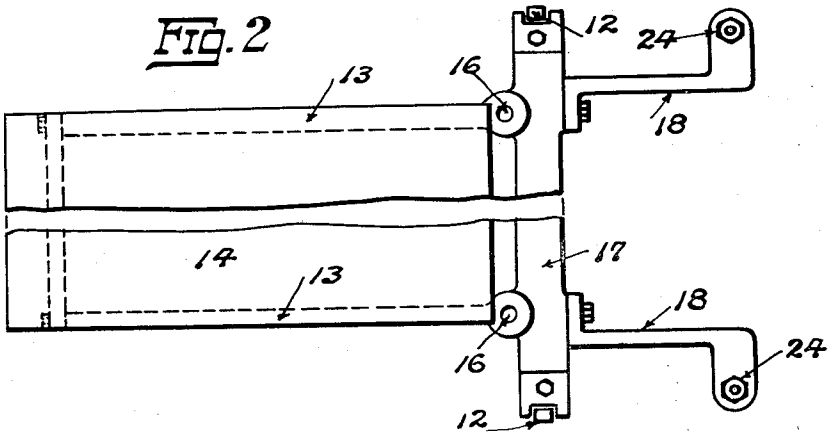
March 27, 1934. A. J. HORTON ET AL 1,953,049

PILE HANDLING MECHANISM FOR PRINTING MACHINES

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FIG. 2



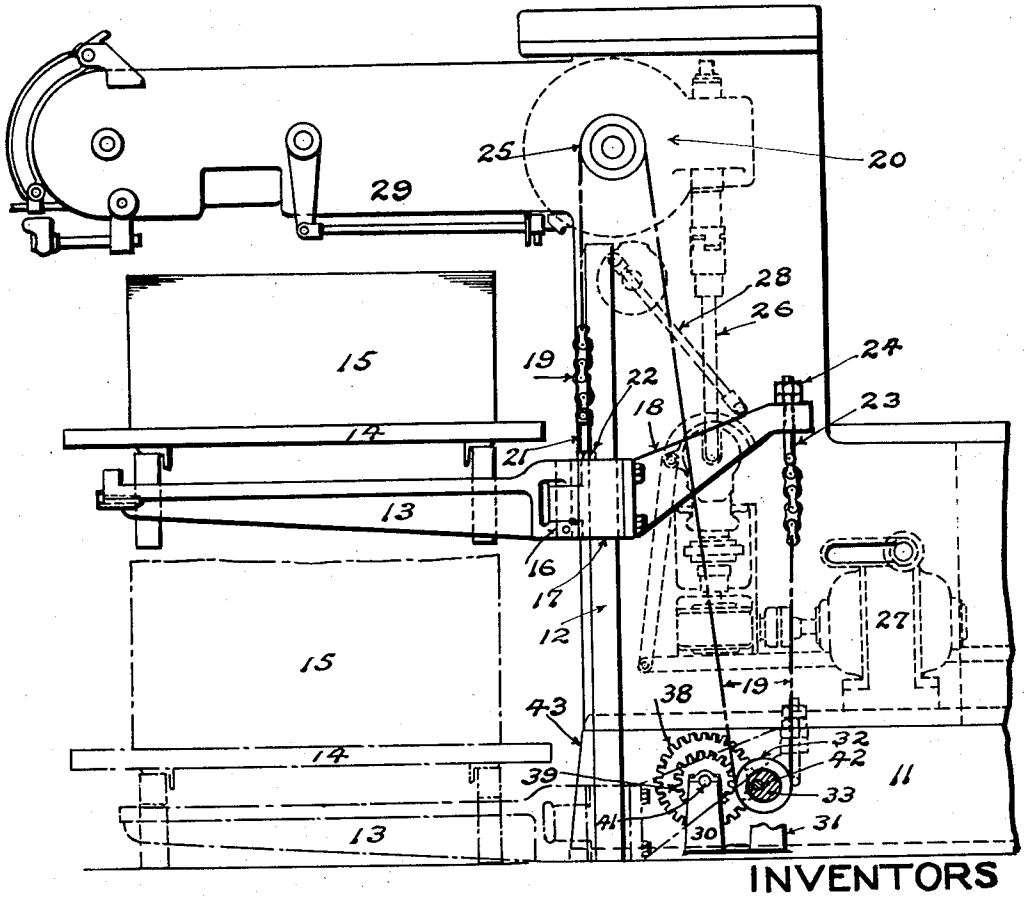


FIG. 1

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PILE HANDLING MECHANISM FOR PRINTING MACHINES

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FIG. 4

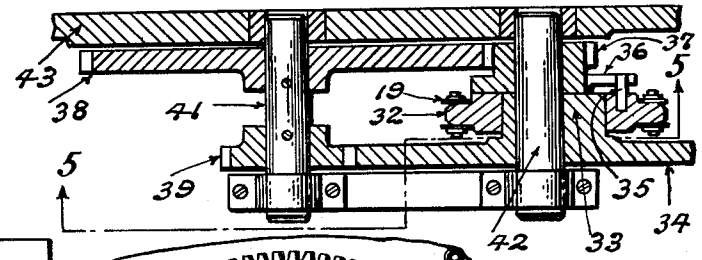


FIG. 5

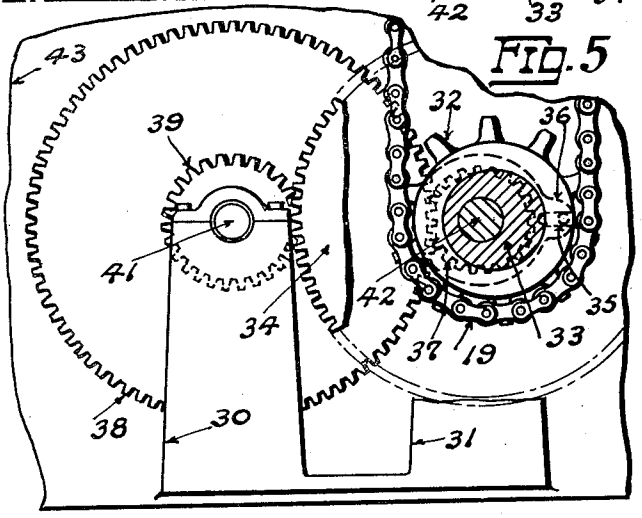


FIG. 3

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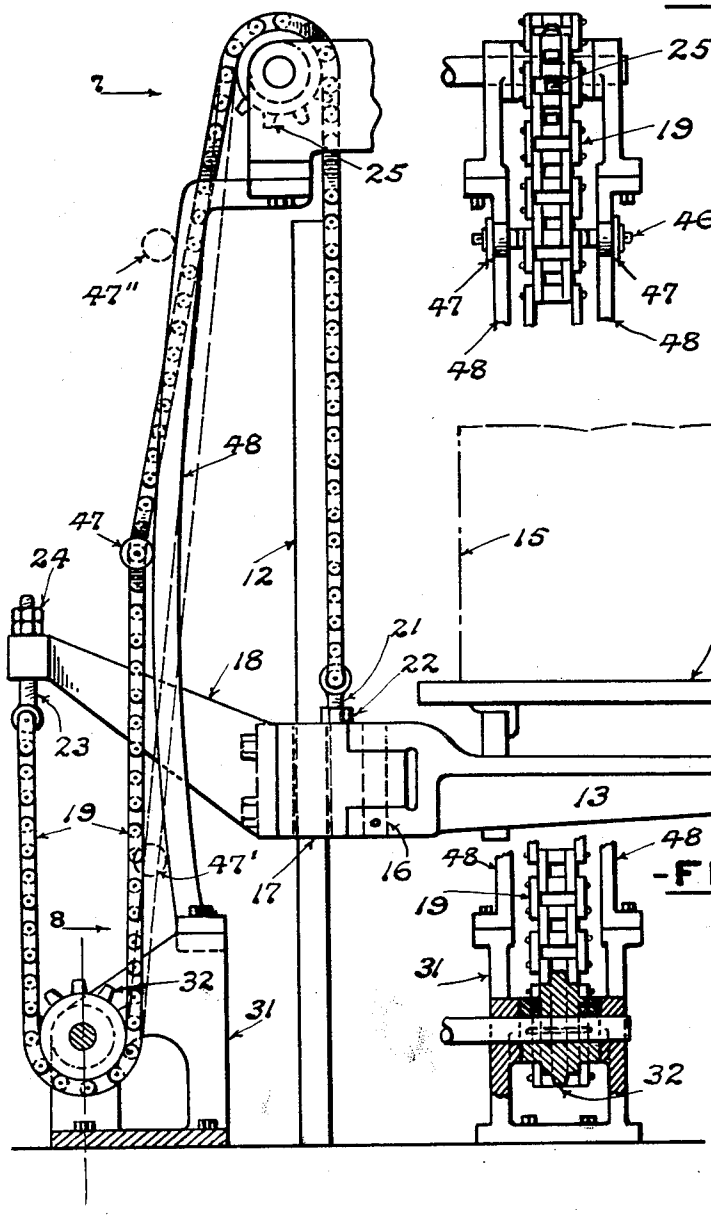
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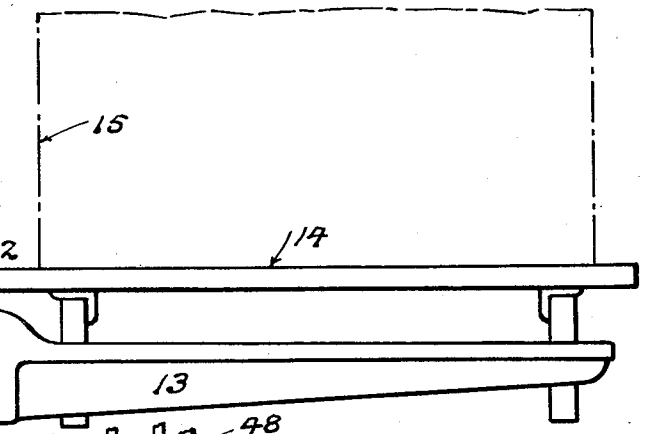
PILE HANDLING MECHANISM FOR PRINTING MACHINES

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-FIG.6.-



-FIG.7.-



-FIG.8.-

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UNITED STATES PATENT OFFICE

1,953,049

PILE HANDLING MECHANISM FOR PRINTING MACHINES

Albert J. Horton, White Plains, N. Y., and William K. Eckhard, Dunellen, N. J., assignors to Irving Trust Company, receiver of R. Hoe & Co., Inc.

Application July 12, 1932, Serial No. 622,040

12 Claims. (Cl. 271—88)

This invention relates to improvements in pile handling mechanism for machines operating on sheet material and is especially adapted to support a pile of sheets received individually from the delivery mechanism of a printing machine, or to support a pile from the top of which sheets are individually removed and fed to the machine, the support being arranged to be raised or lowered to maintain the top of the pile at a fixed level suited to the operation of the feeding or delivery mechanism as the case may be.

The support mechanism disclosed herein is of cantilever construction and as a variation in the weight of the load on the support will act to deflect the ends of the cantilever arms to an extent varying in proportion to the load, mechanism is provided to counteract the deflection which would otherwise occur.

The pile handling mechanism as disclosed herein is provided with a frame having a pair of swinging cantilever arms which are adapted to hold a platform on which the sheets are carried, and where the mechanism is used for receiving sheets delivered from the machine, to lower it slowly as the sheets are successively piled thereon in order to maintain the top sheet at the proper level to receive the following one, the arms being made swingable to allow access from three sides to a suitable form of truck which is employed for transporting the pile of sheets to and from the machine.

Where the mechanism is used in connection with a feeding device, the platform is arranged to be raised gradually as the sheets are removed from the top of the pile, thus maintaining the top of the pile at the correct height for engagement of the sheets by the feeding mechanism.

Suitable mechanism for raising and lowering the pile handling device is disclosed in patent of Albert J. Graf, No. 1,866,562, dated July 12, 1932.

It is an object of the present invention to provide a mechanism whereby a pile of sheets of paper or similar material may be supported and raised or lowered to maintain the topmost sheet of the pile at a suitable height and in a substantially horizontal position, the mechanism being of cantilever construction whereby it is supported from one side and provided with means for correcting tendency to deflection due to varying weight of the pile.

It is also an object of the invention to provide a pile handling mechanism of generally improved construction, whereby the device will be simple, durable and inexpensive in construction, as well as convenient, practical, serviceable and efficient in its use.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts, and in the details of construction hereinafter described and claimed.

Two embodiments of the invention are illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevation of the pile handling mechanism as applied to the delivery of a printing machine, and showing one form of mechanism employed for counteracting a tendency to deflection of the cantilever arms when they are heavily loaded;

Figure 2 is a partial plan view of the sheet carrying platform shown in Figure 1, and portions of its supports;

Figure 3 is a side elevation of the sheet handling mechanism depicted in Figure 1, the view being shown in the opposite direction from which it appears in that figure;

Figure 4 is a horizontal sectional plan view of the deflection correcting mechanism shown in Figures 1 and 3;

Figure 5 is a vertical sectional elevation of parts shown in Figure 4 viewed on the line 5—5 of that figure and in the direction of the arrows;

Figure 6 is a view similar to Figure 4 but showing another form of deflection correcting mechanism;

Figure 7 is a fragmentary view of the mechanism shown in Figure 6 as seen in the direction of arrow 7 of Figure 6, but with certain of the parts in a different position; and

Figure 8 is a fragmentary view partly in section showing the mechanism of Figure 6 as seen in the direction of arrow 8 of that figure.

Although only one chain and connected parts are shown in the elevations and frequently referred to herein in the singular number in the description and claims, it should be understood that two are used, namely:—one set on each side of the apparatus.

Referring to the characters of reference on the drawings:—

The lower portion of the frame of a printing machine is indicated as 11, and mounted and secured thereon and to the other portions of the machine frame are the vertical, substantially rectangular guide bars 12. A pair of platform supporting arms are indicated as 13, and it will be seen that these project forwardly from the guides in the form of cantilevers. A cross member 17 is adapted to move up and down longi-

tudinally of the guides in order to raise and to lower the sheet platform 14 which carries the pile of sheets indicated at 15.

As viewed in Figure 1, the upper position of this pile of sheets and its suports are shown in full lines and its lower position and that of its supporting parts are indicated by broken lines.

The cantilever arms 13 are pivotally supported as at 16 to the cross member 17 and it should be noted that the ends of this cross member have a clearance on the sides around the guides 12 in order to facilitate its easy movement and to allow the counter-balancing of the parts as hereinbefore described. The guides 12 therefore merely serve to limit the lateral movements of the arms 13 and their attachments.

Secured to the cross member 17 near the ends thereof are the rearwardly or oppositely extending counter-balancing levers or back supports 18, forming the rear portions of the cantilever, and to the ends of these, the sprocket chains or sustaining members 19, after passing around the wheels 32 and thence upwardly, are adjustably secured by means of eye bolts 23 and adjusting nuts 24, while the other end of each chain is secured to the cross member 17 by means of the eye bolts 21 and secured in position by the clamping nuts 22.

The eye bolts 21 are adapted to adjust the arms 13 so that both are at the same horizontal elevation in order to insure the proper positioning of the sheet platform 14 thereon. The eye bolt 23 and the adjusting nuts 24 are adapted to take up slack in the rear part of the chain due to permanent stretching or wear, and this is equally true of the eye bolts 21 with respect to the forward part of the chain so that the adjustment of the other parts will not be disturbed.

The chain 19 is supported on and driven by the sprocket wheel 25 which is adapted to be rotated for the rapid movement of the supports by means of a worm and worm wheel which are concealed within the casing 20, and which may be driven by the shaft 26. Slow motion of the arms 13 and the platform 14 carried thereby, may be accomplished by the reciprocating connecting rod 28 which is actuated by the sheet delivery mechanism generally indicated at 29 and in time therewith so that the shaft 26 is intermittently rotated and the platform 14 is lowered step by step to extents substantially equal to the thicknesses of the sheets deposited thereon, whereby the top of the pile remains at the proper delivery level, the preferred mechanism for accomplishing this being fully disclosed in the hereinbefore mentioned application Serial Number 443,140.

It will be understood that when the device is used as a feeding mechanism the pawl is arranged to rotate the ratchet wheel in the opposite direction to slowly raise the platform.

When it is desired to move the platform up or down quickly, the motor 27 is employed to provide the more rapid movement required.

The pillow blocks 30 and 31 are formed on the machine base 11 and support one end of each of the shafts 41 and 42, the other ends of which are carried by the bearing plate 43. The shaft 41 is rotatable with the gears secured thereto, while the shaft 42 is fixed and its gears rotate thereon.

A sprocket wheel 32 is adapted to be driven by the chain 19 and is rotatably mounted on the eccentric hub 33 of the gear wheel 34, which latter is rotatably mounted on the shaft 42. This sprocket wheel is provided with a projecting stud 35 which is adapted to operate in a slot of a projection 36 of a pinion 37 so that this pinion is driven by the sprocket wheel 32.

The pinion 37 drives a spur gear 38 which is secured on the shaft 41 and on the other end of this shaft is secured a pinion 39 which meshes with the gear 34, provided with the eccentric hub 33. The gear ratios of this train of gears are preferably such that the entire movement of the platform 14 from its highest to its lowest position will revolve the eccentric about one quarter of a revolution.

The apparatus is so adjusted and arranged that when the platform 14 is at its highest point, with little load thereon, the platform is level and the sprocket wheel, as determined by the position of the eccentric hub 33, is in its highest position. As the platform is slowly lowered when receiving a succession of sheets from the delivery mechanism, the movement of the chain 19 rotates the sprocket 32, and by means of the train of gears 37, 38 and 39, gradually rotates the spur gear 34 and its eccentric hub 33 until the sprocket wheel is moved to a lower position. This action exerts a pull on the chain which tends to lift the outer ends of the cantilever arms and thus neutralizes the stretch of the chain which would otherwise allow the arms to sag and tip the platform to some extent. This pull on the chain is applied gradually and increases in proportion to the load of sheets 15 on the platform 14 and therefore keeps the platform level as desired.

In operation, when the mechanism is used in connection with a delivery device, the platform is brought to its uppermost position by means of the motor 27 and the automatic lowering mechanism then thrown into gear. As the sheets are deposited on the platform it is gradually lowered, and as the weight of the pile increases, the deflection correcting mechanism operates to increase the pull on the chain sufficiently to counteract the tendency of the outer ends of the arms to sag, due to their own bending and to stretch in the chains, and the platform is thus maintained in a level position. When the pile is to be removed from the machine, a suitable form of truck is placed under the platform and the arms are then lowered by means of the motor 27 until the platform rests on the truck. Where space is available beyond the rear of the machine, the truck with its load can be removed to the rear, but where space is limited, the pile can be removed from either side of the machine by using a common form of lifting truck and first swinging one of the arms 13 on its pivot to move it out of the way. It will thus be understood that the mechanism is particularly adapted for use in locations where space is limited and the absence of any supporting mechanism on the outer ends of the arms makes access to the pile of sheets convenient.

When the mechanism of this invention is used for supporting a pile of sheets in a position from which they are fed to a printing machine, the slow movement of the pile would be upward, instead of downward, and when beginning the delivery of sheets from a large heavy pile, the eccentrically mounted sprocket wheel would be in position to provide maximum pull on the chain. As the pile decreased by delivery of sheets therefrom, the pull would be decreased by the revolution of said sprocket and become gradually less and less in proportion to the load of sheets on the supporting arms.

In the form of the invention shown in Fig-

ures 6 to 8, the eccentrics 33 and the gear trains for operating them are omitted, and the chain 19 is provided with a shaft 46 on which flanged rollers 47 are rotatably supported. These rollers are adapted to run on a pair of tracks 48, suitably secured to the frame of the machine, there being a pair of tracks for each of the supporting chains. As shown in Figure 6, the pile 15 is approximately at its mid position. When it is at its uppermost position, the roller 47 would be at the position indicated with the numeral 47' and when the platform is at its lowermost position, the roller would be at the point indicated by the numeral 47''. It will be observed that with the roller in the position marked 47', the chain 19 forms a straight line between its points of engagement with the sprocket 32 and the sprocket 25, but with a heavy pile on the platform which would then be in lowered position, the chain is deflected from its normal path. The tracks 48 are shaped so as to deflect the chains to the extent requisite to counteract the tendency of the arms 13 to sag with any height of pile, and when the top of the pile is in sheet receiving position, the platform 14 will be level.

It will be understood that the invention may be used in connection with other types of machinery and may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiments be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

What we claim is:

1. In a mechanism for supporting a pile of sheets, a platform adapted to receive a sheet, a platform support having cantilever members extending below the platform and oppositely extending back support members, chains secured to the platform support and led upward therefrom around first sprocket wheels, thence downward and around second sprocket wheels located below the platform support, and thence upward and secured to the back support members, means for driving the chains, and means for deflecting them out of their normal path to compensate for increased load on the platform and thereby maintain the pile level at a desired elevation.

2. In a mechanism for supporting a pile of sheets, a platform adapted to receive a sheet, a platform support having cantilever members extending below the platform and oppositely extending back support members, chains secured to the platform support and led upward therefrom around first sprocket wheels, thence downward and around second sprocket wheels located below the platform support, and thence upward and secured to the back support members, means for driving the chains, and means for bodily moving one of the sprockets engaging each chain to compensate for increased load on the platform and thereby maintain the pile level at a desired elevation.

3. In a mechanism of the character described, a cantilever load support adapted to be raised, lowered and counter-balanced by a flexible member, and means for automatically counteracting the stretch of said member, whereby the support is prevented from tilting.

4. In a mechanism for handling a pile of sheets, a pair of cantilever arms, a platform thereon adapted to receive the sheets, means adapted to raise, lower and counter-balance said arms and for preventing the tilting of said platform, said means also serving to compensate for increased load on the platform so that said sheets may be maintained at a constant level while moving in a vertical plane.

5. In a mechanism for handling a pile of sheets, a pair of cantilever arms, a platform carried thereby adapted to receive the sheets, a sprocket chain adapted to raise, lower and counter-balance said arms, and means for automatically counteracting the stretch or contraction of the chain thereby preventing the tilting of said arms and consequently of said platform.

6. In a mechanism for handling a pile of sheets, a load supporting arm of cantilever construction, a flexible member having one of its ends secured thereto and adapted to raise and lower it, the other end of said member being secured to the rearward portion of said cantilever and adapted to balance the load by its tension, and means for gradually varying said tension as the load on the supporting arm is varied.

7. In an apparatus of the character described, a load carrying cantilever support, a flexible member adapted to lower and raise said support and to counter-balance it and a variable load thereon, and means for gradually varying the tension of said flexible member as the load varies, to thereby prevent the tilting of the load carrying support.

8. In an apparatus of the character described, a load carrying horizontal cantilever support, a flexible member, one portion of which is adapted to movably carry said support, the other portion of said member being adapted to counter-balance said support and a variable load thereon, and means for gradually varying the tension in said other portion as the load varies, whereby said support is maintained horizontal.

9. In a mechanism for handling a pile of sheets, a forwardly extending swingable load supporting arm, a rearwardly extending arm secured thereto forming a cantilever construction, a flexible member one end of which is secured to said load supporting arm and adapted to raise and lower it, the other end of said flexible member being attached to said rearwardly extending arm and adapted to tensionally resist the tendency to downward deflection of said load supporting arm, and means for gradually varying the tension in the last mentioned portion of said flexible member in substantial proportion to the variation in load on the supporting arm.

10. In a pile handling apparatus for sheets, a load supporting lever projecting forwardly thereof, a rearwardly extending counter-balanced lever secured thereto, a flexible member one end of which is secured to said load supporting lever and adapted to raise and lower it, the other end of said flexible member being attached to said counter-balance lever and adapted to balance said load supporting lever and its load, and means for gradually varying the tension in the last mentioned portion of said flexible member as the load varies on the load supporting lever, thereby preventing its deflection or tilting.

11. In a pile handling mechanism for sheets, a swingable load carrying arm, a loosely fitting guide column therefor adapted to prevent its excessive lateral motion, a counter-balancing arm secured to the load carrying arm and extending rearwardly thereof, a flexible member one end of which is secured to said load carrying arm and means for driving it in both directions, the other end of said flexible member being secured

to the end of the counter-balancing arm and adapted to tensionally resist its upward movement, and means for gradually varying the tension in that portion of the flexible member extending between its driving means and the counter-balance lever, as the load varies, thereby preventing the tilting of said load carrying arm.

12. In a mechanism of the character described, a cantilever sheet supporting arm, a sprocket chain provided with driving means adapted to raise and lower said arm, the rear portion of said chain being also adapted to counter-balance said arm and the sheets thereon by its tension, a sprocket wheel in the bight of said chain, an eccentric on which said sprocket is rotatably mounted, and means actuated by said chain adapted to rotate said eccentric and to thereby vary the tension in the counter-balancing portion of said chain in proportion to the load on said arm.

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