April 17, 1962 W. J. HAMPTON ETAL 3,029,726

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Fig.1

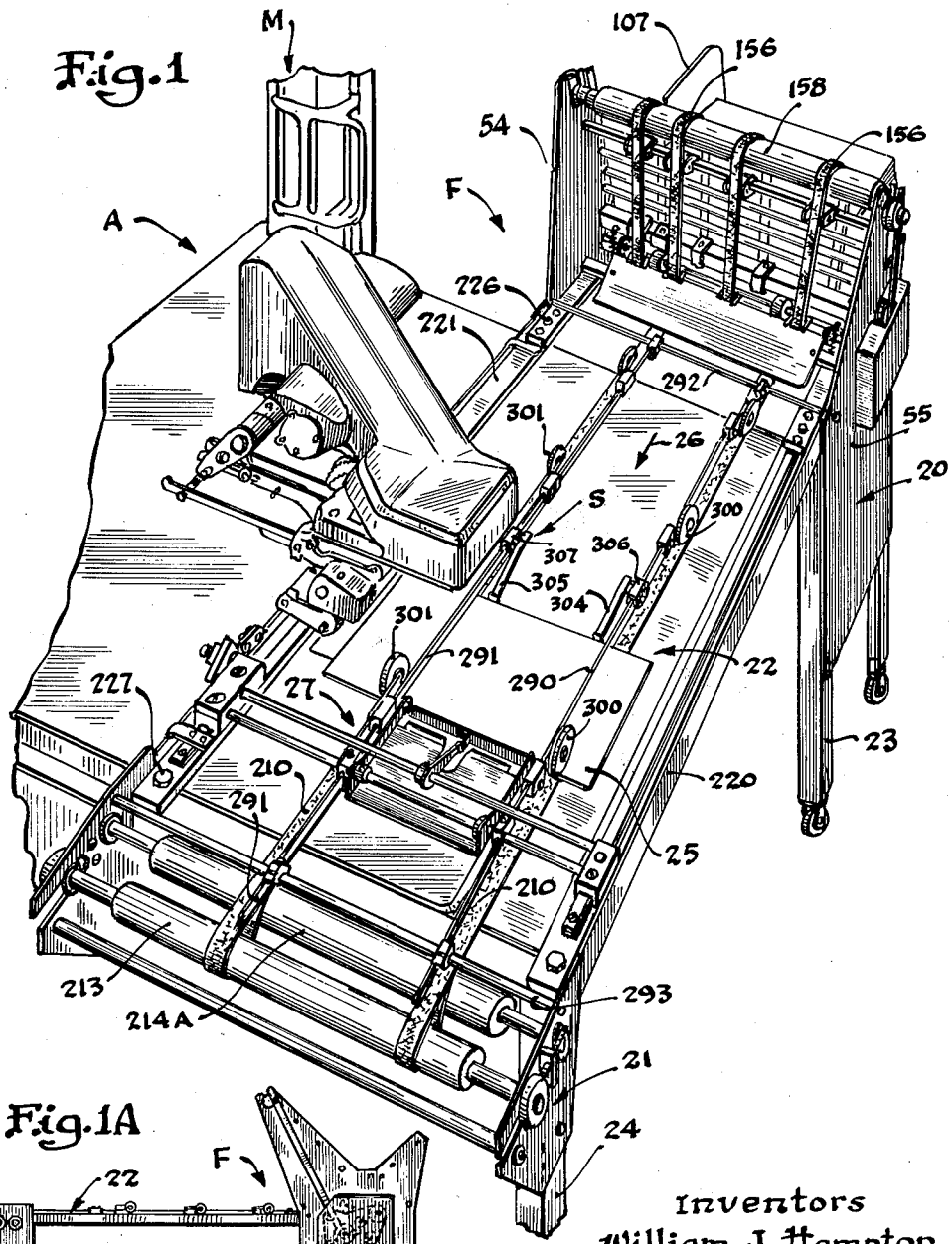

Fig.1A

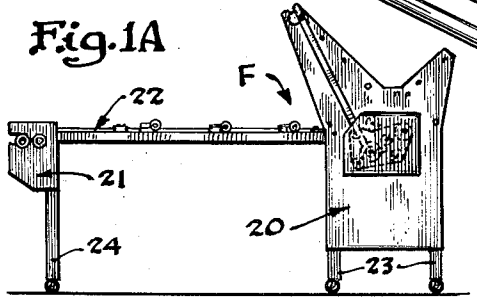

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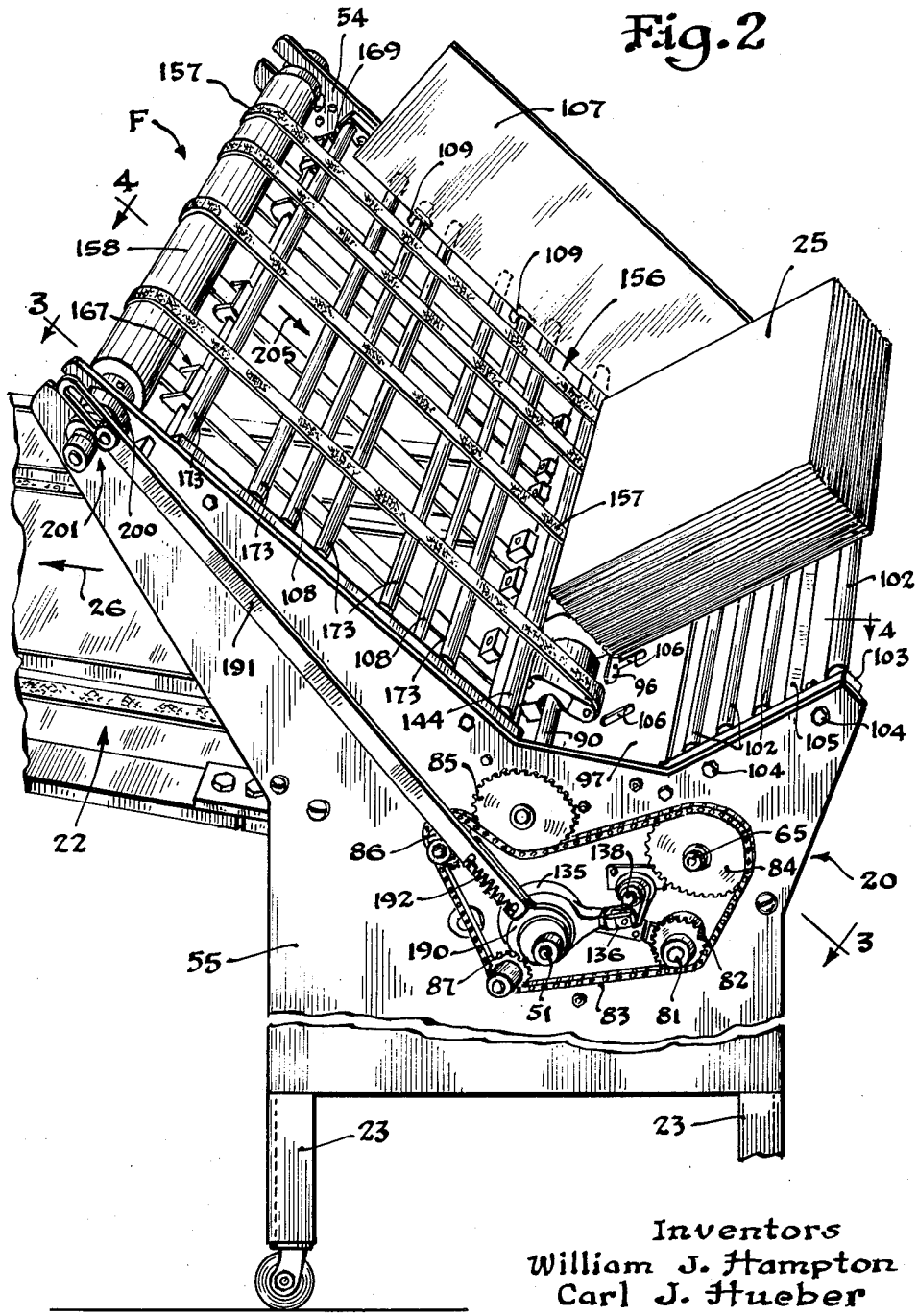
Fig. 2



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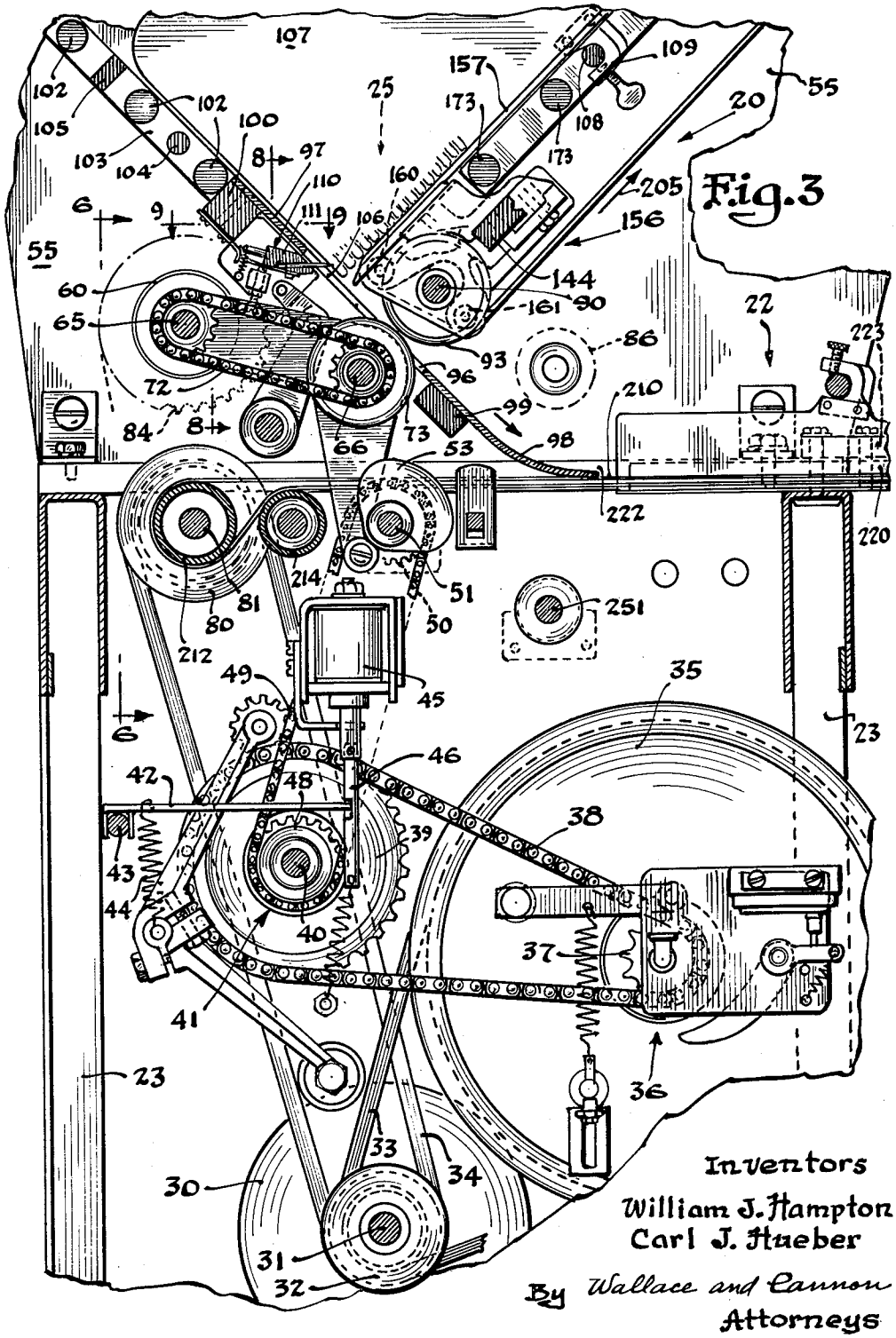

Fig. 3

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Fig. 4

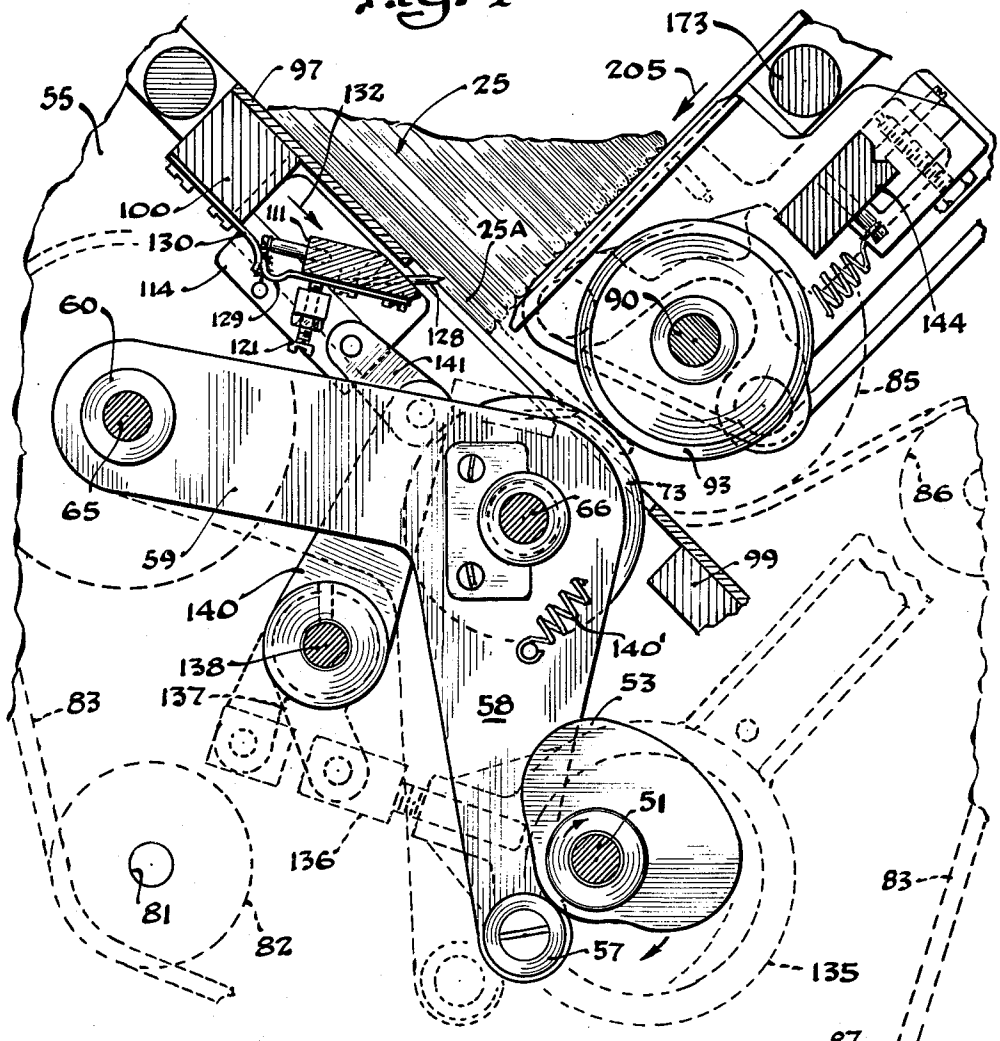

Fig. 5

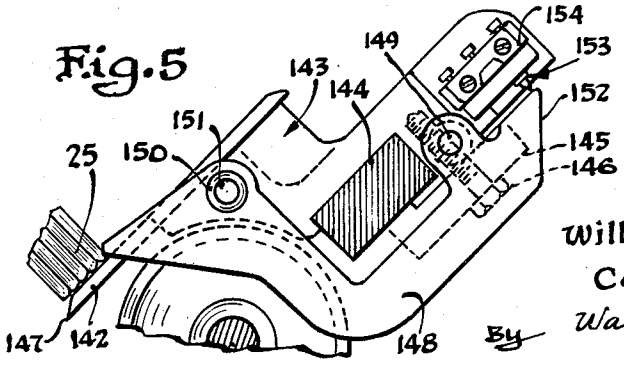

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Fig. 6

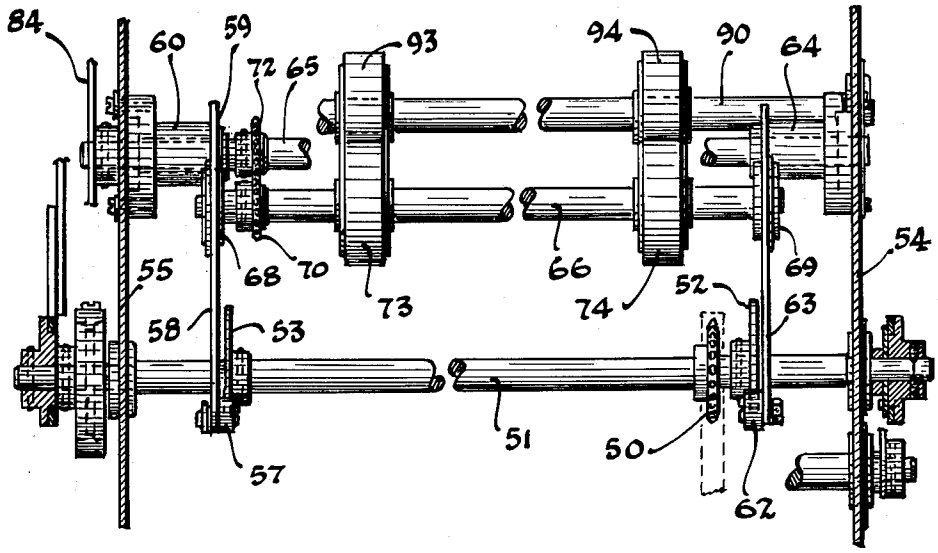

Fig. 7

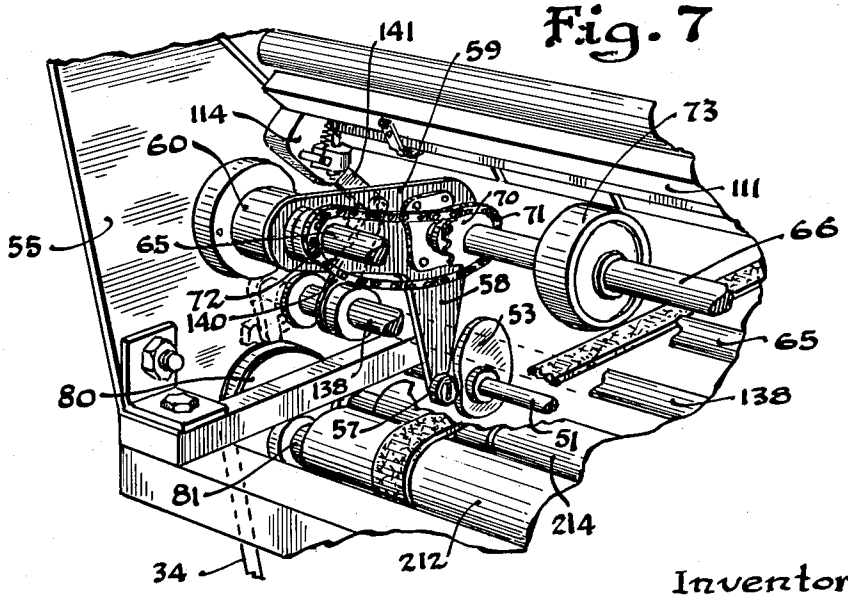

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Fig.8

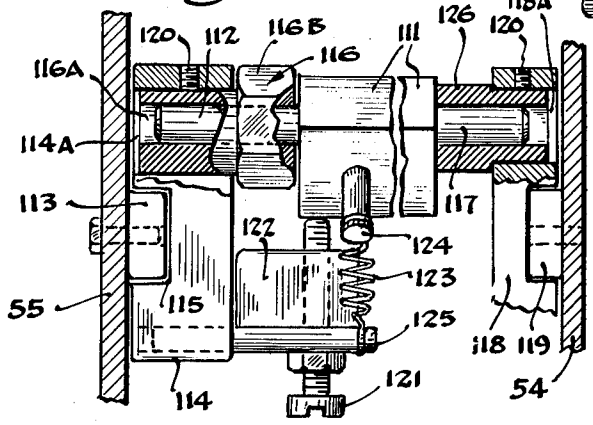


Fig.9

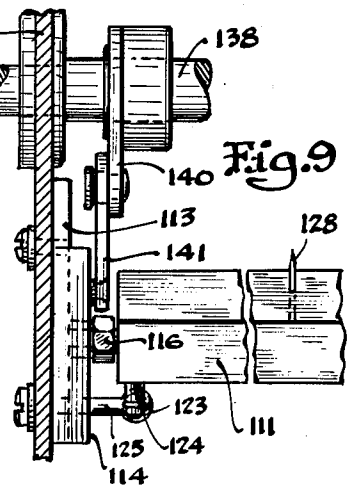


Fig.10

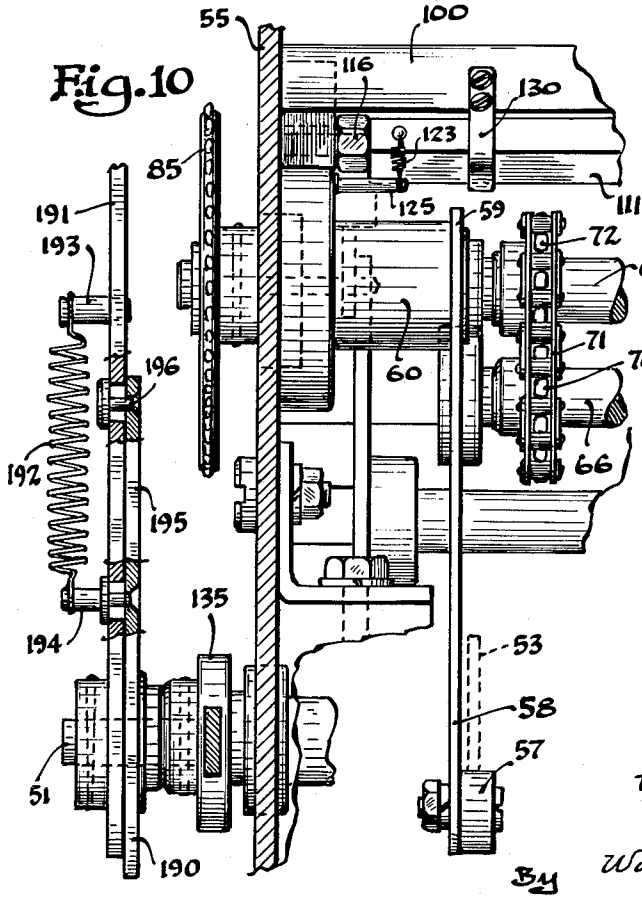


Fig.11

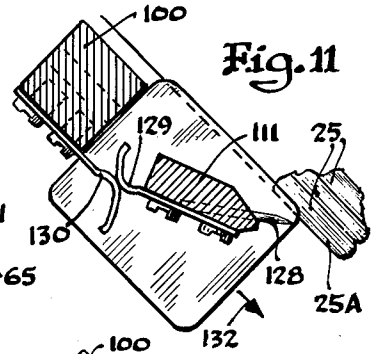
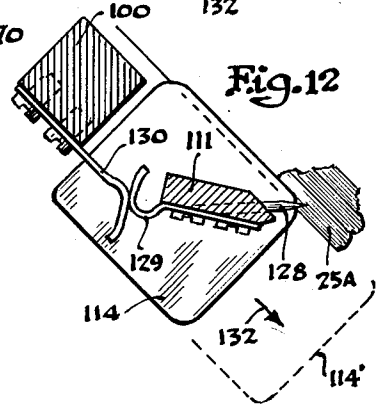


Fig.12



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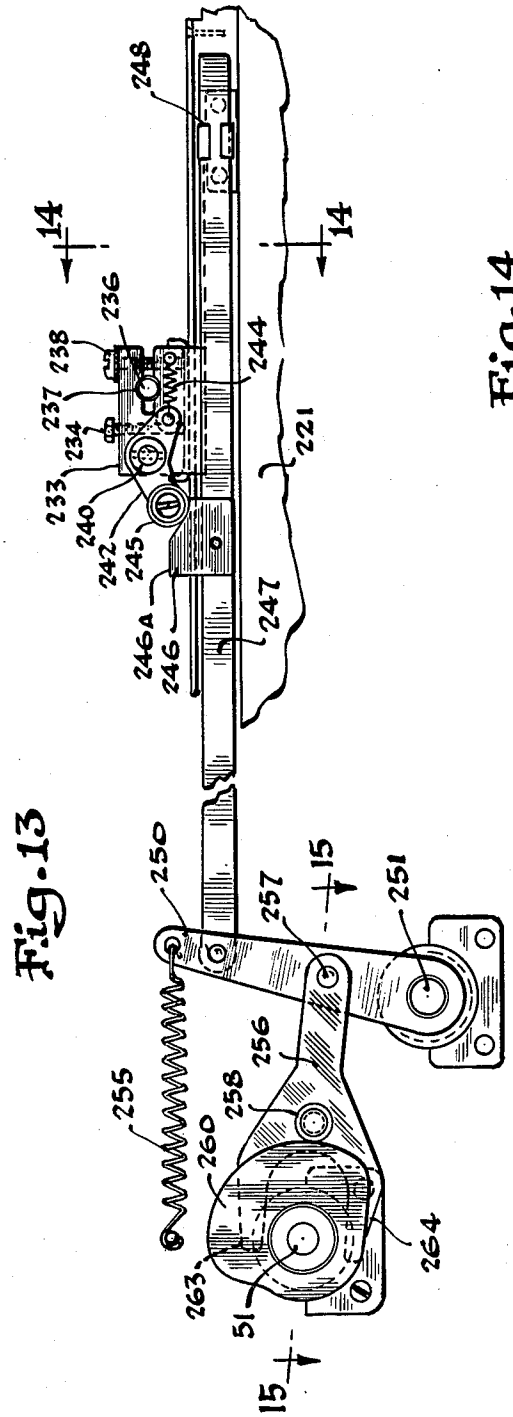

Fig. 13

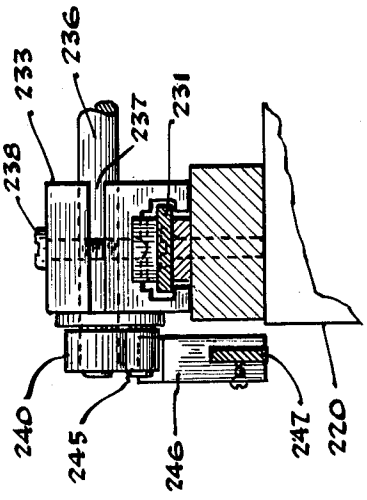

Fig. 14

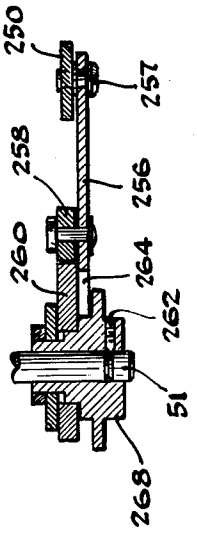

Fig. 15

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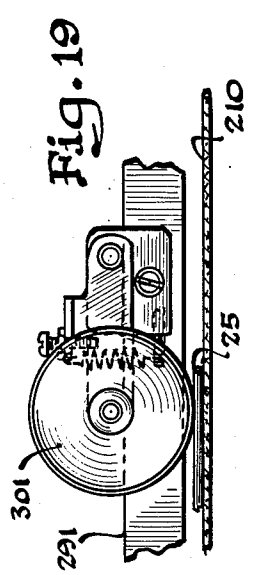

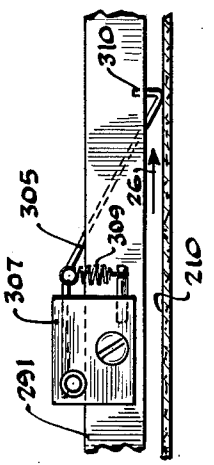

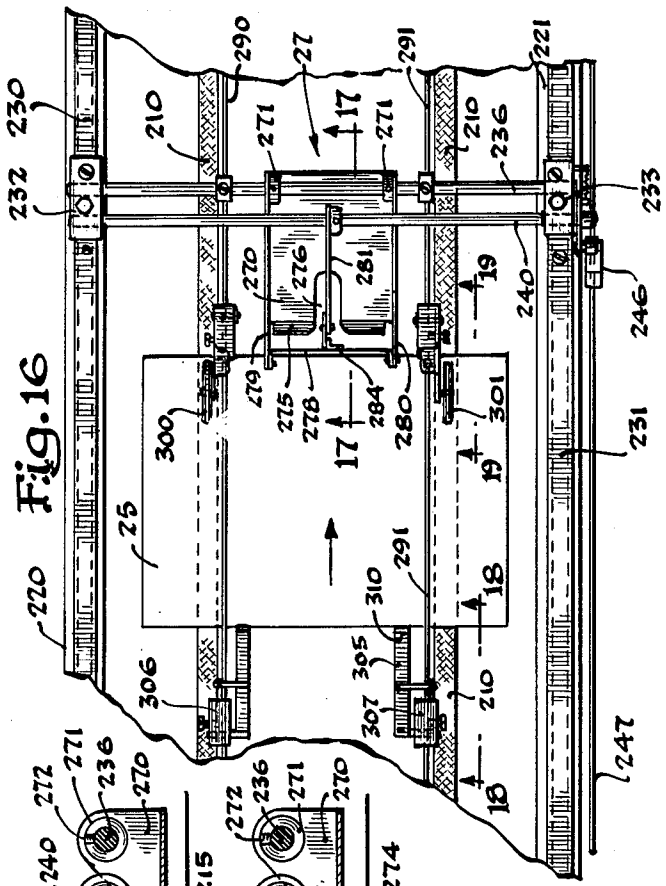

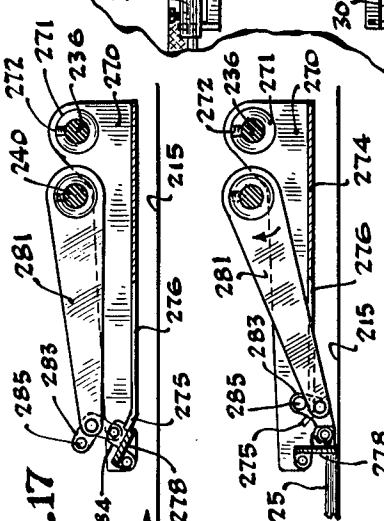

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Fig. 22

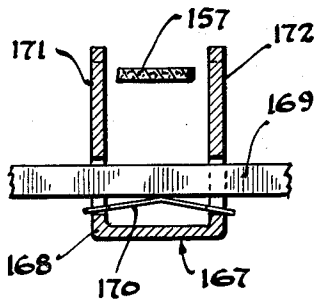

Fig. 20

Fig. 21

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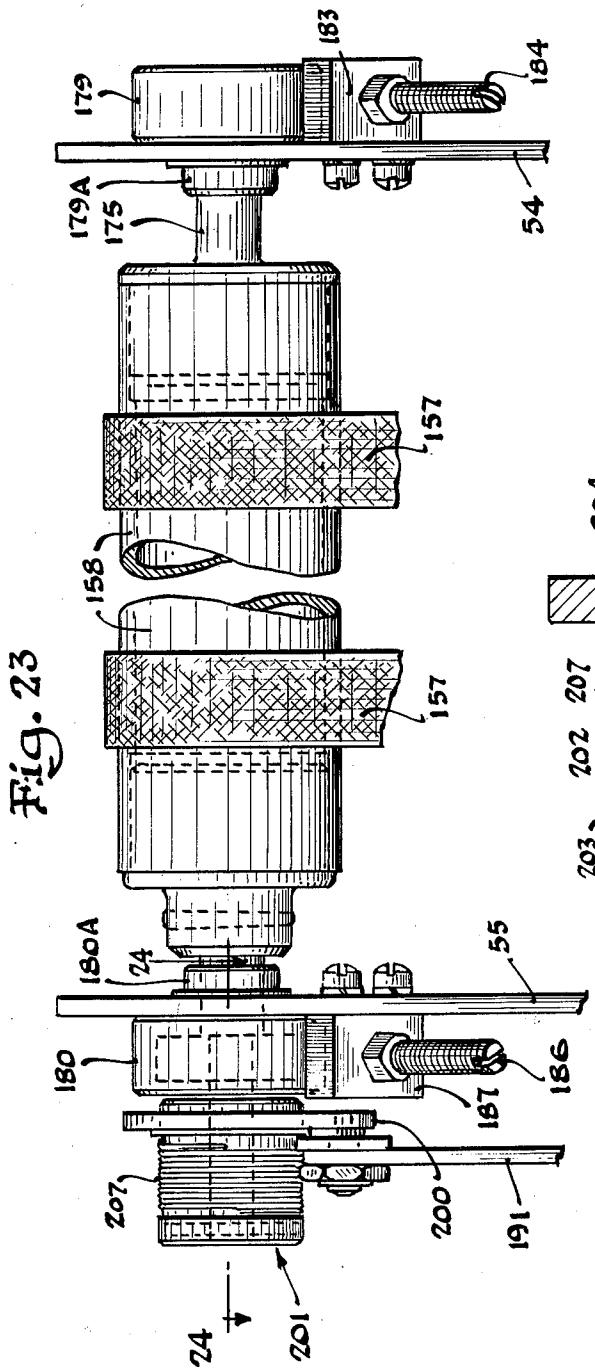

Fig. 23

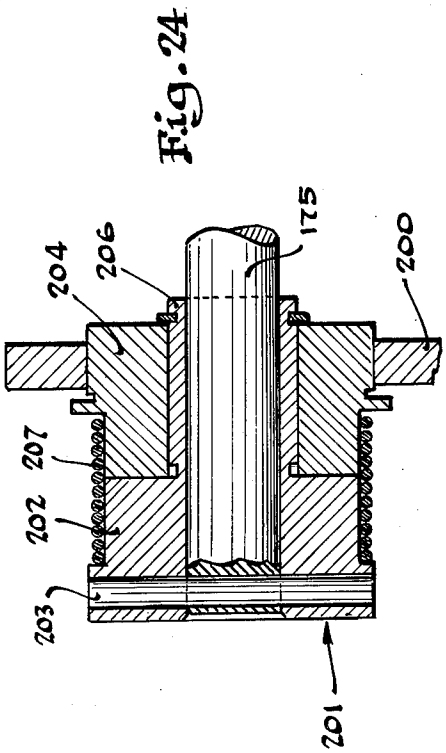

Fig. 24

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Fig. 25

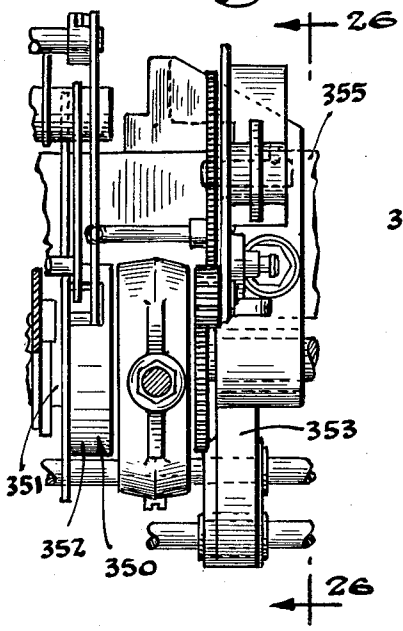

Fig. 26

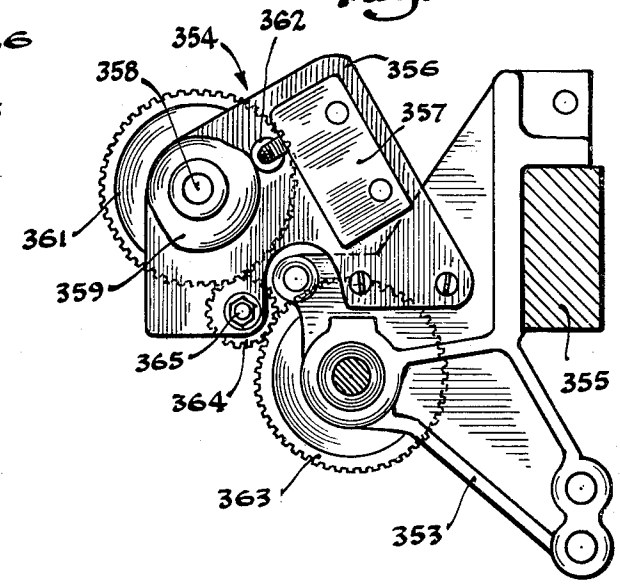

Fig. 27

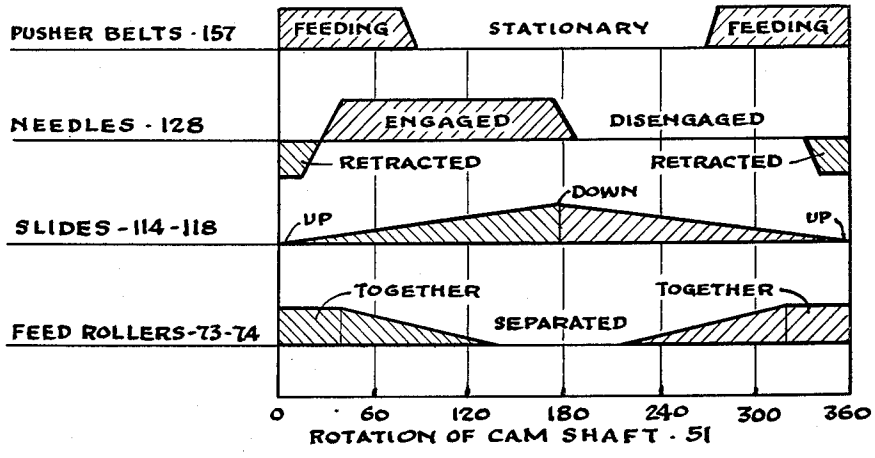

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Fig. 28

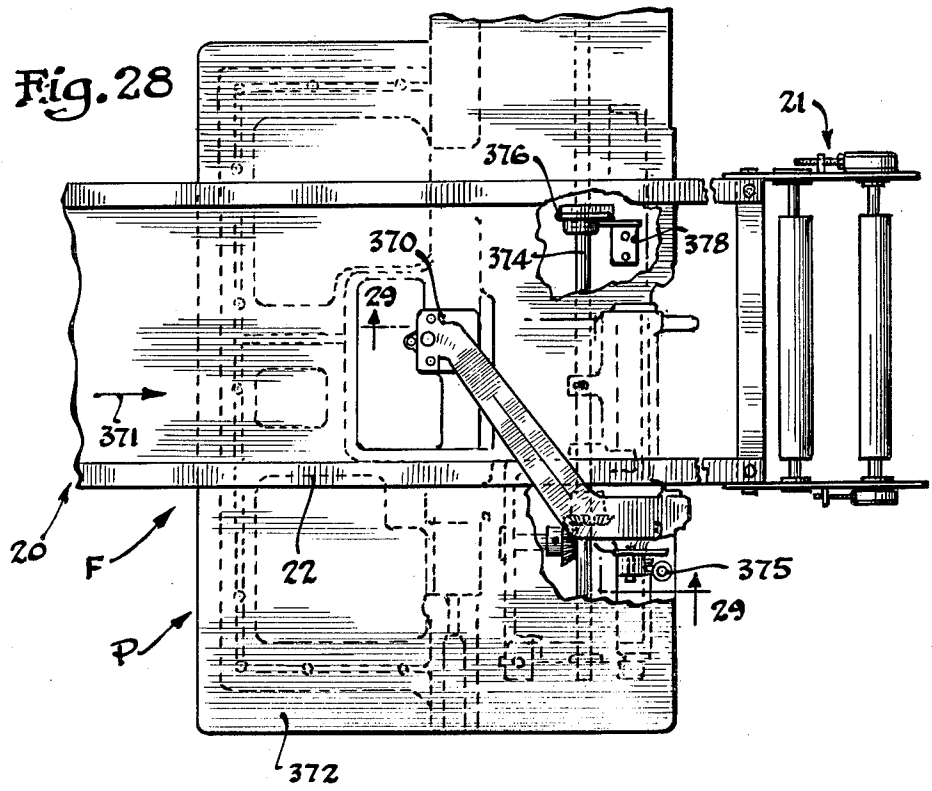
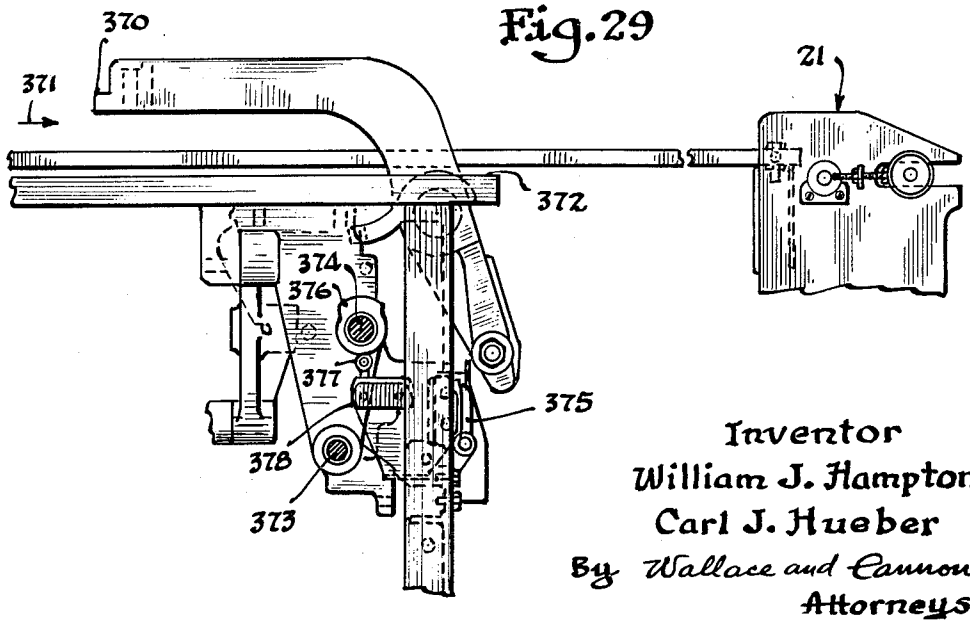


Fig. 29



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United States Patent Office 3,029,726 Patented Apr. 17, 1962

3,029,726

PRINTING MACHINES

William J. Hampton, South Euclid, and Carl J. Hueber, Euclid, Ohio, assignors to Addressograph-Multigraph Corporation, Cleveland, Ohio, a corporation of Delaware

Filed Aug. 8, 1958, Ser. No. 753,922
19 Claims. (Cl. 101—58)

This invention relates to printing machines and more particularly to a feeder apparatus for feeding articles to be printed into a printing machine. The invention is particularly advantageous when applied to the feeding of magazines, newspapers, and similar relatively bulky articles through an addressing machine and is therefore described in that connection.

A relatively wide variety of different devices have been utilized for feeding sheets of paper and other articles through addressing machines and other printing machines. These devices, which are commonly known as sheet feeders, may utilize suction feed devices, friction feed apparatus, or many other different means for separating the individual sheets from a stack in order to feed the sheets one by one into the printing machine. At least some of the previously known feeders of this general kind, however, are not readily applicable to the feeding of relatively thick folded articles such as magazines, folders, newspapers and the like into an addressing or other printing machine. The magazines or similar articles may tend to buckle or curl during the feeding operation, thereby jamming either the feeder or the printing machine. As a consequence, frequent interruptions in operation of the printing machine may be required, making it relatively difficult to carry out a printing operation with a reasonable degree of speed and efficiency.

Another difficulty presented in feeder devices relates to the accurate positioning of relatively heavy articles, such as magazines, in the printing station of an addressing or other printing machine. This problem is particularly pressing in the case of high speed feeder mechanisms, because the magazines tend to bounce when interrupted in their movement into the printing station of the addressing machine, especially in the case of relatively thick magazines and other articles of substantial weight.

Another problem frequently encountered in printing machine feeder mechanisms relates to the direction from which the articles to be printed are fed into the printing machine. Postal regulations require that, in the case of magazines or newspapers, the address must be located in a given position with respect to the folded or bound portion of the article. This location is, of course, different for the back of the publication than for the front. Accordingly, unless the printing machine is to be substantially changed in its operation with a change in printing from the back to the front of different publications, it is necessary that the feeder mechanism be capable of feeding the magazines or like articles into an addressing machine from either of two directions. With many previously known feeder devices this is not possible, particularly in those which require a mechanical connection of one kind or another between the feeder mechanism and the printing machine in order to synchronize operation of the two.

A further difficulty presented in the operation of printing machine feeder mechanisms relates primarily to flexibility of operation of the printing machine itself. For example, a given addressing machine or similar printing machine might be utilized at one time to imprint postal cards, letters, or other similar single sheet articles. At another time, it may be highly desirable to employ the same printing machine in preparing a strip or tape of addresses which are later separated from each other and

individually applied to the articles to be mailed. It may also be desired to employ the same machine in directly imprinting addresses or other data upon relatively thick and bulky articles such as magazines, newspapers and the like. Because the feeding techniques necessary for handling this wide variety of print-receiving articles are highly varied and in some instances mutually exclusive, it is advantageous to afford a feeder mechanism which is substantially self-contained. Furthermore, it is equally desirable that the feeder mechanism be readily removable from the printing machine to permit the use of a different feeder device in conjunction with operation of the printing machine.

The principal object of the invention, therefore, is a new and improved feeder mechanism which is effective to feed relatively bulky articles such as magazines, newspapers, and the like through an addressing machine or other printing machine and which inherently overcomes or minimizes the above noted disadvantages and difficulties of previously known feeders.

A more specific object of the invention is the prevention of buckling and curling of multiple-page articles as the articles are fed from a storage location into an addressing machine or other similar printing machine.

Another object of the invention is a new and improved high speed printing machine feeder mechanism which affords an effective and positive operating mechanism for actually aligning relatively bulky articles, such as magazines, at the printing station of the printing machine.

Another particular object of the invention is a new and improved printing machine feeder mechanism, capable of handling magazines, newspapers and like articles, which is effective to feed the articles into the printing machine from either one of two opposed directions.

Another important object of the invention is the provision of a self-contained feeder mechanism for a printing machine which is constructed for ready and convenient application to and removal from the printing machine.

A more specific object of the invention is a new and improved self-contained printing machine feeder mechanism which may be effectively synchronized with operation of the printing machine by means of a single electrical connection to the printing machine and which requires no mechanical operating connection thereto.

A corollary object of the invention is a new and improved storage arrangement for a printing machine feeder mechanism which inherently minimizes the possibility of binding and jamming of magazines or like articles fed from the storage arrangement into a printing machine and which also effectively minimizes the amount of work required of the feeder mechanism.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the present invention and the principles thereof and what is now considered to be the best mode for applying those principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art wtihout departing from the present invention and the purview of the appended claims.

In the drawings:

FIG. 1 is a perspective view of an addressing machine and of a feeder mechanism constructed in accordance with the invention, the feeder being disposed in one location with respect to the addressing machine to advance articles into and from the printing station in the addressing machine;

FIG. 1A is an elevation view of the feeder, on a reduced scale;

FIG. 2 is a perspective view of the novel feeder looking in toward the right hand side thereof as seen in FIG. 1;

FIG. 3 is a vertical sectional view of the feed station of the feeder taken substantially on line 3—3 on FIG. 2;

FIG. 4 is another vertical sectional view on an enlarged scale of the feed station of the feeder of the invention taken substantially on the line 4—4 on FIG. 2;

FIG. 5 is a detail view, partly in cross section, of a safety device incorporated in the feeder;

FIG. 6 is a transverse detail view taken substantially on the line 6—6 on FIG. 3;

FIG. 7 is a perspective detail view of a portion of the mechanism at the left-hand end of the feeder as shown in FIG. 6;

FIG. 8 is a detail view taken substantially on the line 8—8 on FIG. 3;

FIG. 9 is a fragmentary detail view taken substantially on the line 9—9 on FIG. 3;

FIG. 10 is a vertical sectional detail view taken substantially along the same line as FIG. 6, FIG. 10 being drawn to a larger scale than FIG. 6 and showing different parts of the machine;

FIG. 11 is a vertical sectional detail view showing the article engaging needles of the feeder in retracted position;

FIG. 12 is a view similar to FIG. 11 but showing the needles in operative or article engaging position;

FIG. 13 is a fragmentary elevational view of the stop mechanism of the feeder looking in at the left-hand side of FIG. 1;

FIG. 14 is a sectional elevation view of the guide arrangement for the stop mechanism, taken approximately along line 14—14 in FIG. 13;

FIG. 15 is a horizontal sectional detail view taken substantially on the line 15—15 on FIG. 13;

FIG. 16 is a fragmentary plan view of the stop mechanism;

FIG. 17 is a vertical sectional detail view taken substantially on the line 17—17 in FIG. 16 and showing the stop finger in retracted position;

FIG. 17A is a view similar to FIG. 17 but showing the stop finger in lowered or article stopping position;

FIG. 18 is an enlarged detail sectional view taken approximately along line 18—18 in FIG. 16 and shows a bounce-preventing device included in the feeder;

FIG. 19 is a detail sectional view, drawn to an enlarged scale, taken substantially on line 19—19 in FIG. 16;

FIG. 20 is a detail sectional view of a conditioning apparatus included in the feed station of the feeder;

FIG. 21 is a detail sectional view taken substantially on line 21—21 in FIG. 20;

FIG. 22 is a detail sectional view taken approximately along line 22—22 in FIG. 20;

FIG. 23 is a fragmentary detail view of the upper end of the feed station conveyor;

FIG. 24 is a detail sectional view taken approximately on line 24—24 in FIG. 23;

FIG. 25 is a fragmentary elevation view of a portion of one kind of addressing or printing machine with which the feeder may be associated;

FIG. 26 is a sectional view taken substantially on line 26—26 in FIG. 25;

FIG. 27 is a timing chart utilized to explain the operation of the feeder;

FIG. 28 is a fragmentary plan view illustrating the manner in which the feeder may be associated with a substantially different printing machine; and

FIG. 29 is a sectional view taken approximately along line 29—29 in FIG. 28.

The addressing machine A, shown in FIG. 1, is of the kind illustrated and described in the patent to one of the co-inventors herein, Carl J. Hueber, No. 2,359,851, patented October 10, 1944. However, and as is explained in further detail hereinafter, the novel feeder of this invention may be used in association with other kinds of addressing and similar printing machines, as for example an addressing machine of the nature shown in the patent to Walter T. Gollwitzer, Patent No. 1,992,661, patented February 26, 1935. In the present instance, the feeder F is positioned over the addressing machine A with the feed station 20 of the feeder disposed at the right-hand end of the addressing machine as shown in FIG. 1, looking in from the front of the machine. As is explained in further detail hereinafter, the feed station 20 of the feeder F may also be disposed at the opposite end of the addressing machine A. In either event, the feeder F is effective to feed relatively thick and bulky articles such as magazines, newspapers and the like to the printing station S in the addressing machine. At the printing station S, an impression is made onto the article from a printing device then disposed at the printing station. The printing devices are disposed in the magazine M of the printing machine A and are fed to and from the printing station S in the manner described in the above noted Patent No. 2,359,851.

As best illustrated in FIG. 1A, the feeder F includes the feed station 20 and an exit or discharge station 21, these two stations of the feeder being interconnected by a conveyor portion 22. The feed station 20 is independently supported as by the four legs 23; preferably, casters are provided for the legs of the feed station 20 as is explained in detail hereinafter. The discharge station 21 is likewise supported upon a pair of legs 24 and also is preferably mounted upon casters. The feed and discharge stations 20 and 21 are rigidly connected to the transverse portion or conveyor section 22, thus affording an inverted substantially U-shaped structure (see FIG. 1A), which may be moved into position over the addressing machine A (FIG. 1) and removed therefrom in a simple and convenient manner. Furthermore, the independent support and integrated construction of the feeder make it possible to reverse the feeder with respect to the addressing machine, thereby greatly facilitating the feeding of magazine, newspapers, or the like, from either direction with respect to the printing station S of the addressing machine.

As shown in FIG. 2, the magazines, newspapers, or the like 25 which are to be imprinted in the addressing machine A are located in a stack in the feed station 20 of the novel feeder. The individual magazines 25 are fed from the lowermost end of the station, as seen in FIG. 2, onto the conveyor mechanism 22, the direction of feed being generally indicated in FIGS. 1 and 2 by the arrows 26. From the feed station 20 the magazines are moved to the printing station S of the addressing machine (FIG. 1) and are halted at the desired printing position by means of a stop mechanism 27 which accurately positions each magazine to receive the desired address or other data to be imprinted thereon by the printing machine A. The stop mechanism 27 holds the magazine or the like in a printing position during the printing operation and subsequently is actuated to release the magazine for further movement in the direction of the arrow 26. After the printing operation is complete, the magazine is discharged from the conveyor portion of the feeder at the discharge station 21 of the machine. In the ensuing description, the magazines are described as being fed fold end first, and this arrangement is usually preferred; however, the articles may be fed with an open end leading if desired.

The feeder F is provided with its own motor and is completely independent of the addressing machine A with the exception of a single electrical connection which affords a means for synchronizing operation of the feeder with the printing operation carried out by the addressing machine. Thus, and as indicated in FIG. 3, the feeder F includes a motor or other power source 30 which serves

as the prime mover for the entire feeder mechanism. On the shaft 31 of the motor 30 there is mounted a dual pulley 32 which is engaged by a pair of drive belts 33 and 34. The drive belt 33 also engages a relatively large pulley 35 which is utilized to drive a sprocket 37, the pulley 35 and the sprocket 37 constituting a part of an overload safety device 36 which protects the feeder against jamming and other malfunctioning. The overload safety device 36 is of conventional construction and therefore need not be described in detail here.

The sprocket 37 is engaged by a drive chain 38 which also engages a second sprocket 39. The sprocket 39 is disposed in concentric relation to a main shaft 40 but is not affixed thereto; rather, the sprocket 39 constitutes one of the moving elements of a one revolution clutch mechanism 41 which also includes a latch member 42. The latch member 42 is pivotally mounted on a shaft member indicated by reference numeral 43 and is normally biased downwardly by means of a spring 44. The one revolution clutch 41 may be of substantially conventional construction and therefore need not be described in detail herein.

The one revolution clutch 41 is controlled in its operation by means of a solenoid 45 which is electrically connected to a cam-controlled switch 47 in the addressing machine A, as described more fully hereinafter in connection with FIGS. 25 and 26. The solenoid 45 is connected to an actuating lever 46 which engages the latch member 42 to engage or disengage the clutch 41, depending on whether the solenoid is in its energized or de-energized condition. The electrical connection and control afforded by the solenoid 45 is provided solely for timing and synchronizing purposes and makes it possible to operate the feeder F without mechanical drive connections to the printing or addressing machine A.

A sprocket 48 is mounted upon the main shaft 40 for rotation therewith and engaged by a drive chain 49, the other end of the chain 49 engaging a sprocket 50 which is mounted upon a cam shaft 51. As best seen in FIG. 6, a pair of cams 52 and 53 are mounted at opposite sides of the feeder mechanism and are pinner or otherwise affixed to the shaft 51 for rotation therewith. The shaft 51 is supported in a pair of frame members 54 and 55; preferably, the shaft is journaled in sealed ball bearings which are mounted upon the frame members 54 and 55.

The cam 53 is engaged by a cam follower comprising a roller 57 mounted upon one arm 58 of a crank-shaped lever 59. The bell crank 59 is journaled upon a boss 60 affixed to and extending inwardly of the frame member 55, the shape of the lever 59 being best illustrated in FIG. 4. Similarly, the cam 52 is engaged by a cam follower roller 62 which is mounted upon one arm of a crank-shaped lever 63, the lever 63 being journaled upon a boss 64 on the frame member 54. The central portions of the two bosses 60 and 64 are provided with axial apertures through which a shaft 65 extends as described more fully hereinafter.

A shaft 66, hereinafter referred to as the lower roller shaft, extends between and is journaled in the two crank-shaped levers 59 and 63. Preferably, the shaft 66 is supported within a pair of ball bearings 68 and 69 mounted in the two levers 59 and 63, respectively. A sprocket 70 is affixed to one end of the shaft 66 (see FIGS. 6 and 7) and is engaged by a chain 71 which also extends into engagement with an additional sprocket 72 mounted upon and affixed to the shaft 65. The chain drive comprising the sprockets 70 and 72 and the chain 71 affords a means for continuously rotating a pair of feed rollers 73 and 74 which are mounted upon and secured to the shaft 66. Preferably, the two rollers 73 and 74 are secured to the shaft 66 by keys or similar mounting arrangements but are slidable longitudinally of the shaft to different positions in order to accommodate magazines, newspapers, and the like of varying sizes as explained more fully hereinafter.

In FIG. 3 it is seen that the second drive belt 34, which engages the pulley 32, also engages a pulley 80 which is affixed to a shaft 81, the shaft 81 extending across the rear end of the machine and being journaled in bearings respectively provided in the two frame members 54 and 55. As indicated in FIG. 2, the shaft 81 extends through the side or frame member 55 and a sprocket 82 is affixed to the extension portion of the shaft for rotation therewith. The sprocket 82 is engaged by a chain 83 which also engages a further series of sprockets 84, 85, 86 and 87, the sprockets 86 and 87 being idler sprockets. The sprocket 84 is affixed to the outboard end of the shaft 65 (see FIG. 2) and thus affords a means for continuously rotating the shaft 65. Consequently, the rollers 73 and 74 (see FIG. 6) are continuously driven by means of the driving connection afforded by the two sprockets 70 and 72 and the chain 71 (FIGS. 7 and 10) which links those sprockets.

The sprocket 85, on the other hand, is affixed to a shaft 90 which extends between the two frame members 54 and 55 and is journaled in ball bearings or other suitable bearings mounted in the two side frame members respectively. A pair of rollers 93 and 94 are mounted upon the shaft 90 for rotation therewith. Like the rollers 73 and 74, the rollers 93 and 94 (FIG. 6) are longitudinally movable with respect to the shaft which supports them; consequently, the rollers 93 and 94 may be adjusted along the shaft 90 to locations immediately opposite the rollers 73 and 74. The opposed rollers, such as the rollers 73 and 93 in FIG. 3, are aligned with suitable openings 96 in a plate 97 which extends transversely of the feeder F and which is located at the base of the hopper or feed station 20 of the feeder. As indicated in FIGS. 2 and 3, the plate 97 extends completely across the machine between the frame members 54 and 55 and preferably is disposed at an angle of approximately 45° with respect to the horizontal. This inclination of the base plate 96 is substantially advantageous in reducing the force required to separate and feed one magazine from the stack therewith. The lower portion 98 (FIG. 3) of the plate 97 is curved to afford a smooth transition in the movement of the magazines, newspapers, or the like 25 as they are fed to the addressing machine or other printing machine as explained more fully hereinafter.

A pair of cross braces 99 and 100 are provided to support the plate 98 and prevent bending or flexure of the plate to the maximum extent possible; one of these braces 99 is located adjacent the lower end 98 of the plate, the other brace 100 being mounted beneath the upper end of the plate. For effective and efficient operation of the machine, it is highly desirable that the plate 97 be rigid, regardless of the number of magazines or like articles in the stack. Above the top portion of the plate 97, a series of rollers 102 are journaled in a pair of bars or the like such as the bar 103 illustrated in FIGS. 2 and 3. The rollers 102 extend completely across the feed station 20 of the feeder F and afford additional support for the magazines, newspapers, or the like 25 as indicated in FIG. 2. The support bars 103 are secured to the side frame members such as the frame member 55 by suitable means such as the bolts 104, thus making it possible to assemble the bars and the rollers as a complete unit before they are mounted in the feed station 20 of the machine. In some instances, it may be desirable to afford additional transverse bracing of this portion of the feed station; for this purpose, one or more additional brace members such as the brace 105 may be provided. At least one gage plate 107 is preferably provided in the hopper or storage portion of the feeder. The gage plate may be mounted on a plurality of transverse support members 108 extending between the frame members 54 and 55 (see FIG. 2) by suitable mounting means such as a plurality of clamps 109 (see FIGS. 2 and 3). In many instances, it is desirable to afford two gage plates to en-

gage the opposed sides of the stack of magazines 25 or the like being fed by the machine.

Above the apertures 96 in the plate 97, a series of additional apertures 106 is provided. In some instances, the apertures 106 may comprise extensions of the relatively wide apertures 96; in other instances, the upper apertures may be independent of the apertures provided for the rollers (see FIGS. 2 and 3). The apertures 106 afford a means of access to the magazines 25 and permit engagement of the lower surface of the magazines or newspapers by a plurality of needle units 110 which are mounted upon a transverse bar member 111 and which are distributed at spaced points across the width of the feed station 20. The details of construction of the needle units are best illustrated in FIGS. 8–12.

FIGS. 8–10 illustrate the mounting of the needle bar 111 in the feed station of the feeder F of the machine. A guide bar 113 is affixed to the side frame member 55 and extends along the frame member in a direction substantially parallel to the surface of the plate 97 (see FIG. 3). A nylon block or slide 114 is mounted upon the guide 113 for sliding movement therealong, being provided with a longitudinal aperture 115 which is substantially complementary in configuration to the cross sectional configuration of the guide 113. A mounting member comprising a bushing 116 is utilized to suspend the needle bar 111 from the slide or mounting block 114, the bushing being disposed in encompassing relation to a mounting pin 112 which extends outwardly of the end of the needle bar 111 adjacent the slide 114. The pin receiving opening 116A in the bushing 116 is eccentrically located with respect to the axis of the bushing and the bushing is provided with a hexagonal portion 116B or other convenient means for turning the bushing. The bushing 116 is located in an opening 114A in the slide 114. At the opposite end of the needle bar 111, a mounting pin 117 extends outwardly of the bar and is journaled in an ordinary concentric bushing 126. The bushing 126 extends into an opening 118A in a slide 118 which is substantially similar to the slide or block 114 and which is slidably mounted upon a suitable guide member 119 corresponding to the guide bar 113. It is not necessary to utilize eccentric bushings at both sides of the machine, since leveling of the needle bar 111 may be achieved simply by adjusting one side as by rotational adjustment of the bushing 116. Preferably, set screws 120 or similar fastening devices are employed to secure the bushings 116 and 126 within the nylon slide blocks and to prevent the bushings from rotating in normal use of the feeder.

Of course, with the described mounting arrangement, the needle bar 111 is pivotally movable with respect to the slides 114 and 118 and this pivotal movement is necessary to proper operation of the feeder as described more fully hereinafter. In order to maintain the needle bar in a desired normal or initial pivotal position, a biasing arrangement is provided for the needle bar. This biasing arrangement comprises a limit or stop member 121 which is threaded into a boss 122 on the guide block 114 and which extends upwardly therefrom toward contact with the needle bar 111 (see FIG. 8). The biasing arrangement further includes a spring 123 which extends between a pin 124 on the needle bar and a pin 125 which projects inwardly of the feeder station from the slide block 114. A relatively light spring should be employed for the member 123, it being highly desirable that the spring exert a biasing force only slightly in excess of that required normally to maintain the needle bar 111 in contact with the stop member 121. Stated differently, the spring 123 should not offer appreciable resistance to pivotal movement of the bar 111 during normal operation of the machine, but should have sufficient strength to return the needle bar periodically to engagement with the stop member 121 during operation of the machine, as described in detail hereinafter.

A plurality of needles 128 are mounted upon the needle bar 111 at spaced intervals along the length of the needle bar. These needles project outwardly of the needle bar through the apertures 106 in the plate 97 (see FIG. 3). The needle bar 111 is also provided with a needle retraction device comprising a first retracting or cam member 129 which is secured to the under surface of the needle bar 111 as indicated in FIG. 11. The cam member 129 projects rearwardly of the needle bar toward engagement with a second similar retracting or cam member 130 which is mounted upon the support or brace member 100.

FIG. 11 shows the needle bar in its initial of retracted position in which the two cam members 129 and 130 engage each other to pivot the needle bar to a position in which the needles 128 do not project above the surface of the plate 97 and thus do not contact any of the magazines or newspapers 25 in the feeder stack. As indicated in FIG. 12, a very slight movement of the guide and needle bar assembly in the direction indicated by the arrows 132 releases the two cam members 129 and 130 from effective engagement with each other and permits the needle bar 111 to pivot counter clockwise to its normal position in engagement with the stop member 121 (FIG. 8), thereby bringing the needles 128 into engagement with the lowermost magazine or newspaper 25A in the stack. Continued movement of the needle bar assembly in the direction indicated by the arrow 132 in FIG. 12 advances the magazine 25A downwardly and to the right as seen in FIG. 12 toward engagement with the feed rollers 73 and 93 (see FIG. 3), the limit position of the assembly being indicated by the dash outline 114' for the guide block 114. Subsequent movement of the guide block and the needle bar in the direction opposite arrow 132 returns the needle bar assembly back to the position shown in FIG. 11 with the needles retracted.

The drive linkage for the needle bar assembly comprises an eccentric 135 which is affixed to the outboard end of the shaft 51 as indicated in FIGS. 2 and 4. An adjustable length link 136 is mounted upon the eccentric 135 and is pivotally connected to a lever 137. The lever 137 is pinned or otherwise secured to a shaft 138 and is utilized to rotate the shaft. The shaft 138 extends completely across the feed station 20 of the novel feeder (FIG. 7), being journaled in suitable anti-friction or other bearings mounted upon the respective plates 54 and 55 of the feed station. An actuating link or lever 140 (FIGS. 4 and 7) is affixed to the shaft 138 for rotation therewith and is pivotally connected to an additional link 141 which, in turn, is pivotally connected to the mounting block 114. A similar linkage may be utilized at the opposite end of the machine to connect the shaft 138 to the nylon slide or block at that side of the machine. Thus, rotation of the cam shaft 51 is effective, through the described linkage, to reciprocate the two slides or mounting blocks at the opposite sides of the machine along their respective guide members in a direction substantially parallel to the plate 97 which supports the magazines, newspapers, or other articles 25.

The mechanism of the feed station 20, as thus far described, provides for feeding of the lowermost magazine 25 from the stack completely under control of the cam shaft 51. The shaft 51, as described hereinabove, is driven by the chain 49 from the one cycle clutch 41. At the start of a feed cycle, the needle bar assembly is in the position illustrated in FIG. 11 with the needles 128 retracted from the lowermost magazine 25A. The cam shaft 51 first drives the eccentric 135 and thereby initiates movement of the needle bar 111 along the direction indicated by the arrows 132 in FIGS. 4, 11 and 12, the movement of the needle bar being effected through the linkage comprising the adjustable lever 136, the link 137, the rock shaft 138, and the connecting links 140 and 141. As soon as the needle bar 111 is moved a relatively short distance the two cam members 129 and 130 are effectively disengaged, releasing the needle bar for a relatively

limited pivotal movement about its axis. The force required for this movement is provided by the springs **123**. This pivotal movement is in a counterclockwise direction as seen in FIGS. 3, 4, 11 and 12 and brings the needles **128** into engagement with the undersurface of the lowermost magazine **25A** in the stack, the movement of the needles being from the retracted position thereof shown in FIG. 11 to the engaged position shown in solid lines in FIGS. 4 and 12. Thereafter, continued movement of the needle bar assembly in the direction of the arrows **132** impels the magazine **25A** downwardly along the surface of the plate **97** (see FIGS. 3, 4 and 12) toward the feed rollers such as the rollers **73** and **93**.

As the magazine **25A** approaches limiting position **114'** adjacent the rollers **73** and **93**, the continued rotation of the cam shaft **51** causes the cams **52** and **53** to move the cam followers **57** and **62** in a clockwise direction as seen in FIGS. 3 and 4. Thus, the rollers **73** and **74** are pivoted away from the upper rollers **93** and **94**, permitting the magazine to move into the space between the two sets of rollers. Thereafter, the continued rotation of the cam shaft reverses the effective direction of movement of the linkage connected to the needle bar **111**, withdrawing the needles from engagement with the magazine **25A**. The reverse movement of the needle bar assembly causes the needle bar to pivot to a limited extent in a clockwise direction as seen in FIG. 12 by virtue of the fact that the needles are in contact with the undersurface of the magazine; it is for this reason that the springs **123**, which tend to bias the needle assembly toward the magazine, should exert a relatively light force in order to avoid scratching of the magazine or newspaper.

After the needles **128** have been withdrawn from the magazine **25A**, the continued rotation of the cam shaft **51** causes the cams **52** and **53** to rotate to a position in which they permit counter clockwise movement of the cam follower levers **58** and **63** about their respective pivot points (see FIGS. 3 and 4). The necessary biasing force required to keep the cam followers in contact with the cams is provided by a pair of springs such as the spring **140'** (FIG. 4). The spring **140'** continuously urges the cam follower lever **58** in a counter clockwise direction and maintains the roller **57** in contact with the cam **53**. This movement of the levers **58** and **63** brings the lower feed rollers **73** and **74** substantially closer to the upper feed rollers **93** and **94** and thereby permits the rollers to engage the magazine **25A** and impel it downwardly along the lower portion **93** of the plate **97**. In this manner, the magazine is fed to the conveyor portion **22** of the feeder.

It should be noted that the upward movement of the lower rollers **73** and **74** is not sufficient to bring them into engagement with the upper rollers **93** and **94** in the event that there is no magazine or other article interposed between the rollers. Rather, the movement of the lower rollers is limited to a point just short of contact with the upper rollers to prevent the development of flat spots on the rollers when the feeder is stopped with the rollers **73** and **74** in raised position.

Of course, the continued upward movement of the needle bar assembly **110** returns the needle bar **111** to the initial position illustrated in FIG. 11 in which the two cam members **129** and **130** engage each other and deflect the needles **128** out of contact with the next lowermost magazine in the stack. Consequently, if operation of the machine is stopped and it is desired to remove the magazines from the stack, there is no danger that the person removing magazines would impale his fingers on the needle **128**.

In order to avoid feeding of two or more magazines or newspapers at one time, and also to avoid jamming of the feeder, a plurality of separator plates are mounted in the feeder station **20** immediately adjacent the feed rollers such as the rollers **73** and **93**. A preferred construction of these separator plates is illustrated in FIG. 5. As indicated therein, each of the relatively narrow separator plates **142** is mounted upon a plate holder **143** which engages a mounting bar **144**. The mounting bar **144** extends transversely of the feed station **20** of the machine, the mounting position being most clearly illustrated in FIG. 2. The plate holder or mounting member **143** is effectively clamped to the bar **144** by a clamp member **145**, which engages one surface of the bar **144** and which is secured to the holder **143** by suitable means such as a screw **146**. The lower end **147** of the separator plate **142** is preferably provided with a bevel **147** to permit the lowermost magazine in the stack to advance a very limited distance along the surface of the support plate **97** as indicated in FIGS. 3 and 4.

FIG. 5 also shows a safety device which may be utilized in the novel feeder. The safety device comprises a lever **148** which is pivoted on the holder **143**, as indicated at **149**, and which projects slightly above the surface **150** of the separator plate **142**.

The holder **143** of the lever **148** is provided with a pin **151** which extends into an enlarged hole **150** in the lever **148**. The pin **151** serves to limit movement of the lever **148** when a stack of magazines, newspapers, or the like engage the lever. The opposite end **152** of the lever **148** engages an actuating element **153** which comprises a part of a switch **154**. The element is spring biased and tends to pivot the lever **148** in a counter clockwise direction about its pivot point **149**.

When magazines are loaded in the feeder, however, the weight of the magazines forces the lever downwardly with respect to the separator plate **147** and consequently moves the actuating element **153** inwardly of the switch **154**. The switch **154** is a normally open device which is closed by the above described movement of the lever **148**. The switch is connected to the operating circuit of the feeder in a manner such that the switch must be closed in order to permit operation of the feeder. Consequently, when there are no magazines or the like, or only a very few magazines in the feeder, the safety device is effective to interrupt operation of the feeder until a fresh supply of magazines is placed in the receptacle provided therefor.

In order to prevent jamming of the feeder in the region adjacent the separator plates **142**, it is necessary that the magazines, newspapers or the like be disposed in the feeder with their fold ends abutting the separator plates. Otherwise, the magazines or newspapers would tend to open during the feeding operation and would almost inevitably jam the machine. Ordinarily, however, the fold ends of the magazines are somewhat thicker than the free ends. Consequently, as the magazines are fed from the stack, there is a tendency for the fold ends to pile up or curl. Unless this tendency is effectively counteracted, the lowermost magazine in the stack will not be in contact with the support plate **97** (FIG. 3), but rather will tend to hang up on the separator plates **142** and on other parts of the feeder device. To overcome this difficulty, the feeder is provided with a pushing or conditioning apparatus **156** which is best seen in FIGS. 2, 3 and 20–24.

The pusher or conditioning apparatus **156** comprises a plurality of pusher belts **157** that are passed about a roller **158** located at the top of the hopper for the feed station. The belts **157**, at their lower ends, are each passed around a pair of relatively small rollers **160** and **161**. As shown in FIG. 20, the rollers **160** and **161** are journaled in holders **163**, similar holders being located at spaced points along the mounting bar **144**. The holder **163** is effectively clamped to the mounting bar **144** by means of a set screw or the like **164** which engages in a notch in the rear face of the bar **144**. The holder **163** is provided with flanges which serve to guide the associated belt **157** and prevent displacement of the belt along the rollers. As indicated in FIG. 21, the guide arrangement comprises a pair of ears or guide members **166** which engage the sides of the belt **157** immediately adjacent the

roller 161, to prevent transverse displacement of the belts from their desired positions.

This arrangement is augmented in the portions of the belt which pass over the roller 158, where an additional series of guides 167, one of which is illustrated in detail in FIG. 22, are employed. Each of the guide devices 167 comprises a substantially U-shaped guide member 168 which is slidably mounted upon a bar 169, the bar 169 extending transversely of the feed station 20 of the machine and being mounted in the side frame members 54 and 55 of the feed station 20 of the machine. Each of the devices 167 further includes a spring 170 which is secured to the guide member 168 in adjustably fixed position upon the bar 169. As indicated in FIG. 22 one of the belts 157 extends between and is held in position by the extension portions 171 and 172 of the U-shaped guide member 168. A series of auxiliary rollers 173 support the central portion of the upper pass of each of the belts 157.

It is essential that the belts 157 be maintained under tension. The mounting arrangement employed for this purpose is best illustrated in FIGS. 20 and 23. As indicated herein, the shaft 175 upon which the roller 158 is mounted extends across the feed station of the machine and through the two side frame members 54 and 55. On the outboard ends of the shaft there are mounted a pair of bearings as indicated by the bearing housings 179 and 180, which preferably enclose ball bearings or other anti-friction bearings. Moreover, it is desirable that these bearings be of the totally enclosed type, pre-lubricated and sealed against dust and other extraneous matter. The housings 179 and 180 include the hubs 179A and 180A, respectively, which encompass the ends of the shaft 175. The portion 180A of the bearing housing 180 which extends through the frame member 55 is located in a slot 181 which permits movement of the shaft longitudinally of the slot. A mounting block 183 is mounted upon the frame member 54 closely adjacent the lower end of the slot 181 and a tension adjusting screw 184 is threaded through the block 183 and engages the outer casing of the housing 179.

At the opposite side of the machine, the housing portion 180A is located in a similar slot and is engaged by a tension adjusting screw 186 threaded through a mounting block 187. Manipulation of the screws 184 and 186 makes it possible to adjust the position of the bearings supporting the shaft 175 and thus apply the desired tension on the pusher belts 157; manipulation of the tension adjusting screws also affords a means to maintain the shaft 175 in parallel relation with the rollers 160 and 161. Thus, this arrangement serves as both a tensioning and a leveling mechanism. Of course, the belts 157 retain the roller 158 and the shaft 175 in position on the frame members 54 and 55.

While resort may be had to pusher belts 157 of various kinds, two-ply canvas belts have been found to be highly advantageous. In such belts, each of the plys is impregnated with a rubber solution. Desirably, the treatment of the inner ply which rides over the rollers 158, 160 and 161 is such that high frictional engagement between this face of the belt and the rollers is afforded to insure effective driving of the belts. It is also advantageous to impregnate or otherwise treat the outer ply of the belt to insure good frictional engagement of the belt with the magazines, newspapers or other articles handled by the feeder. This treatment of the outer plys of the belts is preferably of such nature that the frictional material is permanently retained therein and is not rubbed off into the magazines or the like during operation of the feeder.

The drive for the pusher tapes 157 is best illustrated in FIGS. 2, 10 and 23. As indicated in FIGS. 2 and 10, a second eccentric 190 is affixed to the outboard end of the shaft 51 for rotation therewith. The eccentric 190 is connected to an elongated operating lever 191 by a lost-motion connection comprising a spring 192, one end of which is connected to a stud 193 on the lever 191 and the other end of which is connected to a pin 194 secured to the arm 195 of the eccentric 190. The pin 194 and an additional locating pin 196 are slidably engaged in suitable slots in the lever 191; thus, the connection afforded by the spring 192 permits limited longitudinal movement of the lever 191 with respect to the extension arm 195 of the eccentric.

One end of the elongated lever 191 opposite the eccentric 190 is pivotally connected to the operating arm 200 of an unidirectional clutch device 201 (FIGS. 2 and 23). The clutch 201 may be of conventional construction and does not constitute a critical part of the present invention insofar as its structural details are concerned. Any suitable clutch which is effectively engaged when its operating arm is moved in a given direction, but which is disengaged when the arm is moved in the opposite direction, may be utilized as the clutch 201. The driven element of the clutch 201 is mounted on the outboard end of the roller shaft 175. In the present instance, the clutch 201 is effectively engaged to rotate the shaft 175 when the operating arm 200 is rotated in a clockwise direction, as seen in FIG. 2, but is disengaged and is therefore ineffective to rotate the shaft 175 when the operating arm 200 is rotated in a counter-clockwise direction.

A simple, inexpensive, and commercially available construction for the clutch 201 is illustrated in FIGS. 23 and 24. As indicated in FIG. 24, the clutch 201 may include the driven clutch element 202, which comprises a bushing affixed to the shaft 175 as by a pin 203. The clutch further includes a drive clutch element comprising a bushing 204 which is journaled upon a reduced diameter end portion 206 of the driven element 202. The operating arm 200 is affixed to the drive element 204 of the clutch. A torsion spring 207 is mounted in encompassing relation to the adjacent portions of the two clutch elements 202 and 204, the ends of the spring being secured to the two clutch elements.

Rotation of the drive element 204 in one direction (clockwise in FIG. 2) tends to tighten the convolutions of the spring 207 and causes the spring to be effective to transmit torque from the drive element to the driven element 202 and thus to the shaft 175. Rotation of the drive element in the opposite direction, however, simply relieves tension on the spring and opens up its convolutions, so that no substantial torque is transmitted to the shaft.

The pusher belts 157 are intermittently driven from the cam shaft 51 through the linkage afforded by the eccentric 190, the elongated link 191 and the undirectional clutch device 201. The position of the eccentric 190 upon the shaft 51 is made such that the downward stroke of the elongated link 191 is initiated at the beginning of the operating cycle of the main clutch 41, thus coinciding with the time at which the needle support bar 111 is in the position illustrated in FIG. 11. Consequently, movement of the belts 157 in the directions indicated by the arrows 205 is initiated at the beginning of each operating cycle of the feeder, since downward movement of the lever 191 drives the clutch 201 and the shaft 175 in a clockwise direction, as seen in FIG. 2. The rotational movement of the shaft is completed prior to the time that the needles 128 enter the lowermost magazine 25 in the stack. This timing is highly desirable in order to avoid a downward pressing movement of the stack of magazines against the needles 128 and the needle bar 111. Moreover, it insures that undesirable pressure is not impressed upon the needles 128 which might result in damage thereto or to the articles to be engaged and advanced thereby.

The intermittent downward movement of the pusher belts 157 impels the folded ends of the newspapers, magazines or like articles downwardly in the stack and assures contact of the lowermost magazine or the like with the support plate 97. Consequently, the normal tendency of the magazines to curl and bend away from the plate 97 is counteracted by the pusher belts, with the result that

the lowermost article in the stack is effectively and accurately positioned for engagement by the needles 128 and for feeding through the gap between the plate 97 and the separator plates 142, and thence into the space between the feed rollers 73, 74 and 93, 94. Moreover, this entire arrangement is such that it is insured that only the lowermost magazine, newspaper or other article in the stack thereof in the hopper is advanced so as to thereby avoid double feeding, jamming or otherwise objectionable operation. In this connection, it will, of course, be understood that the spacing between the support plate 97 and the separator plates 142 should be adjusted to be slightly greater than the thickness of the articles handled by the feeder but less than the thickness of two articles being fed.

When the feeder F of this invention is associated with an addressing machine A of the kind illustrated in FIG. 1, the addressing machine may advantageously be equipped with conveyor belts in the manner described in the patent to Lawrence H. Morse, No. 2,359,852, patented October 10, 1944. It will be understood, however, that when the feeder F is aligned with the addressing machine A in the manner illustrated in FIG. 1, the conveyor belts are driven in a direction opposite to that in which they are described as being driven in aforesaid patent No. 2,359,852.

In the present instance, when a magazine or other article is discharged from the feed station 20 of the feeder F, it is deposited upon a plurality of feeder belts 210 which extend across the conveyor portion 22 of the feeder. The belts 210 are operated at a speed sufficient to advance the magazines into the printing station S to be arrested by the stop mechanism 27 well in advance of the time an impression is made on the article in the printing station S. Hence, the conveyor belts 210 are operated at a relatively high speed. Although only two belts 210 are illustrated in FIG. 1, it should be understood that any desired number of belts may be employed and that this is by no means critical to the present invention.

As shown in FIGS. 1 and 3, the individual endless belts 210 are passed about a drive roller 212 which is mounted upon the continuously driven shaft 81, the shaft 81 being driven by means of the belt 34 as described hereinabove. From the drive roller 212, the upper pass of each of the belts 210 extends toward and extends around an idler roller 213 located at the discharge end 21 of the feeder F (see FIG. 1). A pair of idler rollers 214 (FIG. 7) and 214A (FIG. 1) engage the lower pass of each of the belts to elevate the lower passes of the belts and thereby make it possible to associate the feeder mechanism with the addressing machine A in such a manner that the operative parts of the feeder are disposed above the top of the table 215 of the addressing machine as A. It is this that enables the feeder of the present invention to be readily associated with or disassociated from a particular printing or addressing machine.

The conveyor portion 22 of the feeder F includes a pair of side rails 220 and 221 which have corresponding ends thereof mounted upon the structural members at the feed station 20 and the discharge station 21. At the feed station of the machine, as illustrated in FIG. 3, for example, the rail 220 is effectively secured to a support rail 222, which constitutes a part of the frame of the feed station 20, by suitable means such as a clamping plate 223 bolted to each of the two rails 220 and 222. At the opposite end of the machine, the rail 220 may be directly bolted to the depending leg 24; of course, other suitable fastening means may be utilized if desired, although it should be noted that the connection should be a rigid one when the feeder F is assembled. Similarly, the rail 221 may be bolted or otherwise secured to the frame of the feed station 20 as by a clamping plate 226 and may be fastened to the leg or frame portion of the discharge station 21 by suitable means such as the bolt 227 (see FIG. 1).

As indicated in FIG. 16, a pair of substantially T-shaped guide rails 230 and 231 are mounted upon the support rails 220 and 221 respectively, the guide rail 231 being shown in cross section in FIG. 14. The guide rails 230 and 231 are individually engaged by a pair of stop finger mounting blocks 232 and 233, respectively, which are provided with substantially T-shaped slots for engaging the guide rails 230 and 231 respectively as shown in FIGS. 13, 14 and 16. Each of the mounting blocks 232 and 233 is provided with a set screw such as the set screw 234 in FIG. 13 which serves to releasably retain the mounting block in any desired longitudinal position with respect to the guide rail with which it is associated.

A support bar 236 extends between the two mounting blocks 232 and 233. Each of the blocks is provided with a clamp arrangement to retain the bar 236 in fixed position therein. Thus, as illustrated in FIGS. 13 and 14, the block 233 is provided with an opening 237 through which the bar 236 extends and a clamp screw 238 which effectively clamps the bar in the desired position.

A stop finger operating shaft 240 extends between and is journaled in the two mounting blocks 232 and 233 and projects outwardly of the block 233. On the outboard end of the shaft 240 there is mounted a bell crank 242 which is normally biased toward rotation in a counter clockwise direction, as shown in FIG. 13, by means of a spring 244. The bell crank 242 supports a roller 245 which engages a cam member 246 mounted upon a stop finger actuating rod 247. One end of the actuating rod 247 is slidably engaged by a guide bracket 248 mounted upon the support rail 220. The opposite end of the actuating rod 247 is pivotally connected to a lever 250 which is mounted upon the outboard end of a shaft 251 which extends completely across the feed station of the feeder F and is journaled in the two side frame members of the feed station.

The end of the lever 250 opposite the shaft 251 is connected to a spring 255 which is effective to bias the lever 250 to rotation in a counter clockwise direction, as seen in FIG. 13. A cam follower link 256 is pivotally connected to the intermediate portion of the lever 250 as indicated by reference numeral 257. A cam follower roller 258 is mounted upon the link 256 and engages a cam 260 which is affixed to the cam shaft 51 at the feeder station of the machine. The cam 260 is preferably secured to the cam shaft 51 by a releasable means such as a set screw 262 in order to permit adjustment of the angular position of the cam 260 with respect to the shaft and also to permit removal of the cam from the shaft, as explained more fully hereinafter. Preferably, the link 256 is bifurcated at the end opposite the pivotal mounting 257 to afford a pair of arms 263 and 264 which engage a portion of the hub 268 of the cam (see FIGS. 13 and 15).

Referring to the stop finger assembly 27, as illustrated in FIGS. 16, 17 and 17A, it is seen that a substantially pan-shaped support member 270 is mounted upon the support bar 236. The support member 270 is provided with a pair of bosses 271 which afford a convenient means for securing the support member to the bar 236, suitable mounting members such as the set screw 272 illustrated in FIGS. 17 and 17A being employed for this purpose.

The base portion 274 of the support member 270 is foreshortened at the end opposite the support bar 236 and the extremity of the bottom portion is turned upwardly to afford a lip 275, as indicated in FIGS. 16 and 17. In addition, a longitudinal slot 276 is formed in the base of the support member 270. The sides of the pan-shaped support member 270 are extended beyond the lip 275, and a stop finger member 278 is pivotally mounted between the two extension portions 279 and 280 of the support member, as clearly shown in FIGS. 16 and 17.

An actuating lever 281 is affixed to the shaft 240 at the center portion thereof and extends from the shaft 240 toward the stop member 278 in alignment with the slot 276 in the base 274 of the support member 270. At the

end of the lever 281 opposite the shaft 240, a relatively small crank-shaped lever 283 is pivotally mounted upon the lever 281. One arm of the lever 283 is pivotally connected to a bracket 284 mounted upon the stop member 278. A pin 285 is secured to the opposite arm of the crank-shaped lever 283 and projects across the plane of the lever 281.

In addition to the support rails 220 and 221 described hereinabove, an additional pair of longitudinal rails 290 and 291 are incorporated in the conveyor portion 22 of the machine and extend from the feed station 20 to the discharge station 21 thereof (see FIGS. 1 and 16). As illustrated in FIG. 1, each of the support rails 290 and 291 is pivotally supported upon a pair of rods 292 and 293 located adjacent the feed station 20 and the discharge station 21, respectively, in a manner which permits raising and lowering of the rails 290 and 291 to engage a magazine being fed across the center portion 22 of the feeder and thereby maintain the magazine in contact with the conveyor belts 210. A plurality of pressure rollers 300 and 301 are mounted at spaced intervals along the rails 290 and 291, respectively (FIGS. 16 and 19), and engage the magazines 25 or the like as they are fed across the conveyor portion 22 of the machine.

In addition, and as best illustrated in FIGS. 1, 16 and 18, a pair of return stop members 304 and 305 are supported upon the rails 290 and 291, respectively, being individually pivoted upon a pair of mounting blocks 306 and 307 which are secured to the two rails but are longitudinally movable therealong to any desired position. As shown in FIG. 18 the return stop member 305 is biased downwardly toward the surface of the underlying conveyor belt 210 by suitable means such as the spring 309; a similar biasing arrangement is applied to the other stop member 304. The biasing force of the spring 309 is relatively weak. Consequently, a magazine advancing along the belt 210 in the direction indicated by the arrow 26 deflects the stop member 305 upwardly and passes beneath the stop member. The end portion 310 of the stop member 305, however, is bent upwardly to afford a stop portion which effectively interrupts movement of a magazine in a direction opposite to the arrow 26 whenever such reverse movement occurs, as described more fully hereinafter.

As described hereinabove, when a magazine, newspaper or the like discharged from the feed station 20 of the feeder F, the magazine is fed across the table portion 215 of the addressing or other printing machine A in the direction indicated by the arrow 26 in the several views of the drawings. As the magazine or other article proceeds along the conveyor, it is of course maintained in contact with the conveyor belts 210 by means of the pressure rollers 300 and 301 and is prevented from buckling by the rods 290 and 291.

As the magazine or other article proceeds along the conveyor, the rotation of the cam shaft 51 causes the cam 260 to impel the cam follower 258 toward the right, as seen in FIG. 13, pivoting the lever 250 in a clockwise direction against the force exerted by the spring 235. As a consequence, the elongated actuating lever 247 is moved longitudinally to the right as seen in FIG. 13, driving the cam 246 beneath the cam follower 245 and pivoting the bell crank 242 in a clockwise direction. The clockwise movement of the crank 242 imparts a corresponding clockwise rotational movement to the shaft 240 and pivots the lever 281 to the position shown in FIG. 17, in which the stop member 278 is elevated above the surface of the table 215 of the printing machine. This action takes place immediately following a printing operation in the machine and, preferably, the elevation of the stop member 278 is started during the printing operation in order that the magazine may be released for continued movement immediately upon completion of printing.

The stop member 278 is maintained in the elevated position of FIG. 17 for only a relatively short period of time, this period being determined primarily by the length of the dwell portion 246A of the cam 246. Following the printing operation, the continued rotation of the cam shaft 51 permits the cam follower 258 to move to the left as seen in FIG. 13 and permits the spring 255 to pivot the lever 250 in a counter clockwise direction. As a consequence, the elongated lever 247 is moved longitudinally to the left (FIG. 13), permitting the cam follower 245 to ride onto the lower portion of the cam 246. As a result, and in response to the biasing force exerted by the spring 244, the bell crank 242 pivots in a counter clockwise direction, as seen in FIG. 13, and pivots the shaft 240 and the lever 281 in a counter clockwise direction to the position seen in FIG. 17A. This pivotal movement of the lever 281 effectively impels the stop member 278 downwardly to a position in which the stop member contacts the top of the table 215. Consequently, the stop member is effective to halt movement of the next magazine 25 or the like being fed along the conveyor, holding the magazine in the desired position for a printing operation. In many instances, the magazine, newspaper, or other article may tend to bounce away from the stop member 278 to a substantial extent. This tendency toward bouncing or reverse movement of the magazine is effectively overcome by the additional stop members 304 and 305, which prevent any substantial rearward movement of the magazine along the conveyor.

It is important to note the direction of movement of the stop member 278 with respect to the direction of movement of the magazines along the conveyor portion 22 of the machine. Thus, and particularly as illustrated in FIGS. 17 and 17A, the stop member 278 pivots, from the elevated position shown in FIG. 17, in a direction which is opposed to the direction of movement of the magazine, indicated by the arrow 26. Consequently, as the stop member returns from the stop position (FIG. 17A) to the elevated position (FIG. 17), it moves in substantially the same direction as the magazine 25. Accordingly, there is little or no tendency for the magazine to bind against the stop member as the stop member is released, with the result that the magazine moves freely along the conveyor as soon as the stop member is actuated toward upward movement.

In order that the feeder F will be effective to position one of the magazines or other articles 25 in the printing station S of the printing machine A during the proper time in each operating cycle of the printing machine, it is necessary that some means be provided to coordinate or synchronize the operation of the feeder with that of the printing machine. In the present invention, this synchronization is accomplished by a single electrical connection between the printing machine A and the feeder F; no mechanical operating connection is employed between the two machines. A typical arrangement which may be employed to synchronize the printing and feeding mechanisms is illustrated in FIGURES 25 and 26, which relate to a printing machine substantially as described in the aforementioned Patent No. 2,359,851 to Hueber.

FIGURE 26 is a fragmentary view of a portion of the printing machine A and corresponds to he right hand end of FIGURE 12 in the above noted Heuber patent. Thus, FIGURE 25 shows the one-revolution clutch 350 which is utilized to drive the printing mechanism of the addressing machine A through a print cycle. The clutch includes a drive member 351 and a driven member 352; the driven member 352 is rotated through a single revolution during each printing cycle of the addressing machine. The control arrangement for the clutch 350 may be of the kind described in detail in the patent. Accordingly, a description of the clutch operation is not necessary herein.

The portion of the printing machine illustrated in FIGURES 25 and 26 also includes a mounting bracket 353 which is substantially similar to the bearing bracket described in the Hueber patent and which is utilized, in the present instance, to support a synchronizing switch mech-

anism 354. The bracket 353 is mounted upon a support rail 355 which constitutes a part of the frame of the addressing machine. At the left hand end of the bracket, as seen in FIGURE 26, there is mounted a support plate 356 upon which a timing switch 357 is supported. A relatively short shaft 358 is journaled in the support plate 356. At one end of the shaft 358 there is mounted a cam 359, whereas a spur gear 361 is affixed to the opposite end of the shaft, on the other side of the support plate. The cam 359 is engaged by a cam follower roller 362 which constitutes an actuating member for the timing switch 357.

The gear 361 constitutes the terminal gear in a gear train including an initial driving gear 363 and an additional gear 364, the gear 364 being interposed between and meshed with the gears 361 and 363. In the present instance, the gear 364 is supported on a shaft 365 which in turn is supported by the plate 356. The gear 363 is mechanically connected to the driven member 352 of the clutch 350 for rotation therewith.

As explained in detail in the Hueber patent, the one-revolution clutch 350 is engaged each time the printing machine A is to effect a printing operation and drives the platen mechanism of the printing machine through the printing operation. In the present arrangement, the clutch 350 also causes the gear 363 to rotate through one complete revolution during each printing cycle of the addressing machine. Because the effective over all ratio of the gear train 361, 363 and 364 and 1:1, the shaft 358 is also driven through one complete revolution during each printing cycle of the addressing machine. During a substantial portion of each revolution of the shaft 358, the cam 359 of the timing mechanism 354 actuates the operating member 362 of the timing switch 357 to close an electrical circuit which is otherwise normally held open. The switch 357 is electrically connected by suitable conductors (not shown) to the solenoid 45 (see FIG. 3) of the feeder F. In this manner, the switch 357 is effective to energize the solenoid once during each printing cycle of the addressing machine. In other words, the solenoid 45, which controls completely the operation of the feeder mechanism, is energized only once during each printing cycle of the addressing machine A and is not energized except when the addressing machine is driven through a print cycle.

The synchronizing mechanism 354 illustrated in FIGURES 25 and 26 constitutes the only operating link necessary between the feeder F and the printing machine A (FIG. 1). Of course, a plug and socket connection may be provided to afford the necessary electrical circuit between the switch 357 and the feeder solenoid 45. In this manner, the feeder may be completely disconnected from the printing machine in an exceedingly simple and expeditious manner.

Each time that the timing switch 357 is closed during a print cycle of the addressing machine, and the control solenoid 45 of the feeder F is energized, the main cam shaft 51 (see FIG. 3) of the feeder is driven through a complete operating cycle. FIGURE 27 is a timing chart which graphically illustrates the relative timing of a number of the operations which are effected by the feeder mechanism during each revolution of the cam shaft 51. In this chart, the movements of the feed rolls 73 and 74, the slides 114 and 118, the needles 128, and the pusher belts 157 are all plotted as a function of rotation of the cam shaft 51.

As indicated in FIGURE 27, at the start of each operating cycle of the cam shaft, the slides 114 and 118 are in their elevated or inactive position and the needles 128 are retracted (see FIG. 11). Furthermore, the feed rollers 73 and 74 are in their raised position closely adjacent the upper feed rollers 93 and 94, this position being shown in FIGURE 4. The pusher belts 157 at the start of the operating cycle are driven to effect a pushing or stack-straightening operation.

As soon as cam shaft 51 starts its rotational cycle the slides 114 and 118 are driven downwardly, as seen in FIGURES 4 and 11, toward the limiting position illustrated by dash outline 114' in FIGURE 12. The slides reach their limiting position at approximately the half way point in the rotational cycle of the cam shaft 51. Shortly after the downward movement of the slides is initiated, the needles 128 move from their initial retracted position into engagement with the lowermost magazine 25A in the stack (see FIGURE 12) and remain engaged with the magazine or like article until the direction of movement of slides 114 and 118 is reversed at the mid point of the operating cycle. At approximately the same time that the needles 128 become engaged with the magazine 25A the feed rollers 73 and 74 begin their downward movement with respect to the rollers 93 and 94, affording a gap into which the needle mechanism may move between the two sets of rollers.

After the cam shaft 51 has rotated through 180°, the continued rotational movement of the shaft reverses the direction of movement of the slides 114 and 118 and disengages the needles 128 from the magazine 25A. Shortly thereafter, the rollers 73 and 74 begin their upward movement toward the upper feed rolls 93 and 94. Consequently, toward the end of the operating cycle, the rollers engage the magazine 25A and impel it downwardly of the stack and down the extension portion 98 of the support plate 97 onto the conveyor belts 210 (see FIG. 3). Also, toward the end of the cam shaft operating cycle, the pusher belts 157 are again actuated to effect a feeding movement with respect to the folded ends of the magazine, thereby pressing the folded ends down against the support plate 97.

The feeder F of the invention has been described hereinabove in connection with a particular type of printing machine, that shown in the aforementioned Patent No. 2,359,851. The feeder is equally useful, however, with other and substantially different printing machines. Thus, FIGURES 28 and 29 illustrate the feeder F associated with a printing machine of the kind described and illustrated in Patent No. 1,992,661, issued February 26, 1935, to Walter T. Gollwitzer.

The printing machine P illustrated in FIGURE 28 is similar to the printing machine A of FIGURE 1, to the extent that it includes a printing station 370 at which individual printing devices are utilized to make impressions upon articles fed through the printing machine. Furthermore, the printing impressions are made from printing devices which are generally similar to those employed in the previously referred to printing machine A. Mechanically, however, the printing machine P is substantially different from the machine A, as is apparent from a comparison of the aforementioned Gollwitzer and Heuber patents.

As indicated in FIGURES 28 and 29, the feeder F is associated with the printing machine P in a manner such that the magazines, newspapers or like articles to be imprinted are fed through the machine P from front to rear as contrasted with the side-to-side feed described hereinbefore in connection with the machine A. The direction of feed of the magazines is indicated by the arrows 371, the magazines of course, being fed from the feed station 20 across the conveyor portion 22 of the feeder to the discharge station 21. As in the previously described arrangement, the direction of feed may be reversed in order to change the location and alignment of the printing impressions upon the magazines; this may be accomplished by removing the feeder F from the printing machine P turning it through an angle of 180°, and again moving the feeder over the table 372 of the printing machine.

As described in the aforementioned Gollwitzer patent, the printing machine P includes a shaft 373 which is continuously driven and which is utilized to drive an operating shaft 374 through a one-revolution clutch. The

one-revolution clutch described in the patent is mechanical in nature. However, an electrically-actuated clutch may be and has been employed to link the two shafts in commercial versions of this machine. The one-revolution clutch, which has not been illustrated in the drawing, is actuated by a conditioning switch 375. The switch 375, in turn, is controlled by the selector mechanism of the printing machine in known manner.

The control arrangement for the feeder F, in the apparatus of FIGURES 28 and 29 comprises a cam 376 which is affixed to the shaft 374 for rotation therewith. The cam 376 engages a cam follower 377 which constitutes the actuating member of a timing switch 378. The timing switch 378 is electrically connected, as by a plug and jack connector or other suitable means (not shown) to the control solenoid 45 of the feeder, FIGURE 3, in substantially the same manner as described hereinabove in connection with the timing switch 357, FIGURE 26.

Operation of the feeder F in conjunction with the printing machine P is substantially the same as when employed with the printing machine A. The shaft 374 rotates through one complete revolution during each printing cycle of the addressing machine P. Consequently, the timing switch 378 is closed during a portion of that operating cycle and is thus effective to energize the main operating solenoid 45 in the feeder mechanism. In this manner, the feeder mechanism is synchronized with the printing machine to feed a single magazine or other article into the printing machine each time the preceding magazine or the like is imprinted. The feeder is not actuated to feed another magazine, however, during those cycles of the printing machine in which no printing operation takes place, as when a printing device is passed through the machine but no impression is made therefrom.

Hence, while the preferred embodiments of the invention have been illustrated and described, it is to be understood that these are capable of variation and modification, and we therefore do not wish to be limited to the precise details set forth, but desire to avail ourselves of such changes and alterations as fall within the purview of the following claims.

We claim:

1. A feeder for feeding magazines, newspapers and like folded articles into a printing machine or the like, comprising: a pair of fixed frame members disposed in spaced relation to each other; and inclined main support member, mounted between said frame members, for supporting a stack of folded articles with the ends thereof facing the lower end of said support member, said support member having a plurality of apertures therein; a pair of slides, each mounted on a respective one of said frame members below said support member for movement along a path parallel to said support member; a needle support bar journaled in said slides; a plurality of needles mounted in spaced relation to each other along said support bar in alignment with said support member apertures; an auxiliary support member mounted between said frame members in position to engage the ends of said articles facing said support member and spaced from said main support member to afford a feed gate; resilient biasing means for pivotally biasing said support bar toward a feeding position in which said needles tend to engage the lowermost article in said stack; and drive means for moving said slides downwardly along said paths to engage said needles with said lower-most article and feed said lowermost article through said gate and for disengaging said needles by moving said slides upwardly along said paths.

2. A feeder for feeding magazines, newspapers and like folded articles into a printing machine or the like, comprising: a pair of fixed frame members disposed in spaced relation to each other; a main support member, mounted between said frame members for supporting a stack of folded articles at an acute angle from the horizontal and with the ends thereof facing the lower end of said support member, said support member having a plurality of relatively small longitudinal needle apertures and at least two relatively large roller apertures therein; a pair of slides, each mounted on a respective one of said frame members below said support member for movement along a path parallel to said support member; a needle support bar journaled in said slides; a plurality of needles mounted in spaced relation to each other along said support bar in alignment with said support member needle apertures; an auxiliary support member mounted between said frame members in position to engage the ends of said articles facing said support member and spaced from said main support member to afford a feed gate; resilient biasing means for pivotally biasing said support bar toward a feeding position in which said needles tend to engage the lowermost article in said stack; at least one pair of upper and lower feed rollers disposed in opposed relation to each other on the side of said gate opposite said stack, the lower roller being movable between a feed position, in which a portion thereof extends through one of said support member roller apertures into close proximity to the upper roller, and an inactive position in which said lower roller is displaced from said upper roller by a substantial distance; drive means for moving said slides downwardly along said paths to engage said needles with said lowermost article and feed said lowermost article through said gate and between said feed rollers and for disengaging said needles by moving said slides upwardly along said paths; and means, connected to said drive means, for moving said lower roller to its inactive position as said lowermost article approaches said rollers and for returning said lower roller to its feed position as said slides move upwardly along said paths.

3. A feeder for feeding magazines, newspapers and like folded articles into a printing machine or the like, comprising: a pair of fixed frame members disposed in spaced relation to each other; an inclined main support member, mounted between said frame members, for supporting a stack of folded articles with the ends thereof facing the lower end of said support member, said support member having a plurality of apertures therein; a pair of slides, each mounted on a respective one of said frame members below said support member for movement along a path parallel to said support member; a needle support bar journaled in said slides; a plurality of needles mounted in spaced relation to each other along said support bar in alignment with said support member apertures; an auxiliary support member mounted between said frame members in position to engage the ends of said articles facing said support member and spaced from said main support member to afford a feed gate; resilient biasing means for pivotally biasing said support bar toward a feeding position in which said needles tend to engage the lowermost article in said stack; drive means for moving said slides downwardly along said paths to engage said needles with said lowermost articles and feed said lowermost article through said gate and for disengaging said needles by moving said slides upwardly along said paths; and a pusher device, mounted on said auxiliary support member, for pushing said fold ends of said articles toward said main support member during the upward movement of said slides.

4. A feeder for feeding magazines, newspapers and like folded articles into a printing machine or the like, comprising: a pair of fixed frame members disposed in spaced relation to each other; an inclined main support member, mounted between said frame members, for supporting a stack of folded articles with the ends thereof facing the lower end of said support member, said support member having a plurality of apertures therein; a pair of slides, each mounted on a respective one of said frame members below said support member for move-

ment along a path parallel to said support member; a needle support bar journaled in said slides; a plurality of needles mounted in spaced relation to each other along said support bar in alignment with said support member apertures; an auxiliary support member mounted between said frame members in position to engage the ends of said articles facing said support member and spaced from said main support member to afford a feed gate; resilient biasing means for pivotally biasing said support bar toward a feeding position in which said needles tend to engage the lowermost article in said stack; cam means for pivoting said support bar, against the effect of said biasing means, to a retracted position whenever said slides are at their uppermost limit of travel; and drive means for moving said slides downwardly along said paths to release said cam means, to engage said needles with said lowermost article, and to feed said lowermost article through said gate, and for disengaging said needles by moving said slides upwardly along said paths.

5. A feeder for feeding magazines, newspapers, and like articles, into a printing machine or the like, said feeder comprising: a support member for supporting a stack of folded articles at an angle of about 45° to the horizontal with corresponding ends thereof aligned with each other; a plurality of feed needles disposed in spaced relation to each other transversely of said support member; means for advancing said needles from a disengaged position into a feeding position in engagement with the lowermost article in said stack, to feed said lowermost article from said stack in a direction parallel to said support member, and for subsequently returning said needles to said disengaged position; and cyclically driven means for impelling the ends of said articles toward said support member during intervals in which said needles are in said disengaged position with respect to said articles.

6. A feeder for feeding magazines, newspapers, and like folded articles, fold end first, into a printing machine or the like, said feeder comprising: a support member, disposed at an angle of approximately 45° from the horizontal, for supporting a stack of folded articles with the fold ends thereof aligned with each other and facing the lowermost edge of said support member; a plurality of feed needles disposed in spaced relation to each other transversely of said support member; means for advancing said needles from a disengaged position into a feeding position in engagement with the lowermost article in said stack, to feed said lowermost article from said stack fold end first in a direction parallel to said support member, and for subsequently returning said needles to said disengaged position in a predetermined operating cycle; and cyclically driven means for impelling the fold ends of said articles toward said support member during a part of said operating cycle in which said needles are in said disengaged position with respect to said articles.

7. A feeder for feeding magazines, newspapers, and like folded articles into a printing machine or the like, said feeder comprising: a support member for supporting a stack of folded articles at a predetermined angle with respect to the horizontal and with corresponding ends thereof aligned with each other, said support member having a plurality of spaced slots therein; a needle support bar disposed beneath said support member and extending transversely of said slots; a plurality of feed needles mounted in spaced relation to each other along said bar in alignment with said slots and pivotally movable with respect to the longitudinal axis of said bar; means for cyclically moving said bar along a path substantially parallel to said support member to advance said needles from a disengaged position into a feeding position in engagement with the lowermost article in said stack, to feed said lowermost article from said stack in a direction parallel to said support member, and to subsequently return said needles to said disengaged position; and cyclically driven means for cyclically impelling the ends of said articles toward said support member in synchronism with the cyclic movements of said bar and during intervals in which said needles are in said disengaged position with respect to said articles.

8. A feeder for feeding magazines, newspapers, and like folded articles, with a given end first, into a printing machine or the like, said feeder comprising: a first support structure disposed at an angle of approximately 45° to the horizontal for supporting a stack of folded articles with given ends thereof aligned with each other; a second support structure extending approximately normal to said first support structure adjacent said given ends of said articles; a plurality of feed needles disposed in spaced relation to each other transversely of said first support structure; means for cyclically advancing said needles from a disengaged position into a feeding position in engagement with the lowermost article in said stack to feed said lowermost article from said stack in a direction parallel to said first support structure with said given end first and for subsequently returning said needles to said disengaged position; and means for cyclically impelling said given ends of said articles toward said first support structure in synchronism with the cyclic movements of said needles during intervals in which said needles are in said disengaged position with respect to said articles, said means comprising a plurality of conveyor belts mounted on and extending longitudinally of said second support structure in engagement with said given ends of said articles.

9. A feeder for feeding print-receiving articles into a printing machine of the kind including a table of given height, a printing mechanism disposed adjacent said table at a printing station, and actuating means for actuating said printing mechanism to imprint data upon an article disposed upon said table at said printing station, said feeder comprising: a substantially self-supporting feed station, including means for supporting a stack of print-receiving articles therein, a feed mechanism for feeding said articles one-by-one from said stack, drive means for driving said feed mechanism through a feeding operation, and control means for controlling said drive means; a substantially self-supporting discharge station; a conveyor section mounted between and supported on said feed and discharge stations at a height approximately corresponding to the height of said printing machine table and including conveyor means, driven from said feed station drive means, for advancing said articles from said feed station across said printing machine table and through said printing station to said discharge station, in either one of two opposed directions determined by alignment of the feeder with the printing machine; and electrical means, connected to said printing mechanism actuating means and to said feeder control means, for synchronizing operation of said feeder with said printing machine.

10. A feeder for feeding print-receiving articles into a printing machine of the kind including a table of given height, a printing mechanism disposed adjacent said table at a printing station, and actuating means for actuating said printing mechanism to imprint data upon an article disposed upon said table at said printing station, said feeder comprising: a substantially self-supporting feed station, including means for supporting a stack of print-receiving articles therein, a feed mechanism for feeding said articles one-by-one from said stack, drive means, independent of said printing machine, for actuating said feed mechanism, and control means comprising an electrically controlled clutch for controlling said drive means; a substantially self-supporting discharge station; a conveyor section mounted between and supported on said feed and discharge stations at a height approximately corresponding to the height of said printing machine table and including conveyor means, driven from said feed station drive means, for advancing said articles from said feed station across said printing machine table and through said printing station to said discharge station in

either one of two opposed directions determined by alignment of the feeder with the printing machine; and electrical synchronizing means, connected to said printing mechanism actuating means and to said feeder control means, for synchronizing operation of said feeder with said printing machine, said electrical synchronizing means consisting essentially of a timing switch actuated by said printing mechanism actuating means and connected in circuit with said electrically controlled clutch.

11. A feeder for feeding print-receiving articles into a printing machine of the kind including a table of given height, a printing mechanism disposed adjacent said table at a printing station, and actuating means for actuating said printing mechanism to imprint data upon an article disposed upon said table at said printing station, said feeder comprising: a feed station, including means for supporting a stack of print-receiving articles therein, a feed mechanism for feeding said articles one-by-one from said stack, and electrically controllable drive means for actuating said feed mechanism; a discharge station; a conveyor section mounted between and supported on said feed and discharge stations, at a height approximately corresponding to the height of said printing machine table, to form a self-supporting feeder structure, said conveyor section including conveyor means, driven from said feed station drive means, for advancing said articles from said feed station across said printing machine table and through said printing station to said discharge station in either one of two opposed directions determined by alignment of the feeder structure with the printing machine; and electrical means, connected to said printing mechanism actuating means and to said feed station drive means, for synchronizing operation of said feeder with said printing machine independently of any mechanical connection to said printing machine.

12. In a feeder of the kind which feeds print-receiving articles one-by-one along a predetermined path and in a predetermined direction from a feeder station into a printing station of a printing machine, an article-positioning mechanism comprising: a main stop element; means for pivotally supporting said stop element for movement between a stop position in which said stop element is disposed in said predetermined path and an inactive position in which said stop element is displaced from said path; actuating means for actuating said stop element for movement from said inactive position to said stop position, in a direction substantially opposite said predetermined direction, to interrupt movement of a print-receiving article in alignment with said printing station, and for subsequently actuating said stop element for return movement to said inactive position, in a direction substantially corresponding to said given direction, to prevent said stop element from interfering with movement of said article once said stop element has started movement toward said inactive position; and at least one auxiliary resilient stop element, normally disposed on said path ahead of said main stop element and deflectable from said path by movement of an article along said path in said predetermined direction but effective to prevent reverse movement along said path.

13. In a feeder of the kind which feeds print-receiving articles one-by-one along a predetermined path and in a predetermined direction from a feeder station across a printing machine table and into a printing station of the printing machine, an article positioning mechanism comprising: a continuously driven conveyor comprising a plurality of conveyor belts extending transversely of said printing machine table; a main stop element; means for pivotally supporting said stop element for movement between a stop position in which said stop element is disposed in said predetermined path in contact with said table intermediate said conveyor belts and an inactive position in which said stop element is displaced from said path to a location substantially above said belts; actuating means for actuating said stop element for movement from said inactive position to said stop position, in a direction substantially opposite said predetermined direction, to interrupt movement of a print receiving article in alignment with said printing station, and for subsequently actuating said stop element for return movement to said inactive position, in a direction substantially corresponding to said given direction, to prevent said stop element from interfering with movement of said articles as said stop element moves toward said inactive position; and at least one auxiliary resilient stop element, normally disposed on said path ahead of said main stop element and deflectable from said path by movement of an article along said path in said predetermined direction but effective to prevent reverse movement along the path.

14. A feeder for feeding relatively thick folded articles including magazines, newspapers and the like into a printing or other processing machine, said feeder comprising: a main support member and an auxiliary support member, disposed in substantially perpendicular relation to each other and each disposed at an acute angle with respect to the horizontal, for supporting a stack of articles to be fed into a machine, said support members being separated from each other by a space smaller than twice the thickness of two of said articles; a feed device, comprising a support bar reciprocably mounted beneath and extending transversely of said main support member and a plurality of needles mounted at spaced intervals along said bar and pivotally movable relative to the longitudinal axis of said bar for feeding said articles one-by-one through the space between said support members; electrically actuated drive means for actuating said feed device; and a safety switch, mounted on said auxiliary support member and electrically connected to said drive means, said switch including an operating member and means biasing said operating member toward engagement with the lowermost portion of said stack to actuate said switch and de-energize said drive means whenever the number of articles in said stack reaches a predetermined minimum.

15. A feeder for feeding relatively thick folded articles including magazines, newspapers and the like into a printing or other processing machine, said feeder comprising: a main support member and an auxiliary support member, disposed in substantially perpendicular relation to each other, for supporting a stack of articles to be fed into a machine; a multiple-needle feed device, pivotally mounted beneath said main support member; means for moving said feed device in a reciprocating motion along a path substantially parallel to said main support member to feed said articles one-by-one through the space between said support members; a pusher device, mounted on said auxiliary support member, for cyclically pushing said articles into contact with said main support member; electrically actuated drive means for actuating said feed device and said pusher device; and a safety switch, mounted on one of said support members and electrically connected to said drive means, said switch including an operating member extending into engagement with the lowermost portion of said stack to actuate said switch and de-energize said drive means whenever the number of articles in said stack reaches a predetermined minimum.

16. A feeder for feeding magazines, newspapers, and like articles, into a printing machine or the like, said feeder comprising: a support member for supporting a stack of folded articles with corresponding ends thereof aligned with each other; a needle feed device having a plurality of feed needles disposed in spaced relation to each other transversely of said support member, said device being mounted for pivotal movement relative to an axis extending in parallel transverse relation to said support member and located beneath said support member; means for advancing said needle feed device from a disengaged position into a feeding position with said needles in engagement with the lowermost article in said stack,

to feed said lowermost article from said stack, and for subsequently returning said needles to said disengaged position; means for impelling the ends of said articles toward said support member during intervals in which said needles are in said disengaged position with respect to said articles; electrically actuated drive means for actuating said feed device; and a safety switch, electrically connected to said drive means, including an operating member extending into engagement with the lowermost portion of said stack to actuate said switch and de-energize said drive means whenever the number of articles in said stack reaches a predetermined minimum.

17. A feeder for feeding print-receiving articles from either of two directions into a printing machine of the kind including a table of given height, a printing mechanism disposed adjacent said table at a printing station, and actuating means for actuating said printing mechanism to imprint data upon an article disposed upon said table at said printing station, said feeder comprising: a substantially self-supporting feed station, including a support member for supporting a stack of folded print-receiving articles with corresponding ends thereof aligned with each other, a feed mechanism for feeding said articles one-by-one from the bottom of said stack, said feed mechanism including a plurality of feed needles disposed in spaced relation to each other transversely of said support member and means for advancing said needles from a disengaged position into a feeding position in engagement with the lowermost article in said stack, to feed said lowermost article from said stack, and for subsequently returning said needles to said disengaged position, drive means for impelling the ends of said articles toward said support member during intervals in which said needles are in said disengaged position with respect to said articles, and control means for controlling said drive means; a substantially self-supporting discharge station; a conveyor section mounted between and supported on said feed and discharge stations at a height approximately corresponding to the height of said printing machine table and including conveyor means, driven from said feed station drive means, for advancing said articles from said feed station across said printing machine table and through said printing station to said discharge station, in either one of two opposed directions determined by alignment of the feeder with the printing machine; and electrical means, connected to said printing mechanism actuating means and to said feeder control means, for synchronizing operation of said feeder with said printing machine without requiring a mechanical connection therebetween.

18. A feeder for feeding print-receiving articles from either of two directions into a printing machine of the kind including a table of given height, a printing mechanism disposed adjacent said table at a printing station, and actuating means for actuating said printing mechanism to imprint data upon an article disposed upon said table at said printing station, said feeder comprising: a substantially self-supporting feed station, including a main support member disposed at an acute angle with respect to the horizontal and having an integral concave lower porton, a second support member extending approximately normal to the medial portion of said main support member for engaging the fold ends of a stack of articles supported on said main support member, said support members being separated by a feed space smaller than twice the thickness of two of said articles, a multiple needle feed device reciprocably mounted beneath said main support member for engaging and feeding said articles one-by-one, fold end first, through said feed space, and a pair of feed rollers for engaging each article as the article emerges from said feed space and for continuing the movement of said article along said main support member; a substantially self-supporting discharge station; a conveyor section mounted between and supported on said feed and discharge stations at a height approximately corresponding to the height of said printing machine table and including conveyor means, driven from said feed station drive means, for advancing said articles from said feed station across said printing machine table and through said printing station to said discharge station, in either one of two opposed directions determined by alignment of the feeder with the printing machine; and electrical means, connected to said printing mechanism actuating means and to said feeder control means, for synchronizing operation of said feeder with said printing machine without requiring a mechanical connection therebetween.

19. A feeder for feeding magazines, newspapers, and like article, into a printing machine or the like, said feeder comprising: a support member for supporting a stack of folded articles with corresponding ends thereof aligned with each other; a plurality of feed needles disposed in spaced relation to each other transversely of said support member; means for advancing said needles from a disengaged position into a feeding position in engagement with the lowermost article in said stack, to feed said lowermost article from said stack, and for subsequently returning said needles to said disengaged position; means for impelling the ends of said articles toward said support member during intervals in which said needles are in said disengaged position with respect to said articles; a conveyor for feeding said articles along a predetermined path into a printing station of a printing machine; a stop element; means for pivotally supporting said stop element for movement between a stop position, in which said stop element is disposed in said predetermined path approximately in the plane of said conveyor, and an inactive position, in which said stop element is displaced from said path to a location above said conveyor; and actuating means for actuating said stop element for movement from said inactive position to said stop position, in a direction substantially opposite said predetermined direction, to interrupt movement of a print-receiving article in alignment with said printing station, and for subsequently actuating said stop element for return movement to said inactive position, in a direction substantially corresponding to said given direction, to prevent said stop element from interfering with movement of said article once said stop element has started movement toward said inactive position.

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