

United States Patent

[11] 3,567,005

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 [21] Appl. No. **780,155**
 [22] Filed **Nov. 29, 1968**
 [45] Patented **Mar. 2, 1971**
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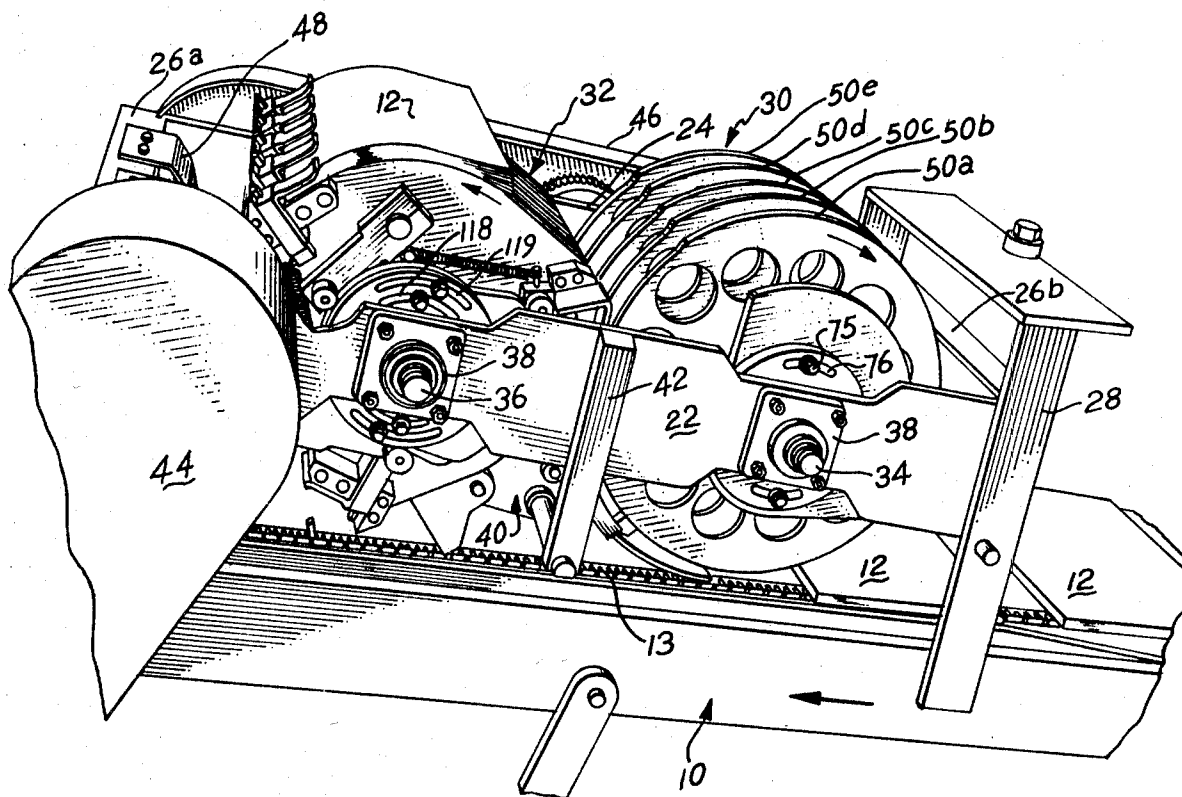
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[54] **TURNOVER DEVICE**
 8 Claims, 6 Drawing Figs.

[52] U.S. Cl..... 198/33,
 271/72, 271/7
 [51] Int. Cl..... B65g 47/24
 [50] Field of Search..... 198/33
 (R4); 271/72, 80, 51, 65; 93/93 (.3); 270/72

ABSTRACT: A turnover device for magazines and the like which may be mounted on an existing magazine conveyor. The device includes a mounting frame with a pusher assembly adapted to push magazines into position for gripping by a clamp cylinder also mounted on the frame. The clamp cylinder rotates counter to the direction of conveyor travel. Magazines are gripped and rotated by the clamp cylinder to effect turnover. The magazines are then released onto the conveyor for further travel. The pusher assembly and the clamp cylinder are both cam actuated.



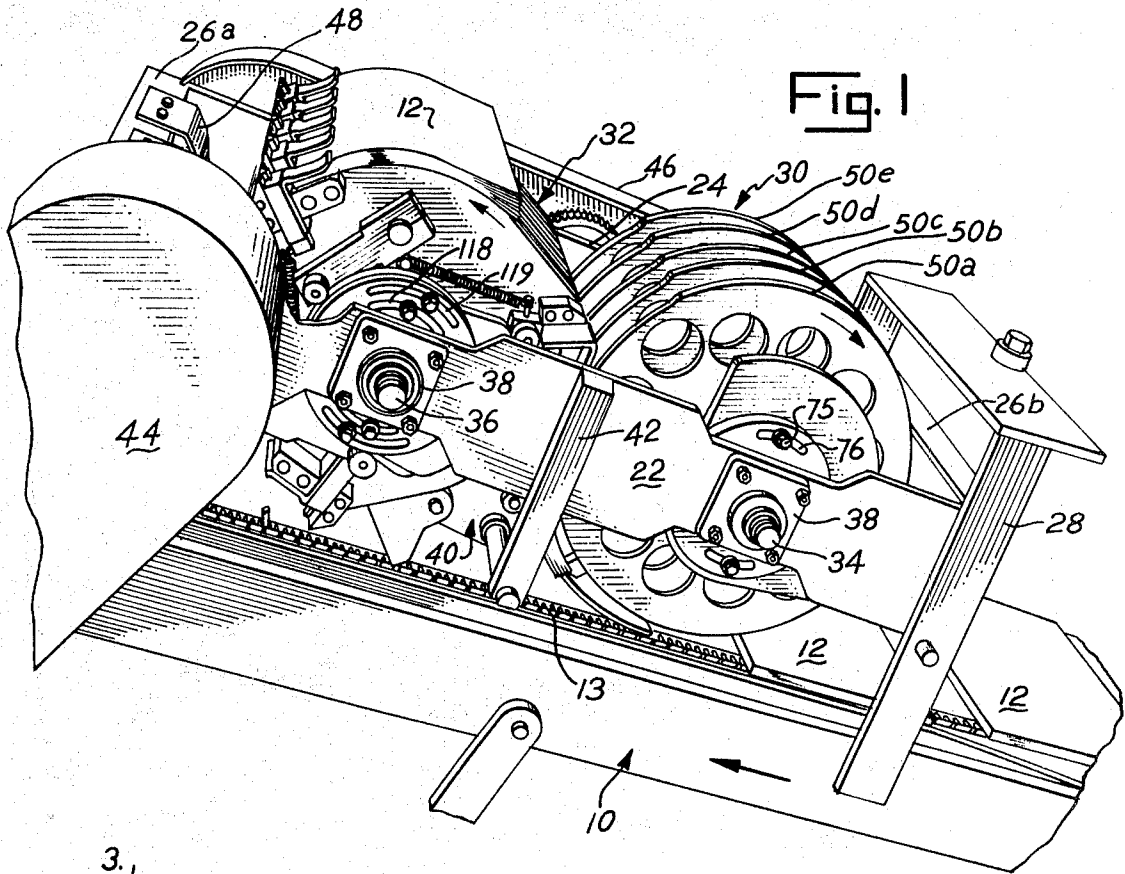


Fig. 1

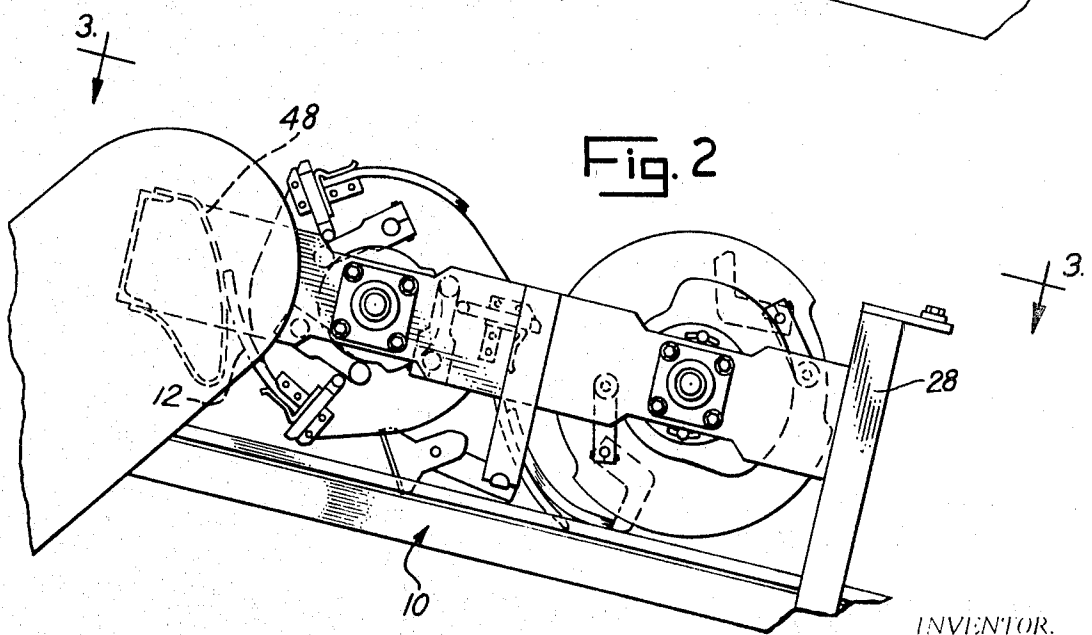


Fig. 2

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Fig. 3

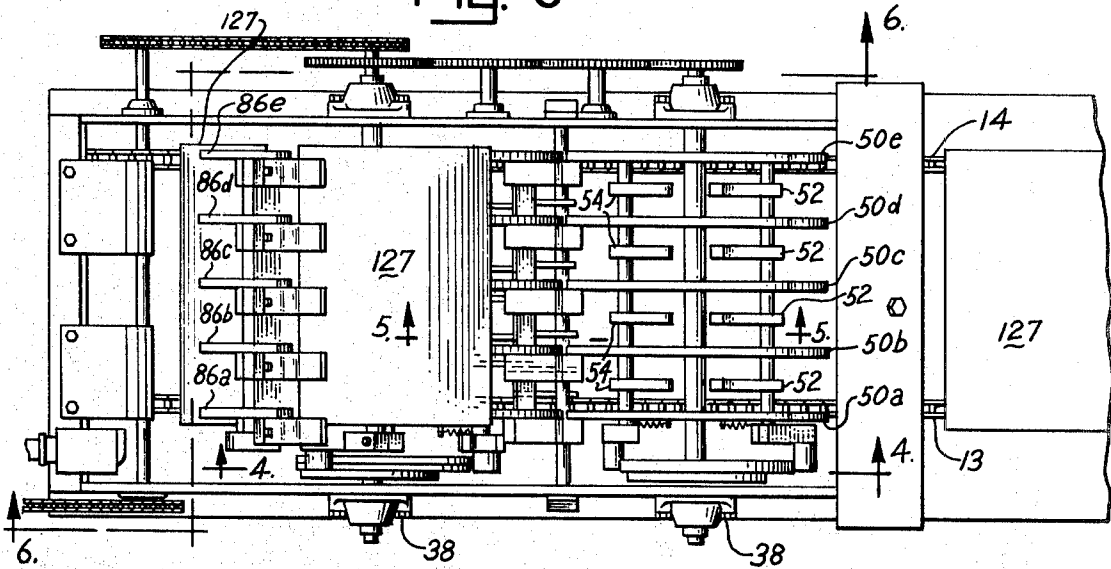
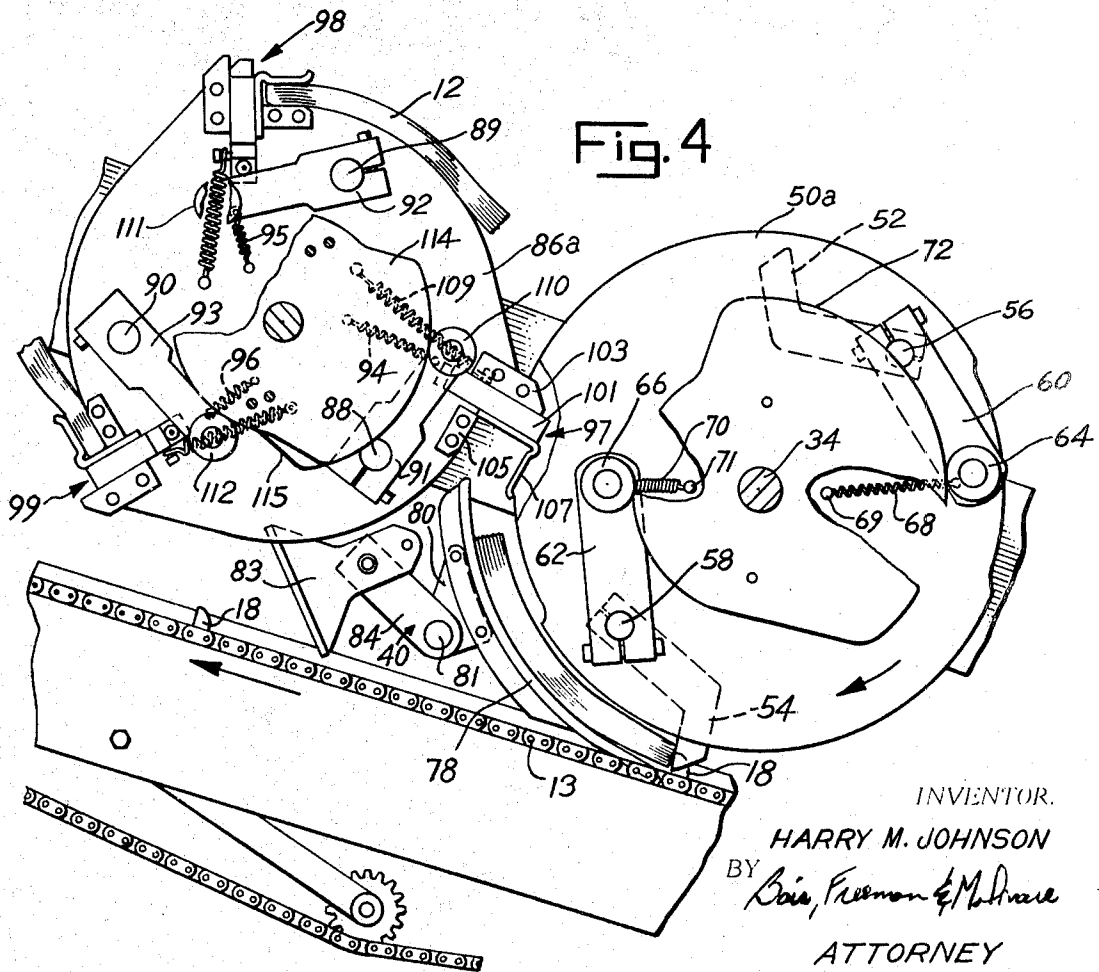


Fig. 4



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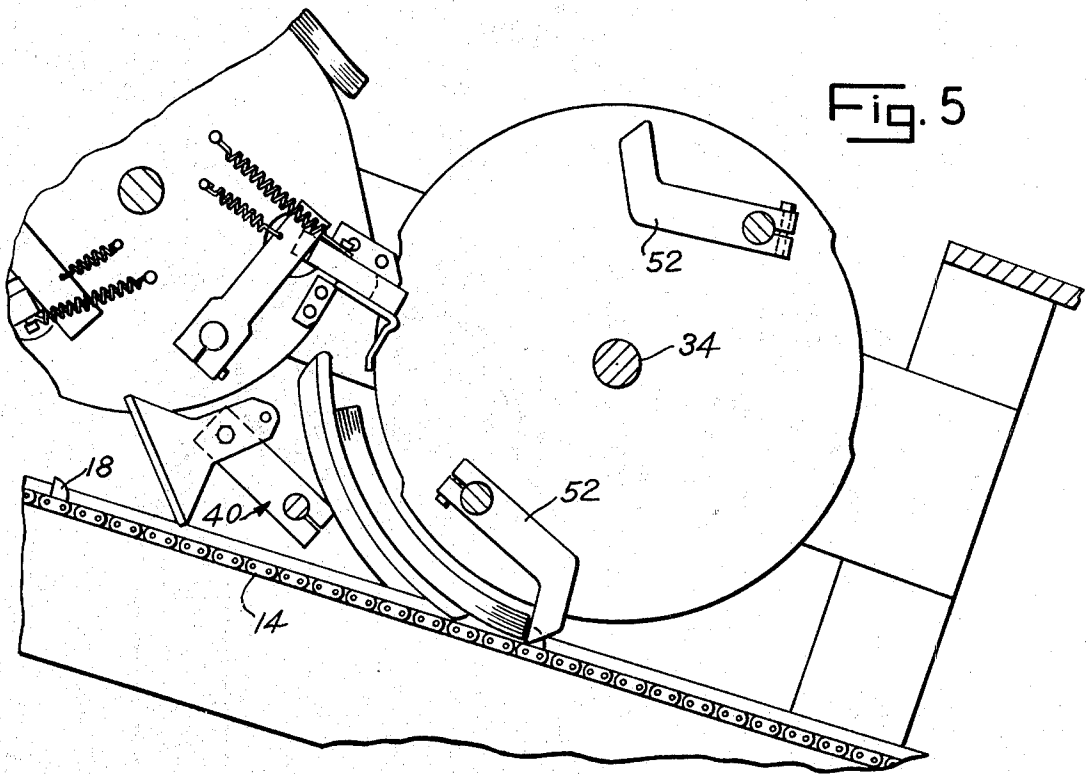


Fig. 5

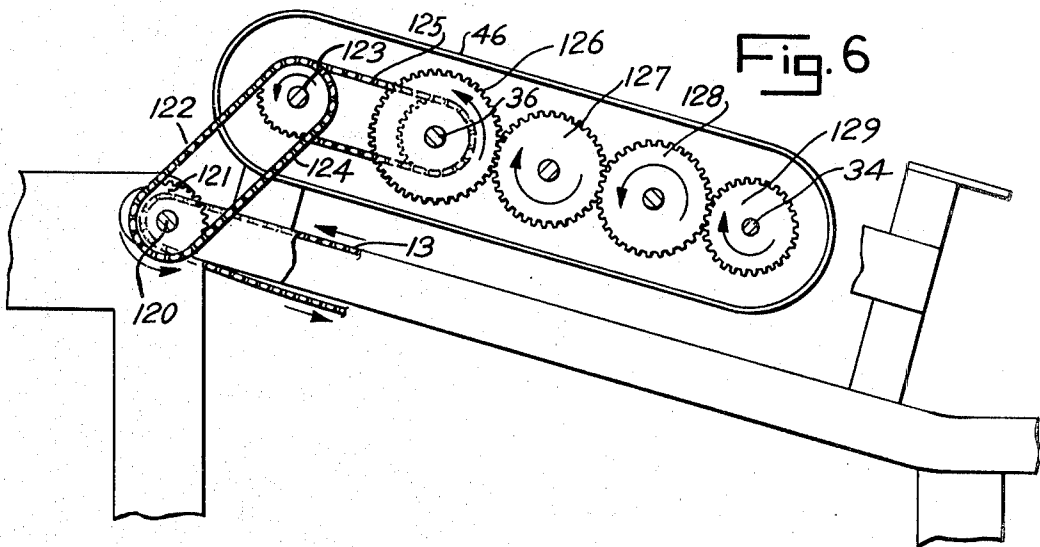


Fig. 6

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TURNOVER DEVICE

BACKGROUND OF THE INVENTION

This invention relates to a turnover device for articles such as magazines and the like.

In printing operations, the final printed article, magazine, newspaper or the like is normally delivered to a mail room or shipping room by means of a conveyor leading from the press room. Often, especially with magazines, workmen in the mail room must turn the printed magazines over in order to affix a mailing sticker to the appropriate face or side of the magazines as required by U.S. postal regulations. Turning the magazines over is a manual operation which is laborious, monotonous and very time consuming.

An automatic turnover device which would eliminate such a manual operation would be required to have a simple and economical construction. In addition, such a device should be constructed for cooperation with presently existing conveyors and have a capability of easy incorporation with existing conveyors.

THE SUMMARY OF THE INVENTION

In a principal aspect of the present invention of a turnover device for use with articles, such as magazines or the like moving along a conveyor, includes a mounting frame positioned over the conveyor having pusher means and clamp means mounted on the frame. The pusher means directs the magazines to a position for gripping by the clamp means. The clamp means rotates on an axis perpendicular to the direction of the conveyor transport, in a sense counter to the direction of conveyor transport and acts to "flip over" or "turn over" the articles and deposit them back onto the conveyor with their opposite side down.

It is thus an object of the present invention to provide an improved turnover device for articles such as magazines or the like.

It is a further object of the present invention to provide an improved turnover device which may be easily incorporated with existing conveyors.

Another object of the present invention is to provide a turnover device having a simplified and economical construction.

One further object of the present invention is to provide a turnover device which can be easily synchronized to operate in unison with a conveyor.

These and other objects, advantages and features of the present invention will be set forth in greater detail in the description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

In the detailed description which follows reference will be made to the drawings comprised of the following FIGS.

FIG. 1 is a perspective view of the turnover device of the present invention as positioned in cooperation with a conveyor;

FIG. 2 is a side view of the turnover device shown in FIG. 1;

FIG. 3 is a top plan view of the turnover device along the line 3-3 in FIG. 2;

FIG. 4 is a side cross-sectional view of the turnover device taken substantially along the line 4-4 in FIG. 3;

FIG. 5 is a side cross-sectional view of the turnover device taken substantially along the line 5-5 in FIG. 3; and

FIG. 6 is a cross-sectional view of the gear drive train for the turnover device taken substantially along the line 6-6 in FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1 there is shown the turnover device of the present invention in combination with a conveyor system generally indicated at 10. The conveyor system 10 conveys articles such as magazines, books, newspapers or the like in the direction indicated by the arrow in FIG. 1. The con-

veyor system 10 includes conveyor chains 13 and 14 on opposite sides of a conveyor frame 16. Upright pegs 18 are attached to the chains 13 and 14. The articles 12 are pushed along the conveyor system 10 by means of the pegs 18.

The turnover device itself includes a mounting frame 20 attached to the conveyor frame 16. The mounting frame 20 includes side support members 22 and 24 which are held in a spaced relationship by means of cross braces 26a and 26b. Frame 20 is fastened to the conveyor frame 16 by means of attachment braces 28.

Suspended between side members 22 and 24 is push means or a pusher cylinder assembly 30. Mounted downrun from assembly 30 and between side members 22 and 24 is gripper or clamp means or a clamp assembly 32. The pusher assembly 30 and clamp assembly 32 rotate respectively about shafts 34 and 36 rotatably journaled in bearing plates 38 attached to the side members 22 and 24.

An article guide mechanism 40 is positioned intermediate the pusher assembly 30 and clamp assembly 32. Guide mechanism 40 is held in this position by means of guide support braces 42. An article 12 transported on the conveyor system 10 is thus pushed by the pusher assembly 30 rotating in the clockwise direction as viewed in FIG. 1, and is guided by the article guide mechanism 40. The article is subsequently gripped by the clamp assembly 32 which is rotating in the counterclockwise sense as viewed in FIG. 1. The article is then carried by the clamp assembly 32 and flipped or turned over. The flipped over article is finally deposited on the conveyor system 10.

Drive chains and gears for the turnover device are protected by a first shroud 44 and a second shroud 46 on opposite sides of the turnover device. A guide member 48 is provided adjacent the clamp assembly 32 attached to a cross brace 26 to insure that magazines which have been flipped over will be deposited gently on the conveyor system 10. FIG. 2 illustrates in further detail how the guide member 48 prevents an article 12 from being incorrectly positioned on the conveyor system 10.

Also FIG. 2 illustrates in further detail, construction of the pusher assembly 30, clamp assembly 32 and article guide mechanism 40. Reference is now also made to FIGS. 3, 4 and 5 to illustrate the construction of these components and the device.

The pusher assembly 30 is fabricated from a series of five cylindrical pusher plates 50a-50e which are rigidly attached to the shaft 34. Attached intermediate each pair of plates 50a-50e is a first finger mechanism 52 and a second finger mechanism 54. Each of the first finger mechanisms 52 is attached to a shaft 56. In a similar fashion each of the second finger mechanisms 54 is attached to a shaft 58. The shafts 56 and 58 are rotatably mounted in the plates 50a-50e. The shafts 56 and 58 extend beyond the outside edge of plate 50a. Attached at the outer end of the shaft 56 is cam follower block 60. A similar block 62 is attached to the shaft 58. A cam roller 64 is mounted at the end of the block 60 and a similar roller 66 is mounted on block 62. A spring 68 is fastened between a fixed pin 69 in the plate 50a and the end of the block 60 to which roller 64 is attached. A similar spring interconnects a pin 71 in plate 50a with the block 62.

A cam plate 72 is rigidly positioned against the side frame member 22 so that the rollers 64 and 66 may be guided by the cam plate 72. The position of the cam plate 72 may be adjusted since the plate 72 is mounted on a mounting plate 74 rigidly attached to the side frame member 22. Plate 72 is thus adjustable by means of bolts 75 in elongated slots 76 in mounting plate 74.

As the pusher assembly 30 rotates in the direction indicated by the arrows in FIGS. 1, 2, 4 and 5, the fingers 52 and 54 are alternately biased outwardly due to the action of the springs 68 and 70 and inwardly due to the following of the cam rollers 64 and 66 on the cam block 72. In this manner, the fingers 52 and 54 act to engage an article or magazine 12 which is being moved along by means of the pegs 18. The fingers thus push

the article 12 into engagement with the guide mechanism 40 and the article is ultimately gripped by the clamp assembly 32.

The guide means 40 includes an arcuate plate 78 mounted on a bracket 80 which in turn is attached to a supported shaft 81 suspended between braces 42. Plate 78 preferably extends 5 below the plane of the down side or face of the article 12 to insure conveyance of the article onto the plate 78.

Also attached to the shaft 81 is a kick plate 83 held by a brace 84. The kick plate 83 serves to disengage articles from the clamp assembly 32 if the articles previously did not 10 become properly disengaged. Thus magazines gripped in the clamp assembly (as described below) are forced from the clamp assembly by means of the kick plate 83.

The clamp assembly 32 is similar in construction to the 15 pusher assembly 30 in that it includes a series of five plates 86a-86 mounted on the shaft 36. Running axially through the plates 86 and disposed at an equal distance from the center of shaft 36 are rotatable shafts 88, 89 and 90 each of which extends beyond the outside edge of plate 86a. Associated with each plate 86a-86e and attached to the shafts 20 88, 89 and 90 respectively is a gripper activating block 91, 92 and 93. Blocks 91, 92 and 93 associated with plate 86a are biased by means of springs 94, 95 and 96 respectively about their respective shafts 88, 89 or 90 towards the central shaft 36. The springs 94, 95 or 96 have opposite ends attached to 25 the plate 86a and the block 91, 92 or 93 respectively. The blocks 91, 92 and 93 associated with the remaining plates 86b-86e may optionally include an associated biasing spring 94, 95 and 96.

Positioned to cooperate with each one of the gripper blocks 30 91, 92 and 93 is a gripper assembly 97, 98 and 99 respectively. Each gripper assembly 97, 98 and 99 is constructed in substantially the same manner. For example, assembly 97 includes a slidable bifurcated block 101 having extensions over 35 opposite sides of the plate 86a so that the block 101 can slide between a pair of fixed blocks 103 and 105 which are attached to the plate 86a. An L-shaped clamp plate 107 is fixed to the slidable block 101 and is adapted to slide therewith. All of the gripper assemblies 97, 98 and 99 on all of the plates 86a-86e 40 are biased toward the shaft 36 by means of a spring, as at 109 for assembly 97 on plate 86a.

Attached to the gripper blocks 91, 92 and 93 most nearly 45 adjacent the side member 22 of the conveyor frame 16 are cam rollers 110, 111 and 112 respectively. The cam rollers 110, 111 and 112 cooperate with a pair of cam blocks 114 and 115 rigidly attached to the side member 22. The cam blocks 114 and 115 are both attached to a mounting plate 117 rigidly 50 fixed to the side member 22 in the same manner as cam plate 72 is attached in a fixed position to mounting plate 74. Thus elongated slots 118 and 119 are provided in plate 117 and 114 to permit adjustment of plates 114 and 115. In this manner cam plates 115 and 114 may be easily adjusted to an invariable 55 number of post positions or replaced by other cam blocks to provide for any desired motion of the gripper blocks following in response to the cam rollers 110, 111 and 112.

In practice the cam blocks 114 and 115 are adjusted so that 60 the gripper blocks 91, 92 and 93 are biased by the cam against the tension of the springs 94, 95 and 96 respectively to force the gripper assemblies 97, 98 and 99 away from the center shaft 36 and accept an article 12 from the guide means 40. After acceptance of the article 12 the guide block disengages 65 the gripper assemblies 97, 98 or 99 thereby permitting the assemblies 97, 98 and 99 and its companion assemblies on adjacent plates 86a-86e to grip the article as illustrated in FIGS. 1 through 4. The entire clamp assembly 32 rotates in a counter-clockwise direction as illustrated in FIG. 4 counter to the 70 direction of conveyor travel or transport and ultimately deposits the article 12 back on the conveyor with its opposite side facing the conveyor. At that time and simultaneously the cam 114 and 115 act to disengage the gripper assembly as at 97 from the article 12. This operation is repeated continuously

and in synchronization with the movement of articles along 75 the conveyor system 10. In practice one revolution of the gripper cylinder is equivalent to 1½ revolutions of the pusher assembly as can be appreciated by the fact that the gripper assembly includes three grippers whereas the pusher assembly includes two finger mechanisms 52 and 54. Obviously other 80 variances can be provided within the scope of the invention.

Referring now to FIG. 6 there is shown a typical drive arrangement utilized for the operation of the turnover device of 85 the invention. In FIG. 6 the conveyor drive chain 13 is driven from a shaft 120 which also drives a sprocket 121. Sprocket 121, in turn, drives a chain 122 causing shaft 123 and sprocket 124 to rotate. This drives a third chain 125 operable to drive 90 the shaft 36 of the clamp assembly 32. Mounted at the end of the shaft 36 is a first gear 126 in a gear train moving in the directions indicated by the arrows. The remaining gears are numbered consecutively 127, 128 and 129. Gear 129 is attached to the shaft 34 of the pusher assembly 30. In this 95 manner the pusher assembly and the clamp assembly are synchronously driven.

I claim:

1. A turnover device for use in combination with a straight-line conveyor for articles such as magazines or the like moving 100 in the direction of conveyor transport, said articles having one side initially adjacent said conveyor and being flipped to place the opposite side of said articles against said conveyor, said device comprising in combination:

a mounting frame positioned over said conveyor;

article push means on said frame for pushing articles in the 105 direction of conveyor transport;

article guide means for receiving articles pushed by said push means and guiding said articles upwardly from said conveyor and also in the direction of conveyor travel; and 110 clamp means on said frame rotating about an axis perpendicular to the direction to the conveyor transport, said clamp means positioned to receive said articles pushed above said conveyor on said article guide means, subsequently clamp said articles, while continuously rotating 115 in a direction counter to the direction of conveyor transport, said clamp means carrying said articles about said axis and subsequently depositing said articles on said conveyor with the opposite side of said articles down.

2. The turnover device of claim 1 wherein said push means 120 comprise a finger mechanism positioned on said frame and rotating about an axis perpendicular to the direction of conveyor transport, said finger mechanism operating to push articles from said conveyor onto said article guide means for subsequent clamping by said clamp means.

3. The turnover device of claim 1 wherein said clamp means 125 includes a plurality of gripper mechanisms mounted thereon, said gripper mechanisms being operative by cam means to open for receipt of articles from said article push guide means, closing to hold said articles as said clamp means rotates, and for subsequently opening upon rotation of said clamp means 130 to discharge said articles onto said conveyor.

4. The turnover device of claim 3 wherein said cam means 135 are mounted on said frame and are engaged by linking means operative to drive said gripper mechanisms into and out of engagement with said articles.

5. The turnover device of claim 2 wherein said finger 140 mechanism includes at least one cam actuated finger mounted on said finger mechanism to push said articles onto said article guide means.

6. The turnover device of claim 1 wherein said turnover 145 device is driven in synchronization with said conveyor.

7. The turnover device of claim 2 wherein said finger 150 mechanism and said clamp means are driven synchronously.

8. The turnover device of claim 1 including means for assisting 155 discharge of articles from said clamp means subsequent to rotation and turning over of said articles.