

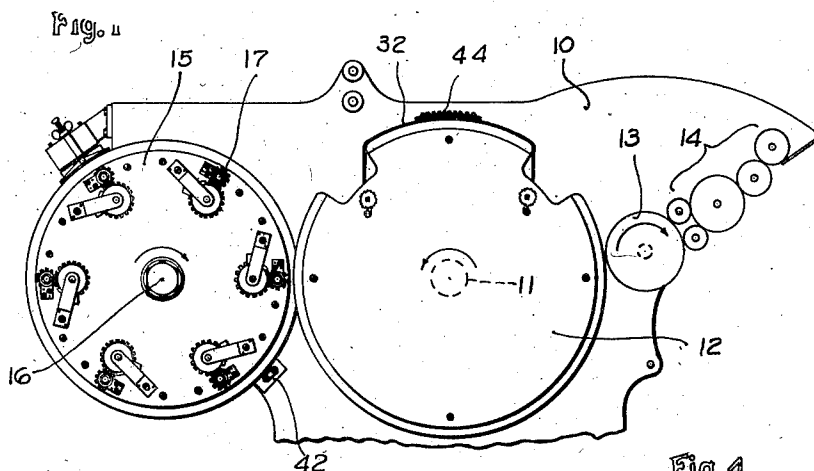
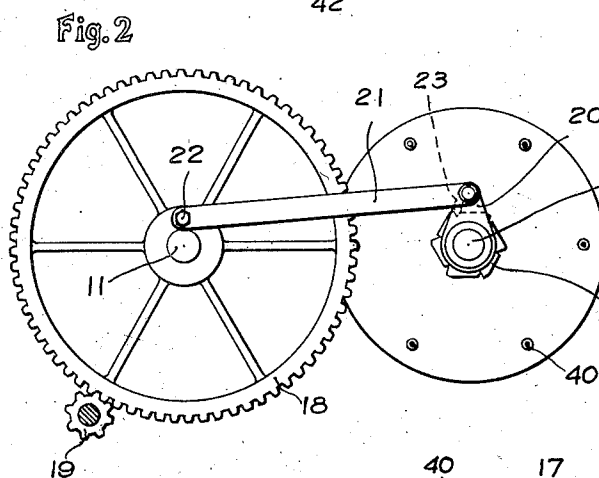
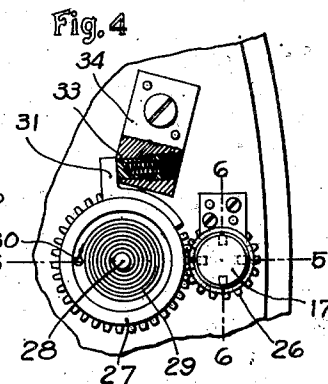
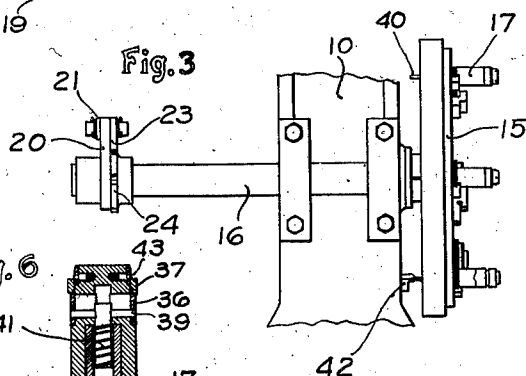
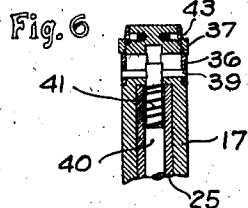
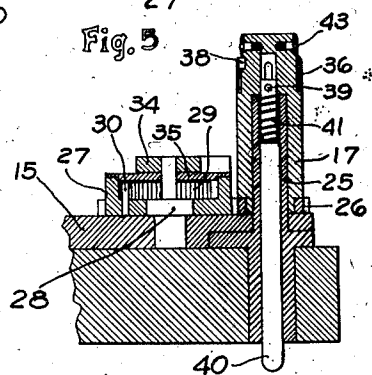
May 5, 1925.

1,536,207

W. R. GORDON

PRINTING MACHINE

Filed Nov. 27, 1922



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UNITED STATES PATENT OFFICE.

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PRINTING MACHINE.

Application filed November 27, 1922. Serial No. 603,584.

To all whom it may concern:

Be it known that I, WILLIAM R. GORDON, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Printing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to printing machines designed for printing on cylindrical articles.

Machines of the kind in question are in use, in which a continuously-rotary transfer-cylinder is arranged to cooperate with each in turn of a series of work-holding spindles carried by a rotary carrier, and means are provided for imparting a partial rotation to the carrier at each rotation of the cylinder, to bring the spindles successively to operative position. Such machines have been used heretofore for printing on such articles as cans and collapsible tubes, in which it is not necessary to secure any particular registration between the impression and the article printed, and the spindles have accordingly been freely rotatable on the carrier, so that the work can rotate in consequence of the frictional engagement with the rubber transfer-blanket.

The object of the present invention is to adapt a machine of the type in question for the printing of such articles as the dials or number-wheels of odometers, speedometers or other instruments, in which a definite relation must be preserved between the impression and certain parts of the article printed upon. To this end it is proposed to provide a machine, of the type in question, with means for holding the work in a definite position, with respect to its axis of rotation, at the moment when the transferring or printing operation upon the work is begun. In the more complete embodiment of the invention it is proposed, further, to provide means for rotating positively each work-spindle at the time when it is in cooperative relation with the transfer-cylinder, thus determining exactly the relation of the spindle, and the work carried thereby, to the impression on the transfer-cylinder, and prevent-

ing the possibility of slippage between the work and the transfer-blanket by which the impression might otherwise be distorted.

The invention is more particularly described with reference to the embodiment illustrated in the accompanying drawings.

In the drawings, Fig. 1 is a partial front-elevation showing so much of a printing-machine embodying the invention as is necessary to an understanding thereof; Fig. 2 is a rear-elevation of the means for rotating the spindle-carrier intermittently; Fig. 3 is an end-elevation of parts of the machine; Fig. 4 is a detail front-elevation, on a larger scale, of parts of one of the work-spindles and its actuating-means; Fig. 5 is a section on the line 5—5 in Fig. 4; and Fig. 6 is a partial section on the line 6—6 in Fig. 4.

The invention is illustrated as embodied in a rotary offset printing-machine of a well known form, and only so much of the machine is shown as is necessary for an understanding of the invention. The machine has the usual frame 10, in which is journaled a horizontal shaft 11 carrying, at its forward end, a drum 12 on which the rubber transfer-blanket 32 is carried. The type is on the usual type-cylinder 13, and is inked by an inking-mechanism 14 of any suitable form. The work-holding spindles 17 are supported by a carrier 15 on the forward end of a horizontal shaft 16. This shaft is journaled in the frame, and its rear end is provided with the usual mechanism for producing a step-by-step rotation. This mechanism, as shown, comprises an arm 20 arranged to swing freely on the shaft 16, and actuated by a rod 21. The rod is pivoted to a pin 22 projecting from a gear 18 fixed on the rear end of the shaft 11. The gear is driven constantly by a pinion 19, actuated by any suitable source of power. As the gear 18 turns it not only rotates the transfer-cylinder 12 constantly, but also, through the rod 21, causes a forward-and-back movement of the arm 20 at each rotation of the transfer cylinder.

The arm 20 carries a pawl 23 which co-operates with a ratchet-wheel 24 fixed on the shaft 16, and the ratchet and pawl cause the spindle-carrier to make a one-sixth rotation for each rotation of the transfer-cylinder and to dwell, after each movement, with one

of the spindles 17 in cooperative relation with the transfer-cylinder at the moment when the blanket 32 is passing the spindle.

The machine, as so far described, is of ordinary and well known form, and the present invention resides particularly in the construction and mode of operation of the spindles and the means for controlling their rotary movements. As shown particularly in Fig. 5, each spindle is mounted to turn on a hollow stud 25 projecting from the carrier 15. A pinion 26 is fixed to the inner end of the spindle, and it meshes with a gear 27 arranged to turn on a second stud 28 projecting from the carrier. The gear is in the form of a hollow drum, and it encloses a spiral spring 29, of which one end is fixed to the stud 28 and the other to a pin 30 fixed in the gear. This spring tends to turn the gear in a clock-wise direction, and the movement is limited by a stop-lug 31 fixed to the gear. This lug cooperates with a spring-pressed buffer 33 which is mounted in a bracket 34 fixed to the carrier 15. The bracket overhangs the gear 27 and holds it in place on the stud 28, by engagement with a cover-plate 35 which closes the recess in the gear.

The spindle 17 is shown as adapted for use in the printing of the number-rings of an odometer. For this purpose it is provided with a stripper-ring 36 of which the outer edge is shaped to engage the recessed edge of a number ring 37. (Fig. 6.) At the point 38 the stripper-ring is recessed to cooperate with certain teeth or projections on the inner surface of the number ring, so that a definite relative position is maintained between the number-ring and the spindle.

The stripper-ring 36 is held in place by a cross-pin 39 which moves in a slot in the spindle, and this pin also connects the stripper-ring with a rod 40 arranged to slide in the bore of the stud 25. A spring 41, coiled around the rod, retains it normally in retracted position, but the rear end of the rod projects in position to engage a bevelled trip-block 42 fixed on the frame of the machine, so that during each movement of the carrier the stripper-ring on the spindle which has last been in operative position is actuated to eject the printed number-ring from the end of the spindle.

The number-ring is held on the spindle, until ejected as just described, by several spring-pressed detent-pins 43 at the end of the spindle. The ends of these pins are rounded, so that the number-ring may be forced over them when the rings are applied or ejected.

The details of the spindle have been described as adapted for use in connection particularly with number-rings, but these details will, of course, be modified according to the particular form and character of

the articles to be printed. The essential features are the provision of means for locating the work in a definite position on the spindle, and for holding the spindle initially in a definite position of rest, so that the engagement and printing of the work shall always begin at a definite position.

Where extreme accuracy in printing is not necessary, the structure so far described will operate satisfactorily. When, in the rotation of the transfer-cylinder, the effective part of the blanket, upon which the impression has been made from the type-wheel, comes into contact with the work on the spindle, the printing begins at the point first engaged, and the continued movement of the blanket past the spindle causes the work and the spindle to be rotated by friction. During this rotation the spring 29 yields and the gear 27 is turned. As soon as the printing is finished and the blanket has moved far enough to disengage the work, the spring immediately rotates the parts back to their original position. Upon the next partial rotation of the carrier a fresh spindle is brought to operative position, and the work just printed is ejected.

Where extreme accuracy in printing is desirable, the rotative movements of the spindle and the transfer-cylinder should be exactly and positively coordinated, and a feature of the invention resides in the provision of means for this purpose. Upon the periphery of the cylinder 12 a short curved rack or gear-segment 44 is fixed, and this rack is adapted to mesh with the teeth of the pinion 26 on the spindle which is in operative relation with the transfer-cylinder. The length and the position of the rack are such as to produce the exact rotation necessary for registration of the work and the impression on the blanket, and to insure equality of surface-speed in these parts so that the impression will not be blurred.

The invention claimed is:

1. The combination, with an offset printing-machine comprising a continuously rotary transfer-cylinder and an intermittently rotary carrier with a series of freely-rotatable work-spindles thereon adapted to cooperate successively with the transfer-cylinder, of a gear mounted on each spindle; a segmental rack carried by the transfer-cylinder in position to cooperate with the gear on the spindle which is in operative relation with the cylinder; a spring for reversely rotating the spindle after the passage of the rack; and a stop for limiting the spring-produced return-rotation of the spindle.

2. In a printing-machine, the combination of a carrier provided with a series of work-spindles; means for imparting successive partial rotations to the carrier, to bring

- each spindle in turn into printing position; a printing-member arranged to cooperate with the spindle in such position; and means for rotating such spindle in harmony with the movement of the printing-member, during the printing operation, and for imparting reverse rotation to the spindle after the completion of the printing operation.
3. In a printing-machine, the combination, with a continuously rotary printing-cylinder, a spindle-carrier, and means for imparting successive partial rotations to the spindle-carrier, in timed relation to the rotation of the cylinder, to bring successive spindles into operative relation to the cylinder, of a series of spindles rotatably mounted on the carrier, each spindle provided with means for holding the article to be printed in a definite relation to the spindle; and means for predetermining the initial position of the spindle relative to the carrier and for returning it to such position automatically after each printing operation.
4. A machine as defined in claim 3, in which the last-mentioned means therein comprise a spring for rotating the spindle back to initial position, and a stop for arresting such rotation at the predetermined position.

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