the pipe 38 to raise the plunger 39 and to seat the same in the valve-seat 40 to close off the exhaust pipe 37 and to permit said pressure fluid to enter the pipe 35 to charge the cylinder 32. As the piston rod 34 of the cylinder moves rearwardly against the tension of the spring 60, the disc 51 is rotated counter-clockwise as viewed in Fig. 1. If the pulley 15 has stopped with the stud 55 thereof elsewhere than in the 90° angle corresponding to the uppermost positions of the needle 12, the detent 56 of the disc 51 will engage said stud 55 and rotate the pulley 15 forwardly, and come to a stop with the stud within said 90° angle, thus raising the needle 12. As the piston-rod 34 reaches its extreme rearward position, the collar 71 engages the rocker-arm 70, and, through the mechanism hereinbefore described, raises the presser-foot 13 against the pressure of the spring 72.

The invention is susceptible of modification within the scope of the appended claims.

I claim:

1. The combination, with a sewing machine of the power-driven type, of clutch mechanism associated with said power drive, fluid pressure operated means for concurrently raising the needle and the presser-foot of the machine, a valve associated with said fluid pressure operated means, and means common to said valve and said clutch mechanism for operating the same in timed relation.

2. The combination, with a sewing machine including a shaft, of a pulley fixed to said shaft, drive-means for said pulley, a disc journaled on said shaft beside said pulley, clutch means on said disc adapted to engage said pulley, and means for imparting determinate reciprocatory angular movement to said disc of less than 360 degrees.

3. The combination, with a sewing machine

including a shaft, of power means for normally driving said shaft, auxiliary shaft-driving means including a single acting fluid pressure cylinder for turning said shaft angularly when the power means is disengaged, and means for automatically resetting said last-named means.

4. The combination, with a sewing machine including a shaft, of power means for normally driving said shaft, auxiliary shaft-driving means including a fluid pressure cylinder for turning said shaft angularly when the power means is disengaged, and presser-foot-lifting mechanism associated with said fluid pressure cylinder.

In witness whereof I have hereunto set my hand this 12th day of February, 1930.

HERBERT L. DAVIS.

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