United States Patent [19]

Edwards

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[54] **APPARATUS FOR LOADING AND UNLOADING PRINTING MACHINES**

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[52] **U.S. Cl.** ..... **214/652,** 214/1 Q
[51] **Int. Cl.** **B66f 9/18**
[58] **Field of Search** ..... 214/652, 1 Q, 1 D

[56] **References Cited**

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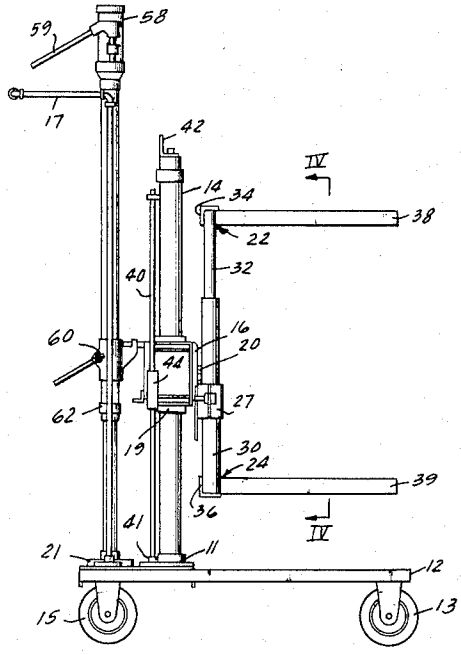
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Assistant Examiner—George F. Abraham
Attorney—Carlton Hill, Benjamin H. Sherman and J. Arthur Gross et al.

[57] **ABSTRACT**

This invention provides an apparatus for loading, unloading and turning over from one side to another, a stack of paper for printing machines and the like. The apparatus comprises a movable horizontal base, a support rod mounted on the base and extending vertically upward therefrom, the rod having a sleeve slidably mounted thereon, a turning head rotatably connected to the sleeve of the support rod, the turning head being arranged to rotate clockwise and counterclockwise, a rack connected to the turning head, the rack being arranged to securely hold a stack of paper and to rotate in the same manner as the turning head, means for raising and lowering the rack and for compressing the stack of paper held by the rack, and locking means arranged to allow the rack to rotate and to hold the rack stationary before and after being rotated.

4 Claims, 5 Drawing Figures



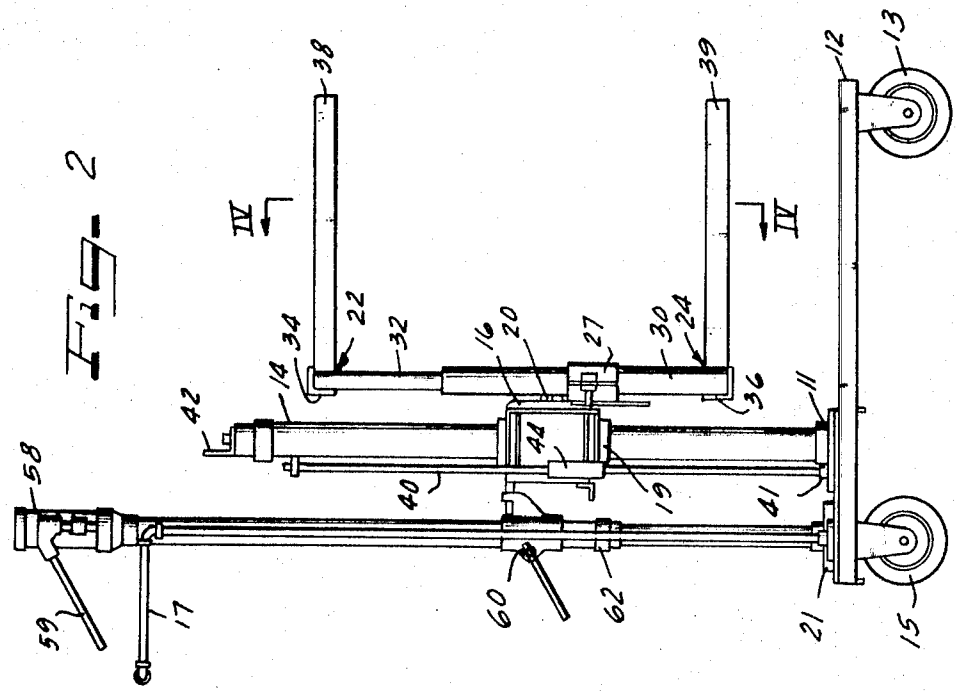

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Fig. 2

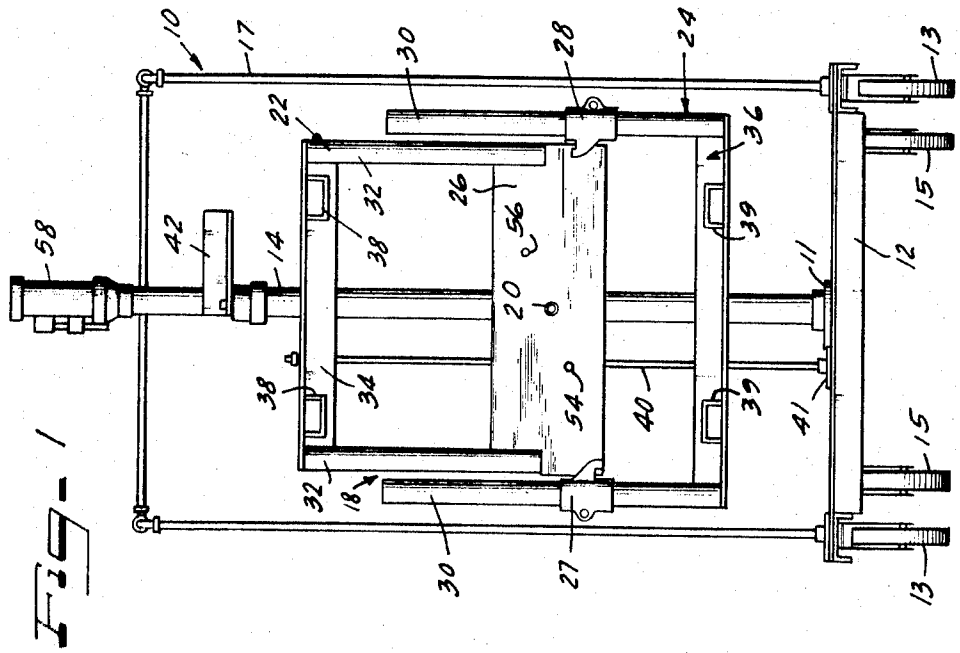

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Fig. 1

Fig. 3

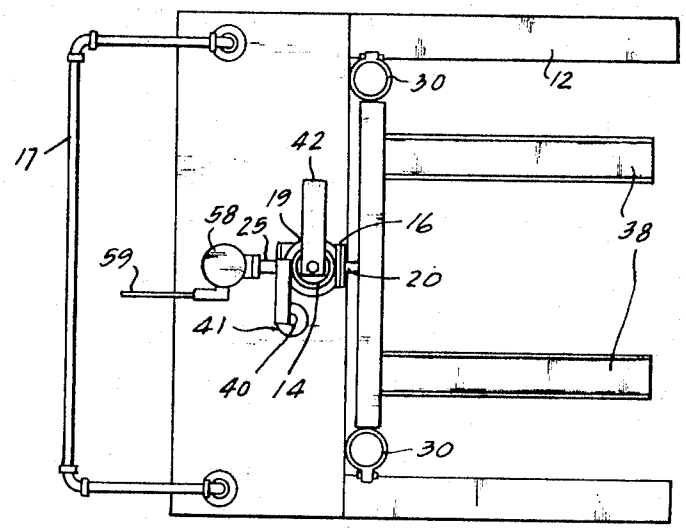


Fig. 4

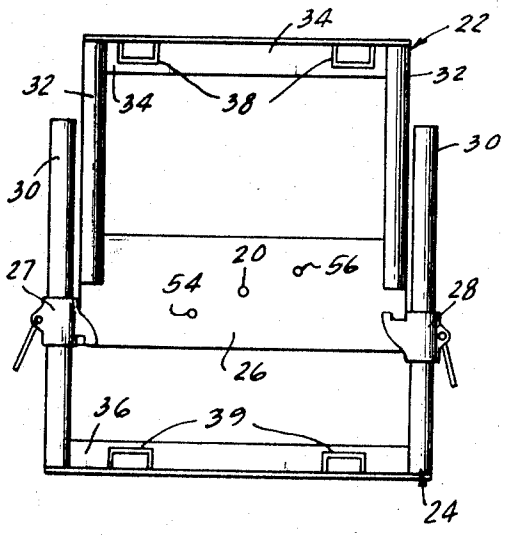
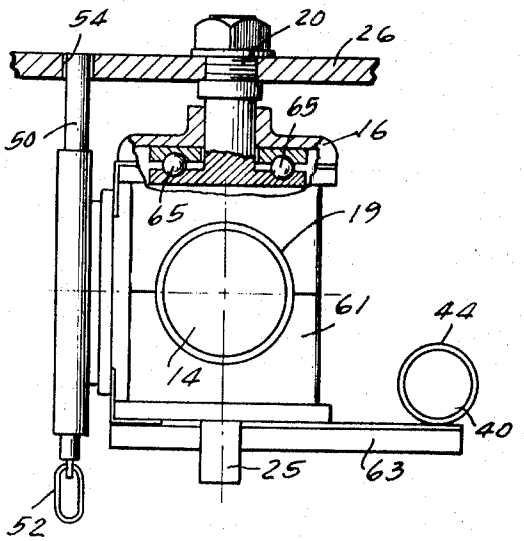


Fig. 5



APPARATUS FOR LOADING AND UNLOADING PRINTING MACHINES

BACKGROUND OF THE INVENTION

This invention is related to an apparatus for loading, unloading and for turning over from one side to another, a stack of paper for printing machines and the like. More particularly, this invention is related to an apparatus for turning over a stack of paper from one side to another without handling the paper by hand.

There are various methods and apparatus for loading and unloading printing machines and the like. These methods and apparatus range anywhere from the actual handling of the stack of paper in every step from the initial loading of a printing machine to the removal of the paper printed on both sides from the delivery end of the machine and the binding of the printed sheets of paper. With the paper being printed on both sides, it is necessary to turn the stack of paper over from one side to another and place it once again in the loading end of the printing machine and having it processed to the exit or delivery end from where it is removed and bound.

Generally, in the process of printing, there are about six times a stack of paper is handled from the time of initially loading it into the printing machine to when the sheets printed on both sides are removed from the delivery end of the machine and folded for binding. There are several apparatus that have been developed whereby the handling of the paper is reduced and greater quantities of paper may be handled to be printed. However, in most of these apparatus, in order to print on both sides of the sheets of paper, the paper has to be turned over from one side to another by hand. This necessitates not only an extra step but also makes the process more difficult in accurately turning over the paper from one side to another as well as more troublesome in the possibility of misarranging the sheets of paper and of marking the surfaces thereof.

There is a need for inexpensive apparatus for efficiently loading, unloading and turning over from one side to another a stack of paper to be printed, without the need of repeated handling by hand.

SUMMARY OF THE INVENTION

I have, accordingly, developed an improved apparatus for loading, unloading and turning over a stack of paper from one side to another in conjunction with printing machines and the like. The apparatus comprises a movable horizontal base, a support rod mounted on the base and extending vertically upward therefrom, the support rod having a sleeve slidably mounted thereon and arranged to move vertically upward and downward on the rod, a turning head rotatably attached to the sleeve mounted on the rod, the turning head being arranged to move vertically in the same manner as the sleeve and to rotate clockwise and counterclockwise, a rack connected to the turning head, the track being adapted to rotate with the turning head and arranged to securely hold a stack of paper, means for raising and lowering the sleeve and rack and for compressing the stack of paper held by the rack, and locking means arranged to allow the rack to rotate and to hold the rack stationary before and after being rotated.

Accordingly, it is an important object of the present invention to provide an apparatus for loading, unloading and turning over a stack of paper from one side to another for printing machines and the like without having to repeatedly handle the stack of paper by hand.

Other objects, features and advantages of the present invention will be readily apparent from the following description of the preferred embodiments thereof, taken in conjunction with the accompanying drawings, although variations and modifications may be effected without departing from the spirit and scope of the novel concepts of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of an apparatus embodying the present invention;

FIG. 2 is a side elevational view of the apparatus illustrated in FIG. 1;

FIG. 3 is a top view of the apparatus illustrated in FIGS. 1 and 2;

FIG. 4 is a view taken on line IV—IV in FIG. 2, illustrating the paper rack of the present apparatus; and

FIG. 5 is an enlarged view of the sleeve mounted on the support rod of the apparatus shown in FIGS. 1 to 3, illustrating the turning head of the present apparatus in its relation to the paper rack shown in FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring initially to FIGS. 1 and 2, an apparatus embodying the present invention is shown. The apparatus, generally indicated at **10**, includes a wheel mounted base **12** on which is mounted a support and guide rod **14**. The support and guide rod **14** is mounted on the base by means of a flange **11**, and extends vertically upward from the horizontal base **12**. The horizontal base **12** is movably mounted on two sets of wheels **13** and **15** mounted on the bottom of the base **12**. A handle **17** mounted at one end of the base and extending vertically in parallel relation to the main support and guide rod **14** is provided to accommodate movement of the base along the floor by hand.

As shown in FIG. 2, a sleeve **19** is slidably mounted on the support rod **14**. The sleeve **19** is arranged to be moved vertically upward and downward on the support and guide rod by means of a hydraulic jack **58** mounted by means of a flange **21** on the base **12** and extending in parallel relation with respect to to the support and guide rod **14**. The hydraulic jack **58** has connection with the sleeve **19** to raise and lower said sleeve along the support and guide rod **14** by a releasable coupling **60** on said jack and a stud **25** extending from a housing **61** on the sleeve **19** and engaging said coupling. Accordingly, by compressing the jack handle **59**, the sleeve is caused to be lifted upward and when the pressure is released at the jack, the sleeve can be lowered and descend down the rod **14**.

As illustrated in FIG. 2, and shown in detail in FIG. 5, a head **16** for the housing **61** forms a bearing support for a rack **18**. The rack **18** is arranged to rotate 360°, both clockwise and counterclockwise. The paper rack **18** is connected to the turning head **16** by means of a bolt **20** extending from within the head **16** through a main plate **26** of the rack **18**.

As specifically shown in FIG. 4, the paper rack **18** includes parallel spaced rack portions **22** and **24**. The rack portion **24** is connected to the main rack plate **26** by means of a pair of compression couplings or clamping collars **27** and **28** slidably extending about vertical

parallel spaced bars **30** of the rack **24** and adapted to be clamped thereto. As shown in FIGS. **1** and **4**, the rack **22** includes parallel spaced vertically extending bars **32**, spaced inwardly of the bars **30** of the rack **24** and in alignment therewith. A plate **26**, turnable about the axis of a bolt **20** and suitably secured thereto, forms a support for the bars **32**, which may be welded or otherwise secured thereto (FIG. **4**). Both the rack portions **22** and **24** include parallel cross bars **34** and **36** on which the respective bars **32** and **30** are mounted. Lifting forks **38** and **39** extend from opposite ends of the respective cross bars **34** and **36** perpendicular thereto and are welded or otherwise secured thereto. The lifting forks **38** and **39** extend horizontally outwardly from the respective cross bars **34** and **36** to support and compress a stack of paper therebetween and are adapted to move toward and away from each other to compress the stack of paper and to release and accommodate removal of the stack of paper held between said forks.

Mounted on the top of the primary guide rod **14** is a pivoted rack stop **42** which is arranged to rotate 90° about a vertical axis to the left or the right of the center of the apparatus **10** and guide rod **14**. When the rack stop **42** is pivoted forward, away from the guide rod **14** toward the front of the apparatus **10**, it limits the height or upper level, to which the rack portion **22** can be raised the rack portion **24** when said rack portion is in an uppermost position to compress the stack of paper between the forks **38** and **39**.

The rack **18** is lifted and lowered by means of the hydraulic jack **58** which is connected with the sleeve **19** through the coupling **60** and the stud **25**. The rack **18** is carried by said sleeve on a head **16** for housing **61** and the bolt **20** (FIG. **5**). With this arrangement, the rack and the forks **38** and forks **39** are raised when the jack is compressed, and lowered when the pressure is released at the jack. The compression couplings **27** and **28**, which may be in the form of clamps extending about the bars **30** of the rack portion **24** are welded or otherwise secured to opposite ends of the plate **26** and are arranged to be loosened and tightened as desired to accommodate movement of the bars **30** along said coupling and to retain said bars in fixed relation with respect thereto. The coupling clamps **27, 28** are loosened to allow the rack portion **22** to descend when desired, e.g. onto a stack of paper placed in the rack inbetween the forks as the sleeve **19** is lowered along the support and guide **14** and the forks **39** are resting on a fixed support such as the base **12**. When the papers are to be held securely between the forks, the coupling clamps **27** and **28** are tightened.

Slidably mounted on the jacks **58** is an adjustment clamp **60** which is connected to the sleeve **19** by the housing **61** extending about and secured to the sleeve **19** and the stud **25** extending from said housing. The clamp **60** may be loosened and tightened to adjust and hold the sleeve **19** in place on the support rod **14**. A stop **62** which may be a closure for the piston rod end of the jack **58** is provided on the jack **58** to limit the lower level to which the adjustment clamp **60** can be moved.

As shown in FIGS. **1–3**, an alignment rod **40** is provided and is mounted by means of a flange **41** on the base **12** in a parallel relation to the main support rod **14**. A sleeve **44** is slidably mounted on the alignment rod **40** and is connected with a plate **63** connected to the housing **61** surrounding the sleeve **19**, as shown in FIG. **5**. With this arrangement, the alignment rod **40** assists in guiding the sleeve vertically and the load lifted and lowered by the paper rack **18**.

Referring to FIG. **5**, there is shown the relationship of the sleeve **19** slidably mounted on the support rod **14**, the turning head and paper rack **18**. The head **16** is abutted by an antifriction bearing **65** rotatably connected by an arrangement of bearings **65**, to the interior of the housing **61** surrounding the sleeve **19**. The paper rack is connected to the turning head by means of the bolt **20** extending from within the flange bearing and bolted to the main plate **26** of the rack **18**.

A spring-loaded locking pin **50** is provided to hold the rack **18** stationary. As shown, the locking pin **50** is slidably mounted and connected to the bracket **61** surrounding the sleeve **19**. The locking pin **50**, in its normal position, extends within one of the locking holes **54** or **56**, as shown in FIGS. **1** and **4**. A chain **52** is provided to pull the locking pin **50** out of the holes when it is desired to rotate the rack **18**, and then the pull on the chain is released to enter the opposing locking hole, e.g. removing the pin from the hole **54** to engage the hole **56**.

The present apparatus may be used in conjunction with various types of printing machines. A typical machine it has been effectively used with is a Multilith Offset, Model 1850, manufactured by the Addressograph-Multigraph Corporation of Cleveland, Ohio.

In the operation of the present apparatus for loading, unloading and turning over a stack of paper for a Multilith Model 1850 or similar machine, initially, the apparatus **10** with a stack of paper securely held in the rack **18** and the rack raised sufficiently, is wheeled into the loading magazine of the machine with the rack above the elevator. Then, the coupling clamps **27, 28** are loosened to allow the forks **38** to be lifted above the stack of paper. With the forks raised, the elevator of the printing apparatus is then raised to lift the stack from the forks **39** of the rack **18**. Then, with the stack of paper lifted slightly above the forks, the apparatus is pulled out from the loading end and wheeled into position at the exit or delivery end of the machine.

To unload the paper from the machine, the apparatus with its forks **38** and **39** sufficiently spaced apart, is pivotally moved to position the forks **38** below the paper delivery shelf or paper receiver. The rack is raised to lift the paper just clear of the receiver, and then, the apparatus is moved away from the machine. With the stack of paper resting on the forks **38**, the clamping couplings **27** and **28** are loosened to allow the forks **39** to descend on the stack of paper. Then, the rack stop **42** is pivoted to extend to intercept the cross bar **36** toward the front of the apparatus and the jack handle **59** is compressed to lift the rack **22** and **24** until the rack **24** contacts the pivoted rack stop. The jack handle is further compressed until a hard pressure is felt on the jack handle **59**, signifying there is sufficient pressure on the stack of paper to hold it while it is turned over. Then, the compression couplings **27** and **28** are tightened, and with the paper secured in the rack, the pressure at the jack is released to lower the rack sufficiently to pivot the rotating rack stop **42**, 90° to the side.

In turning over the stack of paper, first, the locking pin **50**, by means of the chain **52**, is pulled out from a locking hole in the main rack plates **26**. With the locking pin pulled out from the locking hole, by one hand, the paper rack **18**, with the free hand, is rotated until

the locking pin **50** can slide on the main plate **26** without being held out. The locking pin **50** will engage the opposing locking hole when the paper rack has been rotated 180°. With the stack of paper turned over the printing machine is loaded again in the same manner as described above. After the paper has been printed on both sides, the present apparatus can be used to unload the paper and transfer it to be folded and bound, or stored.

I claim as my invention:

1. In an apparatus adapted for use with printing machines for loading, unloading and turning over a stack of paper,

a wheel mounted base adapted to be moved along the floor,

a support and guide rod fixedly mounted on said base and extending upwardly therefrom,

a sleeve slidably mounted on said support and guide rod,

a housing extending about said sleeve and secured thereto for movement therewith along said support and guide rod,

a hydraulic jack mounted on said base and extending in parallel relation with respect to said support and guide rod,

a drive connection from said hydraulic jack to said sleeve for moving said sleeve along said support and guide rod,

a rack carried by said housing and including

a plate pivoted to sand housing intermediate its ends for rotatable movement about a horizontal axis extending longitudinally of said base,

releasable locking means for holding said plate in position relative to said housing and accommodating pivotal movement thereof,

first and second pairs of spaced forks mounted on said plate for adjustable movement with respect to each other and spaced from opposite sides of said plate,

the first pair of forks being fixedly mounted on said plate and the second pair of forks being releasably mounted on said plate for adjustable movement toward and from said first-mentioned pair of forks,

clamping sleeves releasably clamping said second pair of forks to said plate and releasing said forks to move toward or from said first pair of forks,

a stop movably mounted on said support and guide rod in position to engage said second pair of forks when they are in an upper position and upon upward movement thereof which will, when said clamping sleeves are released, compress a stack of paper between said first and second pair of forks, said second pair of forks cooperating with said first pair of forks to enable the compressed stack of paper to be turned over upon clamping said clamping sleeves to retain said forks in position, moving said stop into a retracted position, releasing said locking means and manual turning said rack to position the first pair of forks above the second pair of forks.

2. The apparatus of claim **1**, wherein the drive connection from the hydraulic jack to the sleeve includes a clamping coupling on said hydraulic jack adjustably movable therealong and adapted to be clamped in position on said hydraulic jack, and means operatively connecting said clamping coupling to said sleeve to move said sleeve along said support and guide rod upon operation of said hydraulic jack and thereby effect vertical movement of said rack.

3. The apparatus of claim **2**, including a spring loaded lock pin carried by said housing and biased into engagement with said plate and having locking engagement with said plate when in a normal or inverted position.

4. The apparatus of claim **3**, including a guide rod extending parallel to said support and guide rod, a sleeve movable along said guide rod, and means connecting said housing to said sleeve to move said sleeve upon vertical movement of said housing and to hold said housing from turning movement relative to said support and guide rod.

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