

April 23, 1940.

C. W. HARROLD

2,198,385

SHEET CONVEYER MECHANISM

Filed June 7, 1938

2 Sheets-Sheet 1

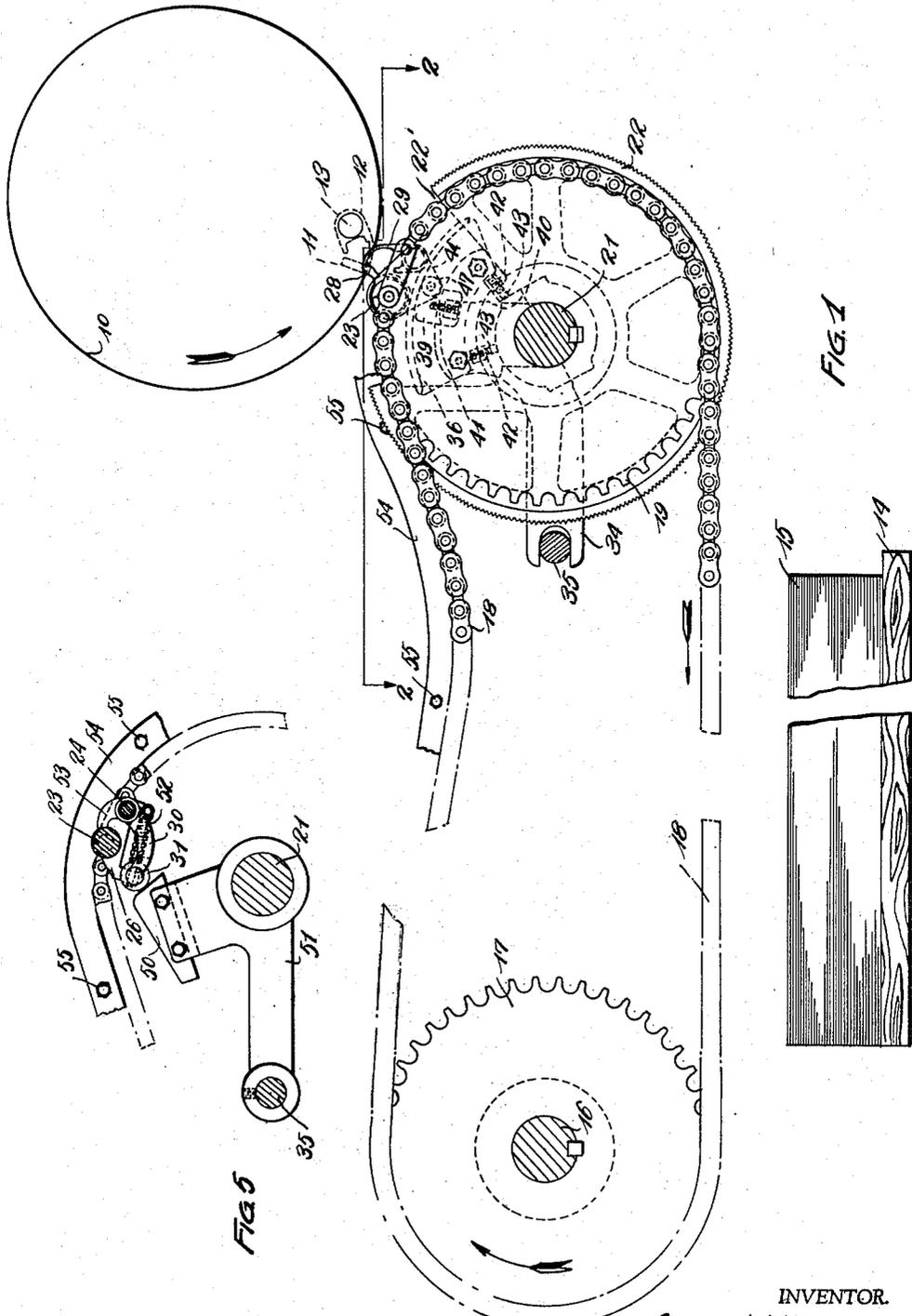


FIG. 1

FIG. 5

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2 Sheets-Sheet 2

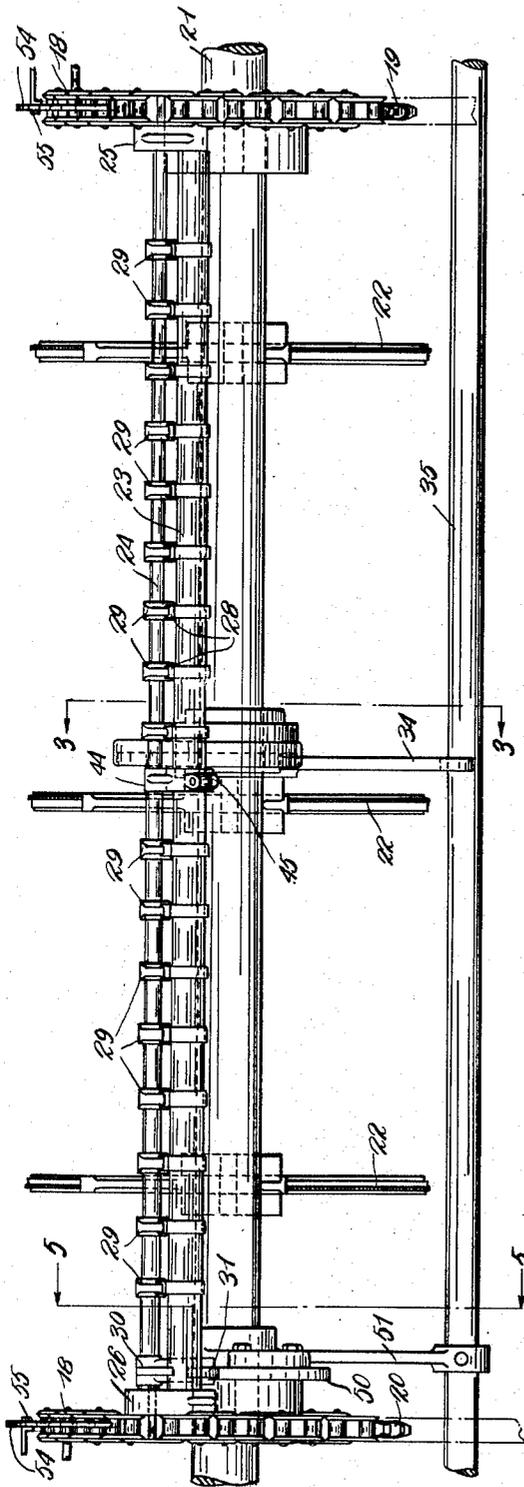


FIG. 2

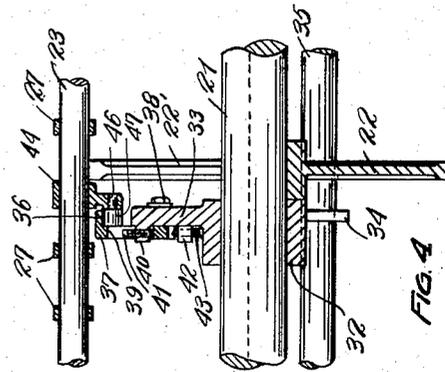


FIG. 4

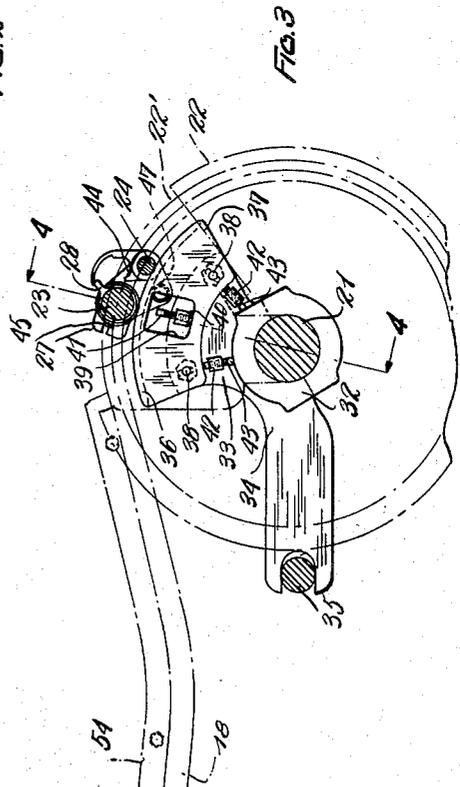


FIG. 3

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SHEET CONVEYER MECHANISM

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9 Claims. (Cl. 271-79)

This invention relates to improvements in sheet conveyer mechanism. In modern printing presses it is customary to employ an endless conveyer for taking sheets from the impression cylinder and conveying them to a pile of sheets located frequently at some distance from the impression cylinder. Such a conveyer commonly consists of a pair of parallel chains, one at each side of the press, which chains support a number of gripper units spaced at regular intervals, the length of which is dependent upon the circumference of the impression cylinder, and adapted to receive successive sheets from that cylinder. These gripper units are supported at their ends by the chains and may consist in each case of a single cross member carrying both the gripper pads and the gripper fingers, or it may consist of two cross members one of which carries the gripper pads and the other of which carries the gripper fingers.

The speed at which such a conveyer as heretofore constructed will operate satisfactorily to take sheets from the impression cylinder of the press is limited by the action of centrifugal force exerted on the gripper unit as it travels around the sprocket wheels of the conveyer in approaching the impression cylinder and taking a sheet therefrom. The action of centrifugal force effects an outward bowing of the gripper unit, which tends to mar a sheet being taken from the impression cylinder. Furthermore, the action of the devices for opening and closing the grippers tends to set up radial vibrations in the cross members. It is desirable that the conveyer grippers close upon each sheet a short distance before the impression cylinder grippers release the sheet, and such vibrations, acting while the sheet is held by both sets of grippers, tend to tear the sheet.

One of the objects of the present invention is to overcome the before-mentioned effects of centrifugal force and vibration, and to guide the gripper units in the desired curved path, so that the sheet will not be marred and so that there will be proper registration of the delivery grippers with the sheet at the time of its transfer from the impression cylinder to the conveyer.

A further object is the provision of means for accomplishing this result in a simple and efficient manner.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawings, in which

Fig. 1 is a somewhat diagrammatic fragmental elevational view of a sheet delivery mechanism

shown in operative relation with the impression cylinder of a printing press;

Fig. 2 is a plan view looking in the direction of arrows 2-2 of Fig. 1;

Fig. 3 is a cross-sectional view taken substantially on the line 3-3 of Fig. 2;

Fig. 4 is a detail sectional view taken substantially on the line 4-4 of Fig. 3; and

Fig. 5 is a detail view showing means for operating the gripper fingers of the conveyer, the view being taken substantially on the line 5-5 of Fig. 2.

In Fig. 1 of the drawings I have indicated at 10 the outline of the impression cylinder of a printing press, carrying a gripper bar 11 with which gripper fingers 12 cooperate, the gripper fingers being mounted upon an oscillatable gripper shaft 13 which is actuated by known means to open and close the gripper fingers at the proper times in the cycle of the cylinder.

After the sheets are printed they are transferred from the impression cylinder 10 to the delivery mechanism. A simple form of such mechanism is illustrated in the drawings. It functions to take the sheets from the press, carry them away, and deposit them upon a delivery board 14 to make a pile of sheets 15. The board 14 is lowered step by step, by conventional mechanism not herein disclosed, so as to maintain the top of the pile in a given predetermined position with respect to the conveyer of the delivery mechanism. As shown herein the delivery mechanism comprises a simple horizontal endless conveyer. In practice it is frequently somewhat more complicated, but the particular make-up of the conveyer as a whole is not important in the present case because the invention has to do only with that portion of the delivery mechanism which is concerned with the transfer of sheets to or from the conveyer.

16 represents a shaft which is rotatably mounted in the frame of the printing press. Near its ends it has sprocket wheels 17 keyed thereto, and over these wheels extend chains 18 which also run upon sprocket wheels 19 and 20 that are keyed to a shaft 21 which is driven by the printing press, as by gears (not shown) connected to the impression cylinder. On shaft 21 at intervals between the sprocket wheels 19 and 20 there are secured a series of disks 22, each provided with a cutout 22', which disks together make up what may be termed a delivery cylinder, as the peripheries of the disks support sheets in their travel around the shaft in a cylindrical path.

Supported by the chains 18 there are a series

of sheet gripper units which are spaced apart lengthwise of the conveyer at proper intervals to take successive sheets from the impression cylinder. Each of these units, of which only one is illustrated, comprises a bar 23, shown round in the present instance, and an oscillatable shaft 24, both of which are mounted at their ends in brackets 25 and 26 that are secured to opposite links of the chains 18. The bar 23 carries a series of collars 27, each one having an integral sheet engaging pad 28. On the shaft 24 are mounted a like number of gripper fingers 29 which act in conjunction with pads 28 to grip the forward edge of a sheet. At one end of shaft 24 there may be keyed an arm 30 with a cam roller 31 on its outer end adapted to engage a fixed cam 50 bolted to a bracket 51 which is supported upon shaft 21 and held from rotation with the shaft by engagement with rod 35. The gripper fingers are urged toward closed position by a compression spring 52 which yields when the roller 31 rides up on cam 50. An extension 53 of arm 30 acts as a stop to limit the extent of the closing movement of the fingers. By means of the cam 50 the fingers 29 are thrown to open or closed position at the proper times in the customary manner.

At each side of the machine are provided chain guide shoes 54, only one of which is shown, secured to the frame of the machine by bolts 55. These shoes serve to hold the chain closely to its sprocket and thereby cause the ends of the gripper unit to accurately follow the desired curved path, overcoming the effects of centrifugal force and the twisting action of cam 50 when opening and closing the grippers.

At a position about midway of the length of shaft 21 there is loosely mounted upon that shaft a cam carrier 32 having an outwardly extending segmental flange 33. This cam carrying member also comprises an anchoring arm 34 which extends horizontally away from shaft 21 and is provided with a slot in its outer extremity to receive a brace rod 35 extending transversely of the machine and mounted in the side frame members thereof. This brace rod 35 keeps the member 32 from turning and permits a slight adjustment of that member transversely of the machine in case such adjustment should become necessary. An internal cam 36 is adjustably mounted upon the segmental flange 33, the cam being formed as an overhang upon an arcuate plate 37 which bears against one side of flange 33 and is secured thereto by bolts or screws 38 which extend through radial slots in flange 33 into threaded holes in plate 37. In the latter plate there is a window 39 which accommodates a threaded boss 40 on flange 33. A set screw 41 extending through that boss bears on the inner edge of window 39 and may be used to adjust the cam toward the axis of shaft 21. Two other bosses 42 on flange 33 inwardly of plate 37 are threaded for screws 43 which bear against the inner edge of plate 37 and may be employed to adjust that plate and the cam 36 outwardly to either the same or unequal degrees, it being understood that these adjustments are made while the clamping screws 38 are loosened, and that the latter screws are tightened when the adjustments have been effected.

44 is a small bracket which is provided with bores to receive bar 23 and shaft 24 and has a split clamp 45 by means of which it may be secured to bar 23 at the proper point. This bracket carries a stub shaft 46 on which is rotatably

mounted a roller 47 that is adapted to bear on the under surface of cam 36.

The rapid travel of the conveyer in its path around shaft 21 brings a strong centrifugal force to bear upon the bar 23 and shaft 24, particularly in large presses where these elements are relatively long, and this force tends to bow out the members 23 and 24 and to cause the gripper parts at the middle of the unit to press against the sheet upon the impression cylinder when the gripper parts on the impression cylinder come into register with those on the conveyer, in other words, when the two gripper mechanisms approach the transfer point illustrated in Fig. 5. Also, as pointed out previously, the strains incident to operation of the grippers set up vibrations in the bar 23 and shaft 24 during the short time both sets of grippers are closed on the sheet, with resultant tearing or weakening of the edge of the sheet. In accordance with my invention, however, the cam roller 47 engages the slightly flared end of cam 36 at about the point where the chains when in motion become tangent to the sprocket wheels. At this point there is no centrifugal force. The surface of cam 36, except at its ends, is cylindrical, and by its engagement with cam roller 47 holds the middle part of the gripper unit of the conveyer to a circular path, entirely overcoming the bowing effect and vibration previously referred to. The cam 36 could, of course, be considerably longer than that shown in the drawings, but the bowing effect of the gripper units is not objectionable after the units have passed beyond close proximity to the impression cylinder. Hence I prefer to release the gripper unit from restraint shortly after it has taken a sheet from the impression cylinder. It is apparent that two sets of devices including cam 36, follower 47 and their associated parts located on opposite sides of the center of the conveyer, or any other desired number located between the borders of the sheet path, may be employed.

Having thus described my invention, I claim:

1. In an endless conveyer for handling sheets of paper or the like, a pair of parallel chains, a gripper unit carried at its ends in said chains, a pair of sprocket wheels over which said chains run, and means arranged intermediate the chains within the borders of the sheet path for restraining the gripper unit against outward movement in its passage around the sprocket wheels.

2. In an endless conveyer for handling sheets of paper or the like, a pair of parallel chains, a gripper unit carried at its ends in said chains, a pair of sprocket wheels over which said chains run, and means arranged intermediate the chains within the borders of the sheet path and between said sprocket wheels for counteracting the effect of centrifugal force on the gripper unit during its passage around the sprocket wheels.

3. In an endless conveyer for handling sheets of paper or the like, a pair of parallel chains, a shaft, a pair of sprocket wheels mounted thereon over which said chains run, a gripper unit carried at its ends in said chains, said unit comprising a gripper bar carrying gripper pads and an oscillatable shaft carrying gripper fingers, and means supported upon said first named shaft intermediate the chains within the borders of the sheet path for restraining the gripper unit against outward bowing in its passage around the sprocket wheels.

4. In an endless conveyer for handling sheets of paper or the like, a pair of parallel chains, a pair of aligned sprocket wheels over which said

chains run, a gripper unit carried at its ends in said chains, said unit comprising a gripper bar and an oscillatable shaft carrying gripper fingers, a bracket arranged intermediate the chains through which said gripper bar and shaft extend, and means for restraining the gripper unit against outward bowing during the travel of the chains around said sprocket wheels, said means comprising a cam arranged inside the path of the unit and a cam follower on said bracket.

5. In combination with the impression cylinder of a printing press having sheet gripper means thereon, an endless conveyer adapted to take sheets from said impression cylinder and transport them to a pile, said conveyer comprising a shaft parallel to the axis of said cylinder, a pair of sprocket wheels carried by said shaft, chains running over said sprocket wheels in close proximity to the periphery of said cylinder, a sheet gripper unit carried at its ends by said chains comprising gripper pads and gripper fingers, and means arranged between the borders of the sheet path within the path of travel of the conveyer around said sprocket wheels for restraining the intermediate portion of the gripper unit against outward movement as it takes a sheet from the gripper means of said cylinder.

6. In an endless conveyer for handling sheets of paper and the like, a pair of parallel chains, a shaft, a pair of sprocket wheels mounted thereon over which the chains run, a gripper unit carried at its ends in said chains, an approximately concentric cam loosely mounted upon said shaft and anchored against rotation, a bracket on said unit intermediate the ends thereof, and a cam follower carried by said bracket adapted to engage said cam for restraining the gripper unit against outward bowing during the travel of the chains around said sprocket wheels.

7. In an endless conveyer for handling sheets of paper and the like, a pair of parallel chains, a shaft, a pair of sprocket wheels mounted thereon over which the chains run, a gripper unit carried at its ends in said chains, an approximately

concentric cam loosely mounted upon said shaft, means for anchoring said cam against rotation effective in any position of the cam lengthwise of the shaft, a bracket on said unit intermediate the ends thereof, said bracket being adjustable lengthwise of the unit, and a cam follower carried by said bracket and adapted to engage said cam for restraining the gripper unit against outward bowing during the travel of the chains around said sprocket wheels.

8. In an endless conveyer for handling sheets of paper and the like, a pair of parallel chains, a shaft, a pair of sprocket wheels mounted thereon over which the chains run, guides for the chains adapted to engage the outer surfaces thereof as they pass over said sprocket wheels for counteracting the effect of centrifugal force on the chains as they pass around the sprocket wheels, a gripper unit carried at its ends in said chains, and means arranged intermediate the chains between the borders of the sheet path and within the path of travel of the conveyer around the sprocket wheels for restraining the intermediate portion of the gripper unit against outward movement.

9. In an endless conveyer for handling sheets of paper and the like, a pair of parallel chains, a shaft, a pair of sprocket wheels mounted thereon over which the chains run, guides for the chains adapted to engage the outer surfaces thereof as they pass over said sprocket wheels for counteracting the effect of centrifugal force on the chains as they pass around the sprocket wheels, a gripper unit carried at its ends in said chains, a cam arranged between the borders of the sheet path and within the path of travel of the conveyer around said shaft and mounted concentric with said shaft, and a cam follower carried by said gripper unit for engagement with said cam for restraining the unit against outward bowing during the travel of the chains around said sprocket wheels.

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