Feb. 23, 1965 O. V. DUTRO ETAL 3,170,397

INK FOUNTAIN AND DUCTOR ROLL DRIVE

Filed Oct. 9, 1962 2 Sheets-Sheet 1

FIG. 1

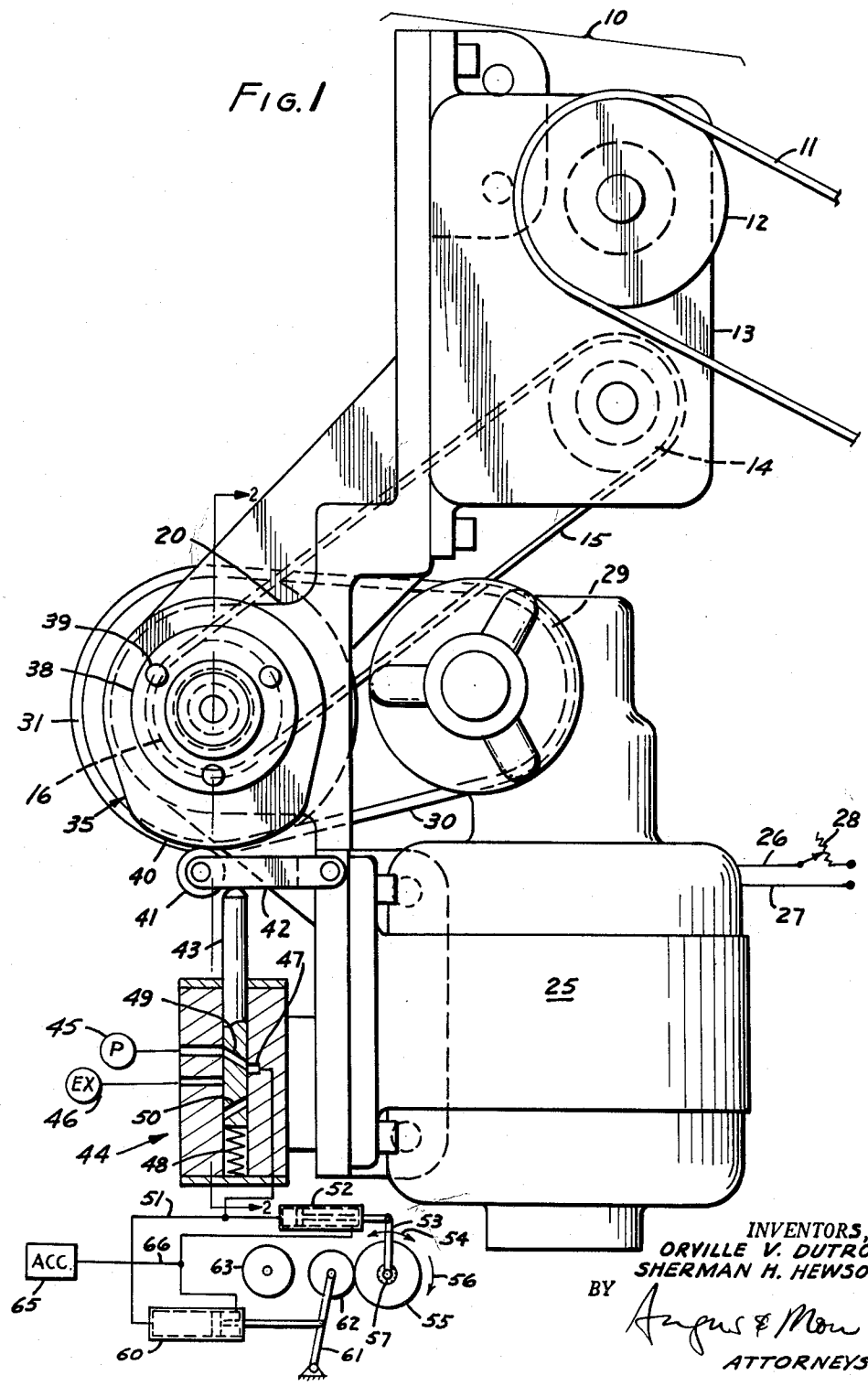

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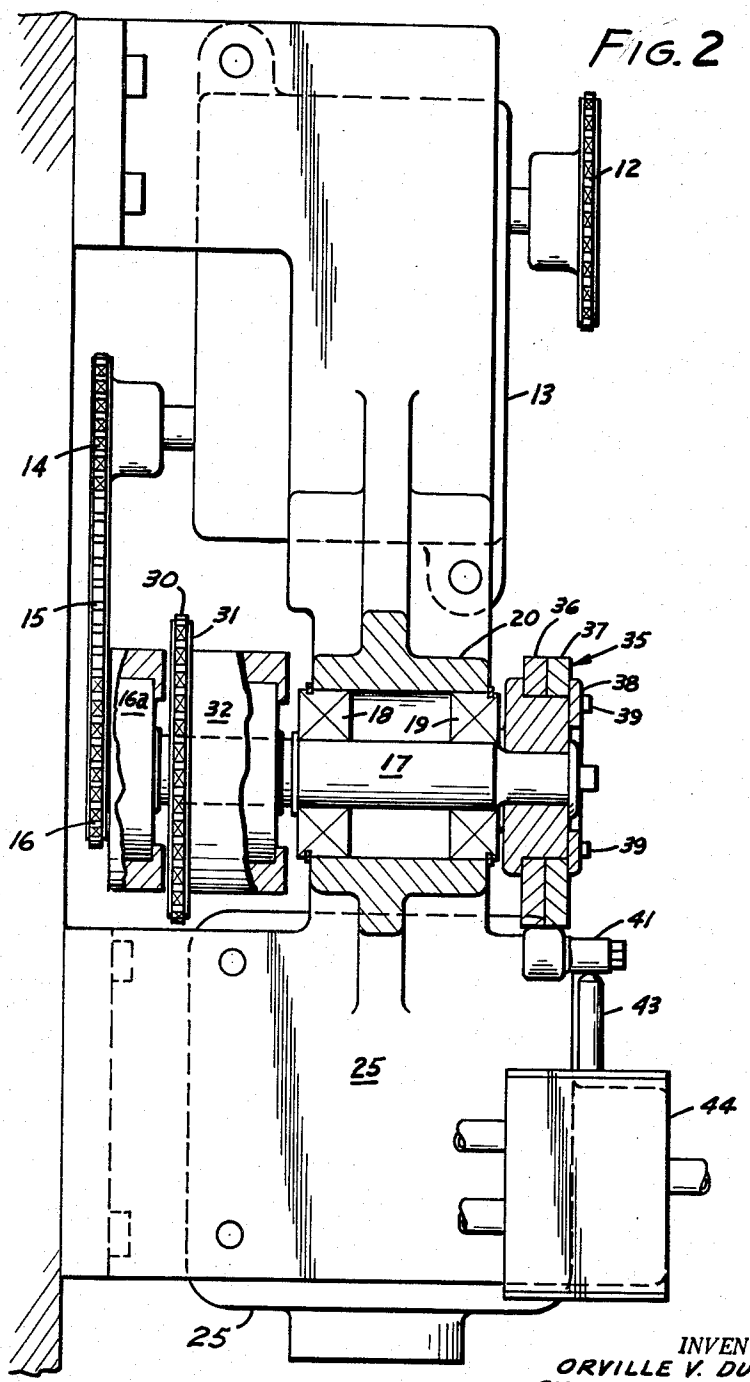
FIG. 2



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INK FOUNTAIN AND DUCTOR ROLL DRIVE

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This invention relates to printing presses, and in particular to ink fountain and ductor roll drives for the same.

An object of this invention is to provide greater flexibility in adjusting and maintaining ink transfer from an ink fountain to a ductor roller and thence to the distribution on printing presses than is available with presently known devices which have the same function. A related object is to obtain perfect contact of a ductor roller with a fountain roller and with a vibrator roller, without the use of mechanical interlinkages between the bearing supports which carry the ductor roller.

A device according to this invention utilizes a ductor roller which is movable to contact an intermittently actuable fountain roller and which is movable to contact a vibrator roller. Means is provided for moving the ductor roller alternatively into these positions of contact.

According to a feature of this invention, movement of the ductor roller to contact the fountain roller, and simultaneous actuation of the fountain roller are caused by operation of a fluid pressure system, in response to timing means, the preferred embodiment of which is a cam. The timing means is operable by two separate power sources. A preferred but optional first source is the printing press itself, connected through a variable speed transmission so that the frequency of actuation of the ductor roller and the fountain roller are adjustable as a function of press speed. The other power source is an independently operable variable speed motor. Each source is adapted to override the other, so that the timing device responds to the power source operating at the higher rate of speed.

The above and other features of this invention will be fully understood from the following detailed description and the accompanying drawings in which:

FIG. 1 is a side elevation, partly in cutaway cross-section and partly in schematic notation, showing the presently preferred embodiment of the invention; and

FIG. 2 is an elevation taken partly in cross-section at line 2—2 of FIG. 1.

The presently preferred embodiment of the invention is shown in FIG. 1. It is attached to the frame 10 of a rotary offset printing press. A drive chain 11 brings power into the device of the invention from the printing press drive. This power is applied to the input sprocket 12 of a variable speed transmission 13, preferably of the "zero-max." variety. This transmission and the press constitute a first power source. The transmission has the property of adjustably varying the speed ratio of its output sprocket 14 relative to that of the input sprocket from zero, that is complete stoppage, to some higher value.

Output chain 15 is engaged to a cam shaft drive sprocket 16, which drives an overriding clutch 16*a* which in turn drives a cam shaft 17. The cam shaft is supported by bearings 18, 19 in bracket 20. The bracket is attached to the frame of the press.

An independent drive motor 25, of the electric, variable speed type, is mounted to bracket 20. It has a pair of leads 26, 27, adaped to be connected to a source of electric potential, and to a switch 28 or other control for applying power to run the motor, and for adjusting its speed. Motor 25 constitutes a second power source.

A motor output sprocket 29 receives torque from the motor through gearing (not shown) and is engaged by a motor output chain 30, which in turn is engaged to motor-

driven sprocket 31. This sprocket drives a second overriding clutch 32, which in turn drives the cam shaft.

The details of the overriding clutches are not essential to this invention. They may be considered ratchets, whose directions of drive on the shaft are in the same direction. Furthermore, they need not be attached to the cam shaft. They need only be disposed in their respective power train between the respective source and the cam shaft. Wherever they are disposed, they will permit the cam shaft to be driven in one direction by them, but not in the other, and will thereby permit the cam shaft to "slip" past either clutch, should the cam shaft be turning faster than the driven part of that clutch.

The cam shaft carries a butterfly cam 35 with two cam elements 36, 37 which are spindled on the cam shaft and are held in adjusted positions by an adjustment plate 38 tightened down by cap screws 39. The angular extent of the dwell section 40 can be adjusted by relative rotational shifting of cam elements 36, 37, thereby to adjust the length of dwell of a cam follower 41 per revolution of the cam shaft.

The cam follower contacts both elements of the butterfly cam. The cam follower is pivoted by arm 42 to the bracket. The arm makes contact with stem 43 of a poppet valve 44. The poppet valve is shown schematically in FIG. 1 as a three-way valve having pressure and exhaust connections 45, 45, respectively. A line connection 47 is selectively joined by the poppet stem to either pressure or exhaust. A spring 48 biases the stem toward the exhaust connection. Passages 49, 50 in the stem make the selective connection. Contact of the cam follower with the cam portions of the butterfly cam moves the stem to the position shown.

The pressure connection 45 is connected to any suitable source of pressure, such as a compressor or accumulator. Supply line 51 connects the line connection to apparatus to be described.

A first linear actuator 52 operates a ratchet arm 53, which ratchet arm can move in both directions shown by arrow 54, but can drive an ink fountain roller 55 only in the direction shown by arrow 56. This unidirectional action is accomplished by ratchet 57 which is disposed between the ratchet arm and the fountain roller.

A second linear actuator 60 operates a swing arm 61 to which a ductor roller 62 is mounted. The second linear actuator can swing the ductor roller either into contact with the fountain roller as shown when pressure is on in the supply line, or into contact with a vibrator roller 63 when the line connection and supply line are connected to exhaust.

Piston-cylinder assemblies may conveniently be used for the linear actuators. The supply line is connected to the cylinders on one side of the piston in each of them. A pressure accumulator 65 is connected through accumulator 66 to the opposite sides of the pistons in said actuators to shift the pistons to the left end of the respective cylinder when the supply line is connected to exhaust.

Two each of linear actuators 52 and 60 will be provided, one of each for each side of the rollers. A pair of swing arms is provided for the ductor roller, one of the linear actuators 60 operating on each. Bearing supports for the vibrator roller, the fountain roller, and the swing arms are provided in the side frames of the press (not shown). Interconnection between the swing arms is through the pneumatic circuitry, thereby avoiding any need for providing mechanical interlinkages such as cross ties to keep the ductor roller propjerly aligned. The linear actuators will operate simultaneously because of their common power source, and thereby press the ductor roller against the vibrator or fountain roller in full axial contact.

In operation, the printer may desire to set up an initial rate of ink transfer from the fountain roller. This foun-

tain roller turns in an ink fountain (not shown) wherein its peripheral surface passes through a bath of ink, and past a ductor blade which determines the thickness of the ink film which will be contacted by the ductor roller. The initial rate can be set by actuating the independent motor to drive the cam shaft. The press need not be turning. The transmission or the clutch in the transmission enables the cam shaft to turn independently of the press. During this time, the length of dwell of the cam followers can conveniently be adjusted by setting the cam elements relative to one another, and the desired output speed of the variable transmission can be estimated. This permits ink adjustments to be made independently of press operation.

When the press is operated, the output speed of the transmission bay be set and the device will operate by driving of the cam shaft from output chain 15. The independent motor is off. The second overriding clutch permits rotation of the cam shaft independently of the motor.

A convenience inherent in the invention is that, should it be desired to stop the ink supply for some reason, but still to leave the press in operation, the transmission may be set at zero, thereby stopping the operation of the ink fountain drive assembly. In addition, this feature enables the dwell period of the cam to be adjusted at the same time, because with the press still running, and the transmission ratio at zero, the cam is still, and the screws can be loosened, the cam elements rotated relative to each other as desired, and the screws retightened. Adjustment of all major controls can therefore be made while the press is in operation.

Should the device be in steady press-driven operation, and an additional amount of ink desired for a short time, then the independent motor can be operated in brief bursts or continuously, at a faster continuous rate than the transmission, thereby turning the cam shaft at a speed greater than would be driven by the transmission. The transmission will then be overridden through the first clutch, and the faster drive of the independent motor will take over and transfer additional ink.

When a cam dwell portion depresses the cam follower, the poppet valve is shifted to admit pressure to the supply line, thereby simultaneously actuating all linear actuators. The ductor roller is swung into contact with the fountain roller and is turned by the fountain roller as the latter turns. This transfers ink to the ductor roller which the fountain roller brought from the fountain. Movement will continue for the length of time established by the dwell period of the cam follower. The stroke available for the linear actuator 51 will be sufficient to provide motion for the entire period of dwell provided by the butterfly cam.

When the dwell portion departs from the cam follower, the supply line is connected to exhaust, and the linear actuators will retract under the accumulator pressure. The ductor roller thus is swung into contact with the vibrator roller. This cycling action continues so long as the cam shaft turns to "pulse" the poppet valve. Of course, timing means other than a cam shaft can be used to pulse the poppet valve. Solenoid valves pulsed by electric signals comprise another example. The essence of the invention resides in the pulsing action powered by two alternate sources each capable of overriding the other, rather than in any particular construction of these elements. However, the construction shown is inexpensive, rugged, easily serviced, and in general ideally suited for the trade which will use it. Its elements are mechanically simple and readily understood, while electrical and electronic devices do involve service and operational difficulties to which this construction is not susceptible.

This invention thereby provides means for adjusting and maintaining the operation of ink fountain drives independently of press operation, and for closely adjusting the fountain drive during press operation.

In addition, the preferred embodiment of the invention, because of its fluid-actuated mechanisms, is able to dispense with heavy shafts and the like for suspending the ductor roller and keeping its axis aligned, because the actuators accomplish this automatically. The complexity and expense of the machine is thereby greatly reduced.

This invention is not to be limited by the embodiment shown in the drawings and described in the description which is given by way of example and not of limitation, but only in accordance with the scope of the appended claims.

We claim:

1. In combination: a fountain roller, a vibrator roller; a ductor roller; and an ink fountain drive comprising a cam shaft, a cam carried and driven by said shaft, unidirectional drive means driving the fountain roller, a first fluid-powered actuator for intermittently driving said unidirectional drive means, mounting means mounting the ductor roller for swinging movement between a first position wherein it contacts and rotates with the fountain roller, and a second position where it contacts the vibrator roller, a second fluid-powered actuator for moving the mounting means to move the ductor roller to each of the said two positions, fluid-valving means responsive to the cam adapted to simultaneously actuate and deactuate the actuators, the actuators comprising piston-cylinder assemblies, and the fluid-valving means being connected to all of said assemblies to actuate them simultaneously, a first and a second power source, both power sources being connected to the cam shaft to actuate the same in the same direction, and each adapted to be overridden by the other power source, whereby the cam shaft may be driven by either of said power sources independently of the other, and the frequency of actuation of the cam and thereby the valving means and actuators being determinable by either of said power sources, and a source of static pressure connected to the actuators opposed to the fluid-valving means to bias the mounting means toward one of said positions, pressure from the fluid-valving means overcoming such static pressure to move the mounting means to the other of said positions.

2. A combination according to claim 1 in which the fluid-valving means is a three-way poppet valve actuable by the cam.

3. A combination according to claim 2 in which the second power source is an independently operable, adjustable speed motor.

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