Sept. 20, 1938. E. A. TIMSON ET AL 2,130,977

SHEET FEEDING MECHANISM FOR PRINTING AND ANALOGOUS MACHINES

Filed March 22, 1937 2 Sheets-Sheet 1

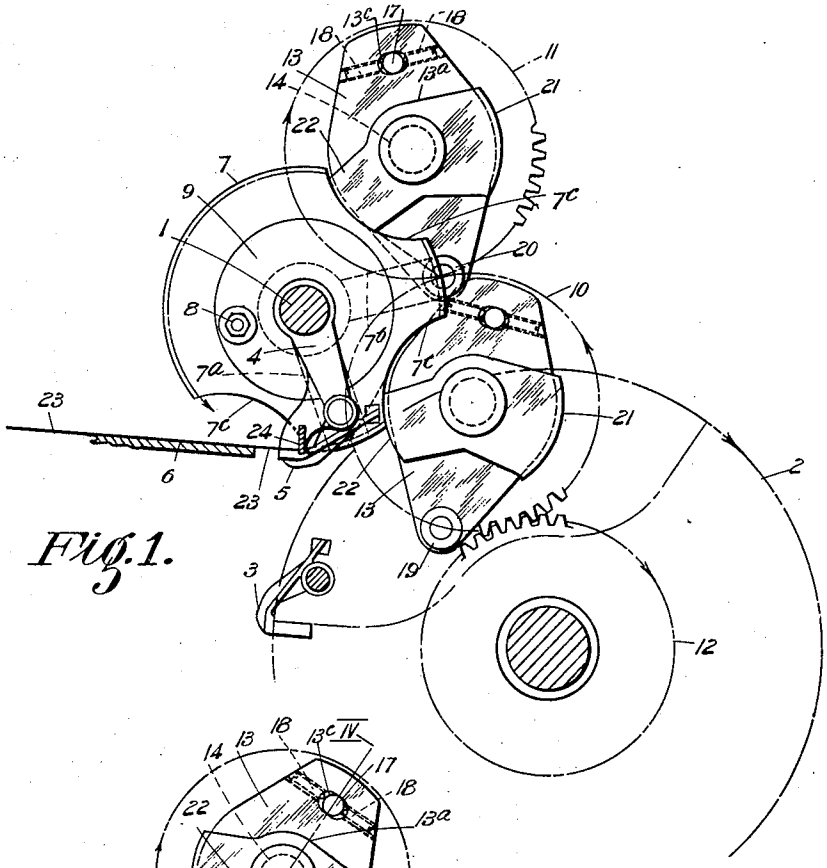


Fig. 1.

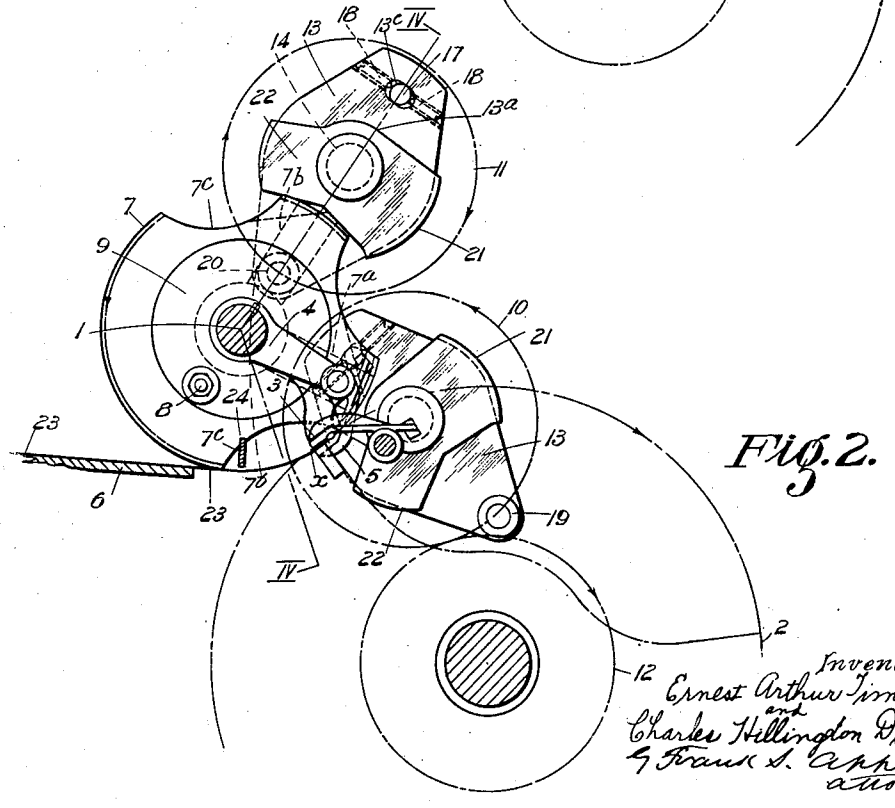


Fig. 2.

Inventors:
Ernest Arthur Timson
and
Charles Hillingdon Dickinson,
by Francis S. Appleman
attorney.

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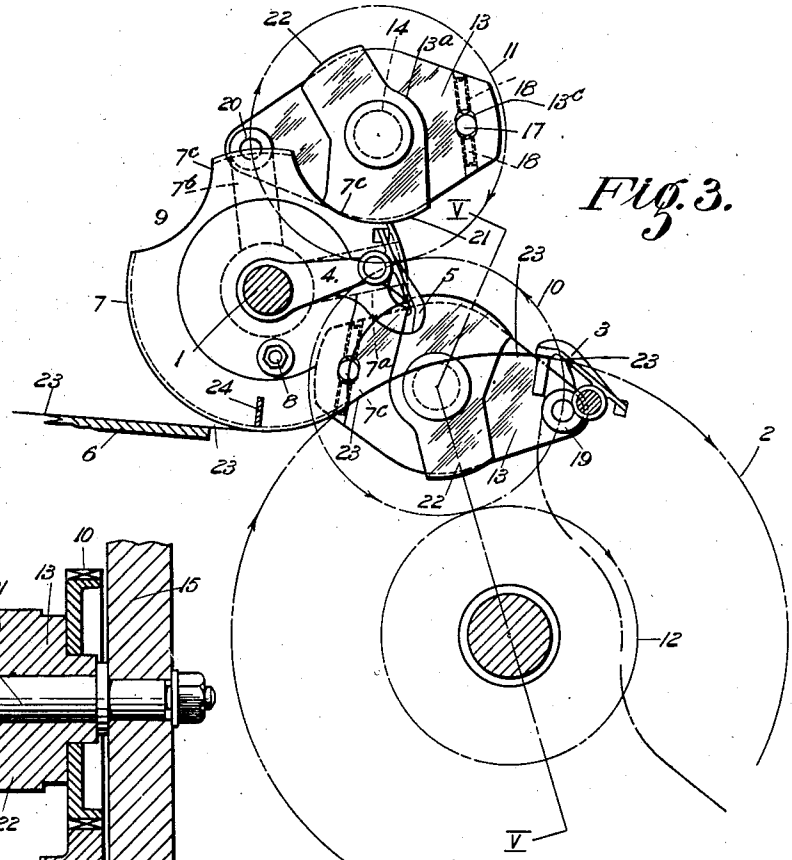


Fig. 3.

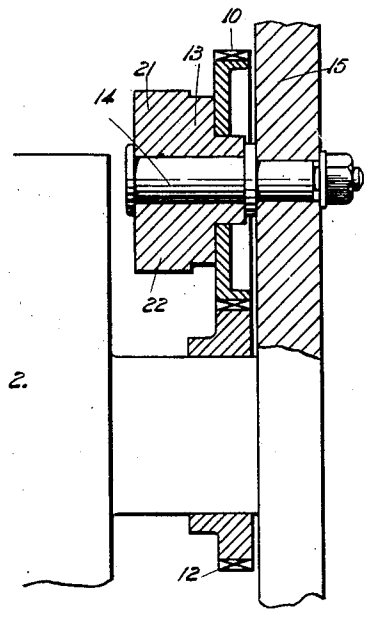


Fig. 5.

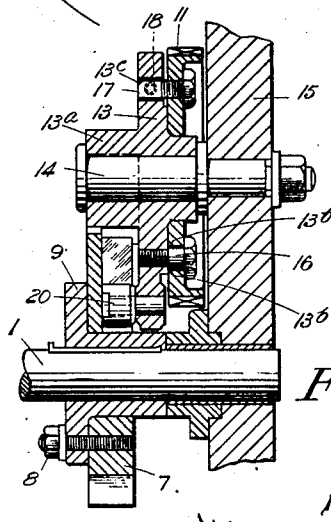


Fig. 4.

Inventors:
Ernest Arthur Timson &
Charles Hillingdon Dickinson
by Frank S. Ackerman
Attorney

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UNITED STATES PATENT OFFICE

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SHEET-FEEDING MECHANISM FOR PRINTING AND ANALOGOUS MACHINES

Ernest Arthur Timson and Charles Hillingdon Dickinson, Kettering, England

Application March 22, 1937, Serial No. 132,388
In Great Britain April 24, 1936

9 Claims. (Cl. 271—53)

This invention relates to sheet-feeding mechanism for printing and analogous machines and concerns such mechanism of the kind in which grippers take sheets from a feed board or equivalent support and transfer them to other grippers associated with a rotating drum or cylinder, for example, the impression cylinder of a rotary printing machine.

The invention is mainly intended for application to rotary printing machines but is not necessarily limited in this respect since it may be applied, for example, to machines for cutting, perforating or folding or similarly treating sheets of paper or like material.

In mechanism of the kind concerned the grippers are provided for the purpose of transferring the sheets from the feed board or equivalent to the drum or cylinder at a linear speed which corresponds approximately to the linear speed of the circumference of the drum or cylinder. In this manner there is provided an arrangement in which any tendency for the grippers to snatch and consequently tear the sheets is obviated. In sheet-feeding mechanism of the kind concerned, moreover, the grippers are usually carried by arms rigidly secured to a shaft, sometimes known and hereinafter referred to as the feed arm shaft.

In the known form of mechanism to which the present invention is applied the grippers are of an oscillatory character and the latter, in transferring a sheet to the drum or cylinder, travel somewhat beyond the transfer point after which their movement is reversed so that they return to receive another sheet from the feed board or equivalent at the appropriate time. In this form of mechanism the feed arm shaft is oscillated for the purpose of imparting the feed movement to the oscillatory grippers and in this connection it has been proposed to oscillate the shaft by means of one or more cams and intermediate linkage.

The object of the present invention is to provide in or for a printing or analogous machine an improved sheet-feeding mechanism of the form aforesaid of a relatively simple and inexpensive construction and positive in action.

In the accompanying drawings:

Figures 1, 2 and 3 are diagrammatic elevational views of the improved sheet feeding mechanism as viewed from the inside of a rotary printing machine and illustrating the manner in which a sheet is transferred from the feed board to the impression cylinder.

Figures 4 and 5 are detail sectional views taken on the lines IV—IV and V—V of Figures 2 and 3 respectively.

In the arrangement illustrated the feed arm shaft 1, which is mounted in suitable bearings, is disposed adjacent and parallel to the axis of the impression cylinder 2. A series of grippers such as 3 is mounted on the impression cylinder. The feed arm shaft 1 has rigidly secured thereto at spaced intervals a number of downwardly extending arms such as 4 each of which carries at its lower end one of the oscillatory grippers 5. These grippers are normally closed and are caused to open and close at the appropriate times, that is to say when taking a sheet of paper from a feed board 6, and when subsequently laying the said sheet on to the impression cylinder 2, by any conventional means now well known to those in the printing art. In accordance with the invention the driven shell 7 of a Geneva motion is disposed in a plane parallel with that of the ends of the impression cylinder 2 and is rigidly secured to the feed arm shaft 1 at or near one end thereof. In the specific form of the invention illustrated the driven wheel 7 is secured by one or more screws such as 8 to a flanged member 9 keyed to the feed arm shaft 1. The driven wheel 7 has two open-ended radial slots 7a, 7b, and on each side of each of said slots a recess 7c of concave or arcuate form and of considerable angular extent is formed in the periphery of the wheel.

Two gear wheels 10 and 11 arranged to mesh with each other are mounted to rotate at one side of and in a plane parallel with that of the driven wheel 7. These gear wheels are positioned one above the other and the lower wheel 10, which is slightly forward of the upper wheel, is arranged to mesh with another gear wheel 12 mounted at one end of and rotated from or, as shown, by the impression cylinder 2. The arrangement shown is such that the gear wheels 10 and 11 will be driven in opposite directions and at the same speed as each other and the cylinder 2. Each of the last-mentioned gear wheels constitutes, or is secured to, a driver and each of the drivers carries at the side nearest the driven wheel, a pin or a roller, which latter is disposed at or near the periphery of the gear wheel. The gear wheels 10 and 11 are secured to the corresponding drivers 13 each of which latter is formed with a boss 13a and mounted to rotate on a short axle 14 which is securely held at one end in a part 15 of the machine frame, (see Figures 4 and 5).

Each of the gear wheels 10 and 11 is secured

to the corresponding driver 13—near one end of the latter—by means of a bolt 16 the inner end of which is plain and is located in a slot 13b (see Figure 4) in the gear wheel. Another slot 13c is formed at or near the other end of the driver and in this slot is located a pin 17 formed or provided on the gear wheel. Extending at right angles to the pin 17 are two screws 18 which are screwed into the driver and are adapted to make contact with the pin on opposite sides of the latter. The arrangement just described is such that by loosening the bolts 16 and suitably adjusting the pairs of screws 18, the gear wheels 10 and 11 can be adjusted relatively to the drivers 13 and subsequently locked in their adjusted positions by tightening up the bolts 16. In this manner provision is made whereby the gear wheels 10 and 11 can readily be made to register with each other and with the gear wheel 12 without adversely affecting the timing of the Geneva motion.

The driver associated with the gear wheel 10 carries a roller 19 at one end thereof while that associated with the gear wheel 11 carries a similar roller 20.

The radial slots 7a and 7b and the rollers 19 and 20 are so relatively disposed that, as the drivers 13 rotate in opposite directions, the roller 19 will engage the slot 7a and turn the driven wheel 7 a fractional part of a revolution in one direction, while the other roller 20 will engage the slot 7b and turn said wheel to the same extent in the opposite direction.

As viewed from the inside of the machine the impression cylinder 2 and the top gear wheel 11 both rotate in a clockwise direction, while the lower gear wheel 10 rotates in an anti-clockwise direction, as indicated by the arrows in Figures 1, 2 and 3. This arrangement is such that the roller 20 turns the driven wheel 7 in an anti-clockwise direction and consequently imparts the feed movement to the grippers 5, while the roller 19 carried by the bottom driver turns said wheel in the opposite direction and effects reverse movement of the grippers 5.

Parts 21 and 22 of segmental character provided or, as shown, formed respectively on the sides of the drivers 13 adjacent to the driven wheel 7 are adapted to engage the recesses 7c in said wheel at the appropriate times in the revolution of the drivers to lock the driven wheel during the idle periods, and ensure that during such periods the driven wheel will be held in such a position that the roller next to engage the wheel can readily enter the appropriate slot. The free ends of the locking parts 21 and 22 are made convex to suit the concave recesses 7c and said parts are arranged concentrically with the respective drivers so that the said ends can readily engage the concave surfaces of the recesses 7c similarly to the manner in which the concentric surface of the driver engages the concave surfaces of the driven wheel in a Geneva movement of conventional form.

The operation of the mechanism to effect the transference of a sheet, such as 23, from the feed board 6 to the impression cylinder will now be described. Immediately prior to the commencement of the sheet-feeding operation the front edge of the sheet 23 rests against the back of the usual front lay 24 and the latter is in its lowermost position as shown in Figure 1. Moreover, the driven wheel 7 is locked and prevented from rotating by the locking part 22 on the top driver 13 which is in engagement with one of the recesses 7c and the roller 20 is about to enter the radial slot 7b. It will be understood, of course, that the gear wheels 10 and 11 and the drivers 13 associated therewith are continuously rotating in opposite directions and just before the roller 20 proceeds to move down the slot 7b and the locking part 22 on the top driver to move out of the said recess 7c, the front lay 24 is raised, in any convenient manner, and the grippers 5 grip the front edge of the sheet 23. Now, as the roller 20 moves to the inner end of the slot 7b, the grippers 5 move with the sheet from rest and with increasing speed towards the impression cylinder 2; at the same time the grippers 3 on the drum move towards the grippers 5 at the same speed. By the time the roller 20 has moved to the inner end of the slot 7b, as shown in Figure 2, the driven wheel 7 and hence also the feed arm shaft 1 have been turned one eighth of a revolution and the grippers 5 are moving at a linear speed which corresponds to the linear speed of the circumference of the cylinder. At this point the grippers 5 lay the sheet on to the cylinder 2 and the grippers 3 are opened to take the sheet. The transfer point is indicated at x in Figure 2. While a sheet is being laid on to the impression cylinder, none of the locking parts 21 and 22 are in engagement with the recesses 7c in the driven wheel. The grippers 5 are now opened to release the sheet and the various parts of the Geneva motion continue their movement until the driven wheel 7 has been turned one quarter revolution (see Figure 3). During this time the grippers 5 are slowed down until they come to rest somewhat beyond the transfer point x and the grippers 3 proceed to take the sheet round the impression cylinder. The roller 20 is now about to leave the slot 7b and the locking part 21 on the top driver 13 is in engagement with one of the recesses 7c to lock the driven wheel 7 until the roller 19 approaches the slot 7a. As shown in Figure 3, the locking part 21 on the bottom driver is just about to enter another of the recesses 7c and this part 21 also assists in locking the driven wheel and prevents the latter from rotating until the roller 19 actually moves into the slot 7a. During this idle period the sheet 23 is taken still further round the impression cylinder. At the termination of the idle period, i. e., after both of the locking parts 21 have moved out of the recesses 7c the roller 19 works in the slot 7a and turns the driven wheel and hence also the feed arm shaft 1 one quarter revolution in the opposite direction. Consequently the movement of the oscillatory grippers 5 is reversed and they return to receive another sheet from the feed board 6.

What we claim then is:

1. Sheet feeding mechanism comprising, in combination, a support for sheets, a rotating drum, grippers associated with said drum, oscillatory grippers adapted to take sheets from said support and transfer them to the grippers associated with the drum, a feed arm shaft having thereon arms adapted to carry the oscillatory grippers, a driven wheel of a Geneva motion secured to said shaft and driving means including two revolvable parts adapted to rotate said driven wheel first in one direction and then the other through a fractional part of a revolution, for the purpose described.

2. Sheet feeding mechanism comprising, in combination, a support for sheets, a rotating drum, grippers associated with said drum, oscillatory grippers adapted to take sheets from said

support and transfer them to the grippers associated with the drum, a feed arm shaft having thereon arms adapted to carry the oscillatory grippers, a driven wheel of a Geneva motion, which is formed with two radial slots and secured to said shaft, and driving means including two parts, one for each slot, said parts being revolvable in such a manner that each engages in the corresponding radial slot and remains in the latter for a part of a revolution only, for the purpose described.

3. Sheet feeding mechanism as claimed in claim 2, wherein each of the driving parts is carried by a separate rotary driver.

4. Sheet feeding mechanism comprising, in combination, a support for sheets, a rotating drum, grippers associated with said drum, oscillatory grippers adapted to take sheets from said support and transfer them to the grippers associated with the drum, a feed arm shaft having thereon arms adapted to carry the oscillatory grippers, a driven wheel of a Geneva motion secured to said shaft, driving means including two revolvable parts adapted to rotate said driven wheel first in one direction and then the other through a fractional part of a revolution, for the purpose described, and means for locking the driven wheel during the idle periods.

5. Sheet feeding mechanism comprising, in combination, a support for sheets, a rotating drum, grippers associated with said drum, other grippers adapted to take sheets from said support and transfer them to the grippers associated with the drum, a feed arm shaft having thereon arms adapted to carry the transfer grippers, a driven wheel of a Geneva motion which is formed on its periphery with recesses and is secured to said shaft, a rotary driver having thereon complementary parts adapted to engage in said recesses at the appropriate times, and driving parts carried by the rotary driver and adapted to rotate said driven wheel first in one direction and then the other through a fractional part of a revolution, said recesses and complementary parts constituting means for locking the driven wheel during the idle periods.

6. Sheet feeding mechanism comprising, in combination, a support for sheets, a rotating drum, grippers associated with said drum, oscillatory grippers adapted to take sheets from said support and transfer them to the grippers associated with the drum, a feed arm shaft having thereon arms adapted to carry the oscillatory grippers, a driven wheel of a Geneva motion secured to said shaft, two rotary drivers, means for continuously rotating the drivers from said drum, and a driving part on each of the drivers, said parts being adapted, as the drivers revolve, to rotate the driven wheel first in one direction and then the other through a fractional part of a revolution.

7. Sheet feeding mechanism comprising, in combination, a support for sheets, a rotating drum, a gear wheel mounted at one end of and rotated by said drum, grippers associated with the drum, oscillatory grippers adapted to take sheets from said support and transfer them to the grippers associated with the drum, a feed arm shaft having thereon arms adapted to carry the oscillatory grippers, a driven wheel of a Geneva motion secured to said shaft, two intermeshing gear wheels mounted to rotate at one side of and in a plane parallel to the plane of the driven wheel, one of said gear wheels being arranged to mesh with the gear wheel mounted at the end of the rotating drum, a driver associated with each of the two intermeshing gear wheels, and a driving part on each driver, said parts being adapted, as the drivers revolve in opposite directions, to rotate the driven wheel and hence also the feed arm shaft first in one direction and then the other through a fractional part of a revolution.

8. Sheet feeding mechanism comprising, in combination, a support for sheets, a rotating drum, grippers associated with said drum, oscillatory grippers adapted to take sheets from said support and transfer them to the grippers associated with the drum, a feed arm shaft having thereon arms adapted to carry the oscillatory grippers, a driven wheel of a Geneva motion which is formed with two radial slots and with recesses of concave form, one at each side of each slot, said driven wheel being secured to the feed arm shaft, two rotary drivers formed respectively with two locking parts which are made convex at their ends and adapted to engage in said recesses at the appropriate times, and a driving part on each driver, said parts being adapted to engage in the respective slots and remain in the latter for a part of a revolution only, for the purpose described.

9. Sheet feeding mechanism comprising, in combination, a support for sheets, a rotating drum, grippers associated with said drum, a shaft from which are operated oscillatory gripping means adapted to take sheets from said support and transfer them to the grippers associated with said drum, a driven wheel of a Geneva motion rigidly secured to said shaft, said wheel being recessed peripherally and formed with open-ended radial slots, two rotary driving members each having in association therewith parts adapted to engage the recessed periphery of the driven wheel at appropriate times to lock said wheel during idle periods, means for continuously rotating each of said driving members from aforesaid drum, and parts on said driving members which are adapted as the latter revolve to engage the radial slots in the driven wheel and rotate said wheel through fractional parts of a revolution to effect oscillatory movements of the gripping means associated with the shaft, for the purpose described.

ERNEST ARTHUR TIMSON.
CHARLES HILLINGDON DICKINSON.