

[54] PRINTING PRESS HAVING AUTOMATIC PRINTING CYLINDER LOADING AND UNLOADING APPARATUS

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[51] Int. Cl. B41f 9/18

[58] Field of Search ... 101/150, 152, 153, 212, 216; 214/130 R; 242/58.6

[56]

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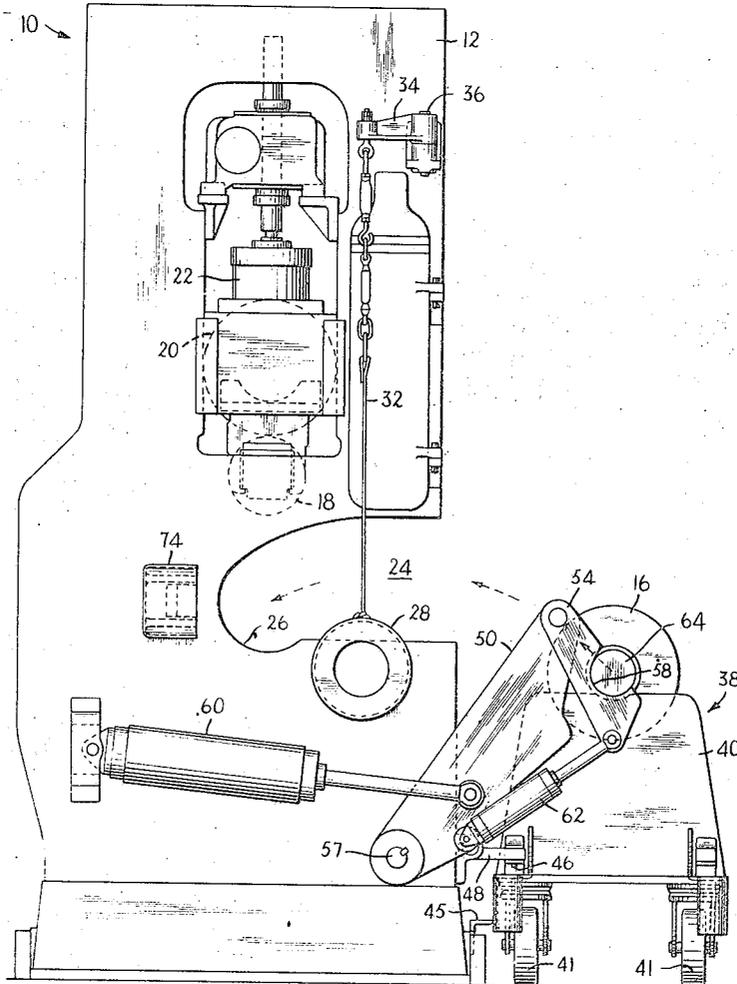
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[57] ABSTRACT

Apparatus for automatically loading and unloading printing cylinders from a rotogravure printing press. The printing press, which is of itself conventional, includes two upright frame members having horizontal openings for lateral insertion of the journals of a printing cylinder. According to the invention, a transport arm is pivoted at one end on each of the frame members and provided at the other with a device for supporting and lifting a journal of the printing cylinder. Means are also provided for separately moving the two transport arms and lifting devices so that the printing cylinder can be lifted by the lifting devices from a dolly or hoist adjacent the printing press, transported into the press by the transport arms with the cylinder journals passing into the horizontal openings in the frame members and lowered into position in the press.

10 Claims, 6 Drawing Figures



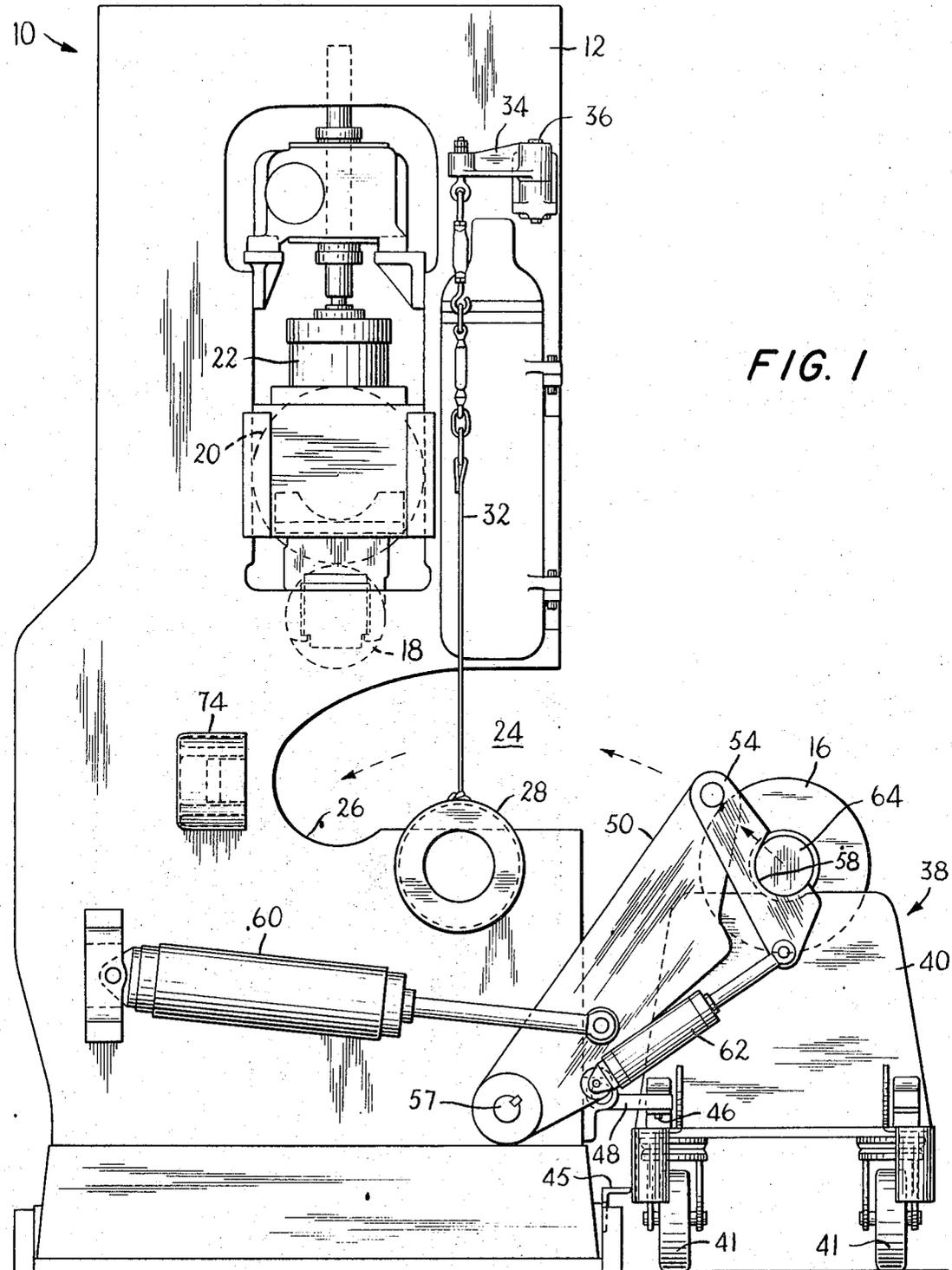


FIG. 1

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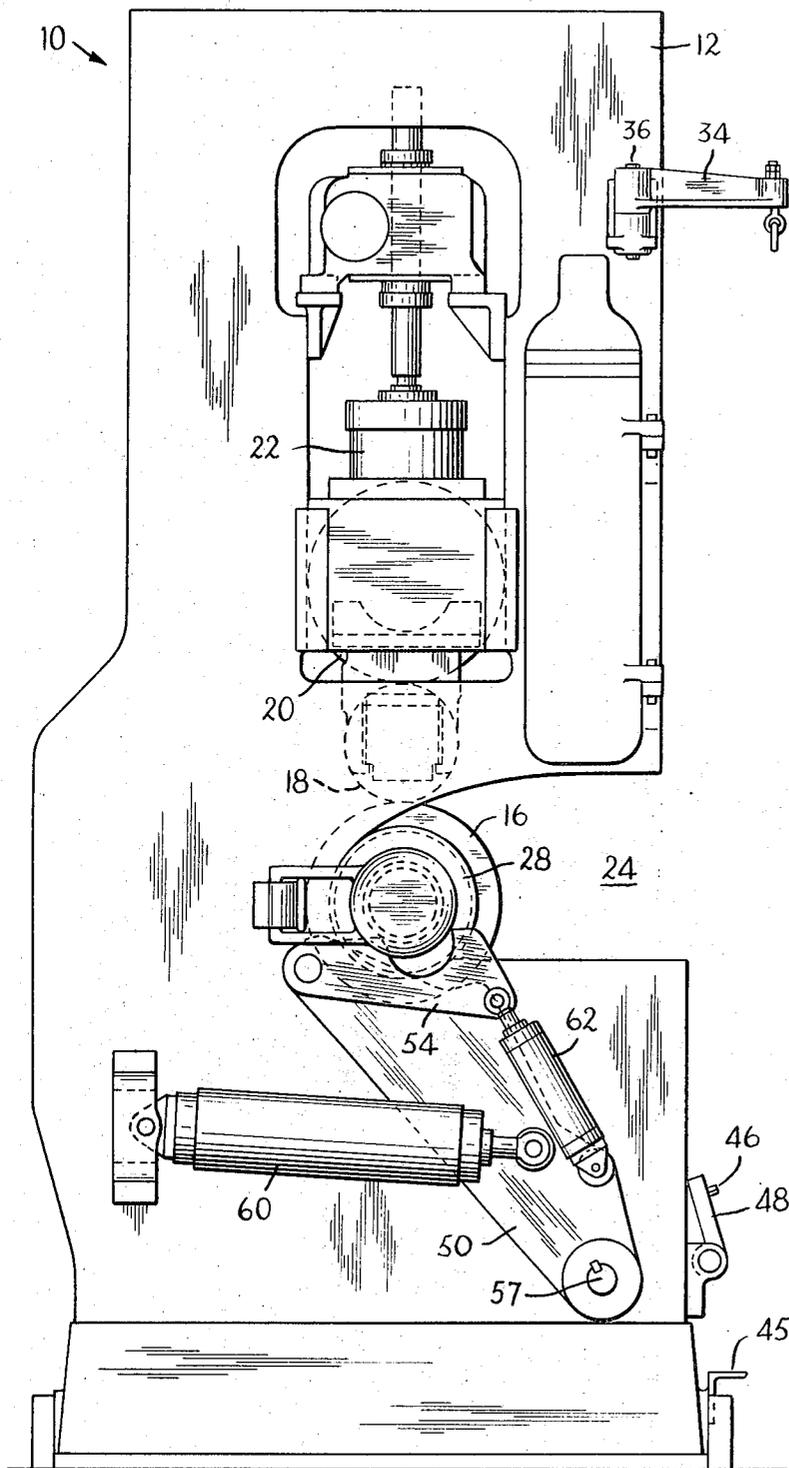


FIG. 2

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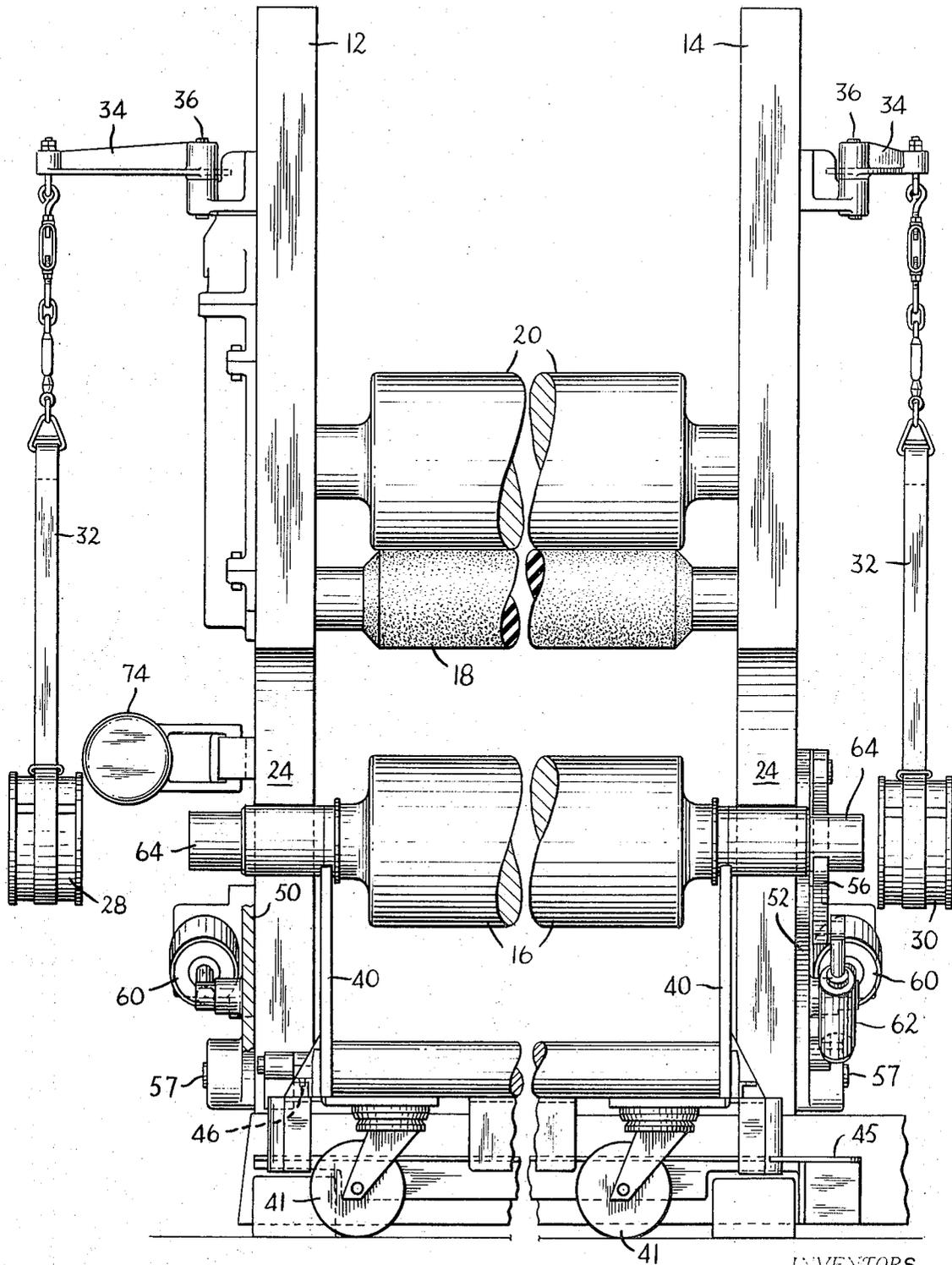


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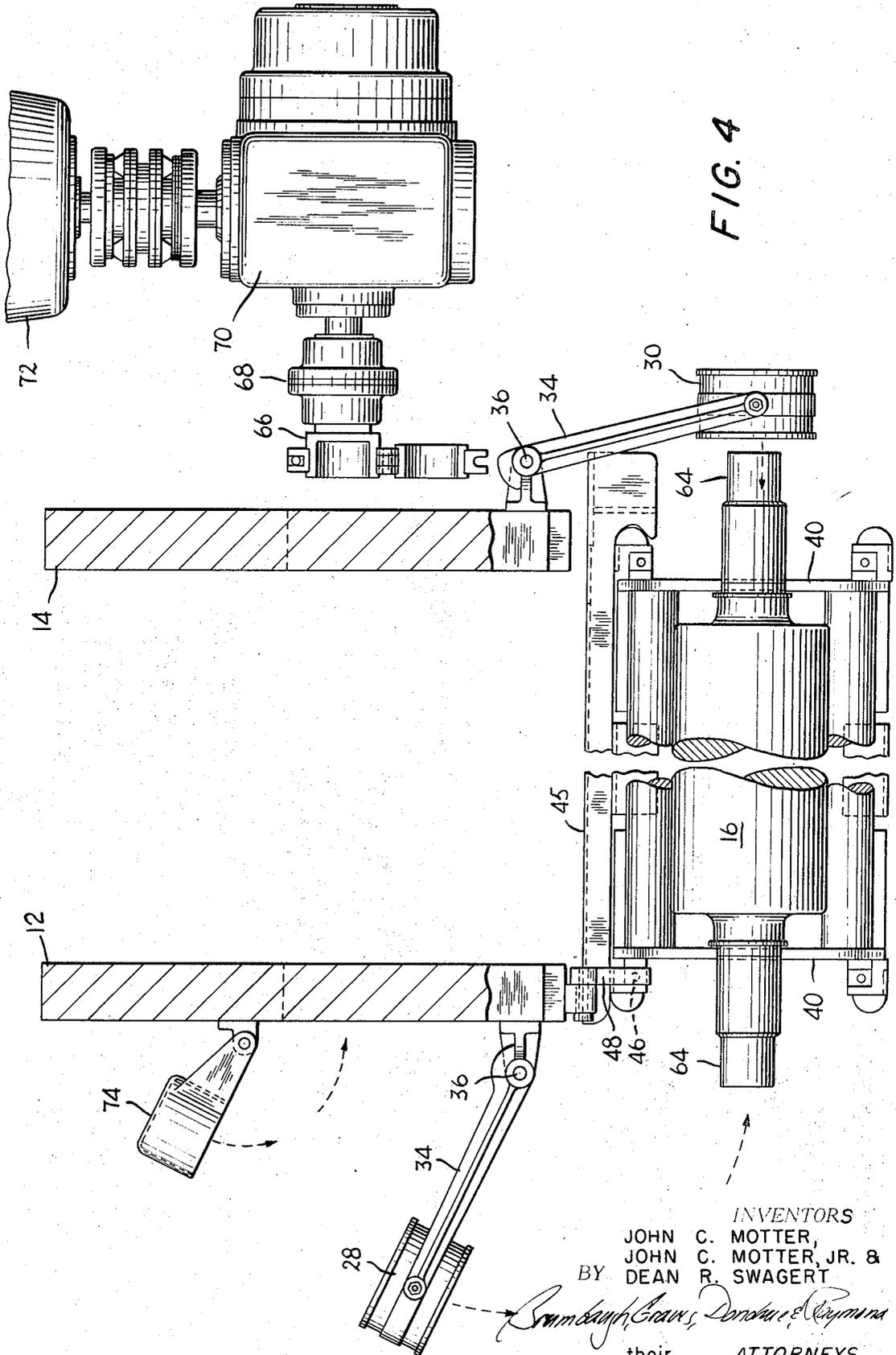


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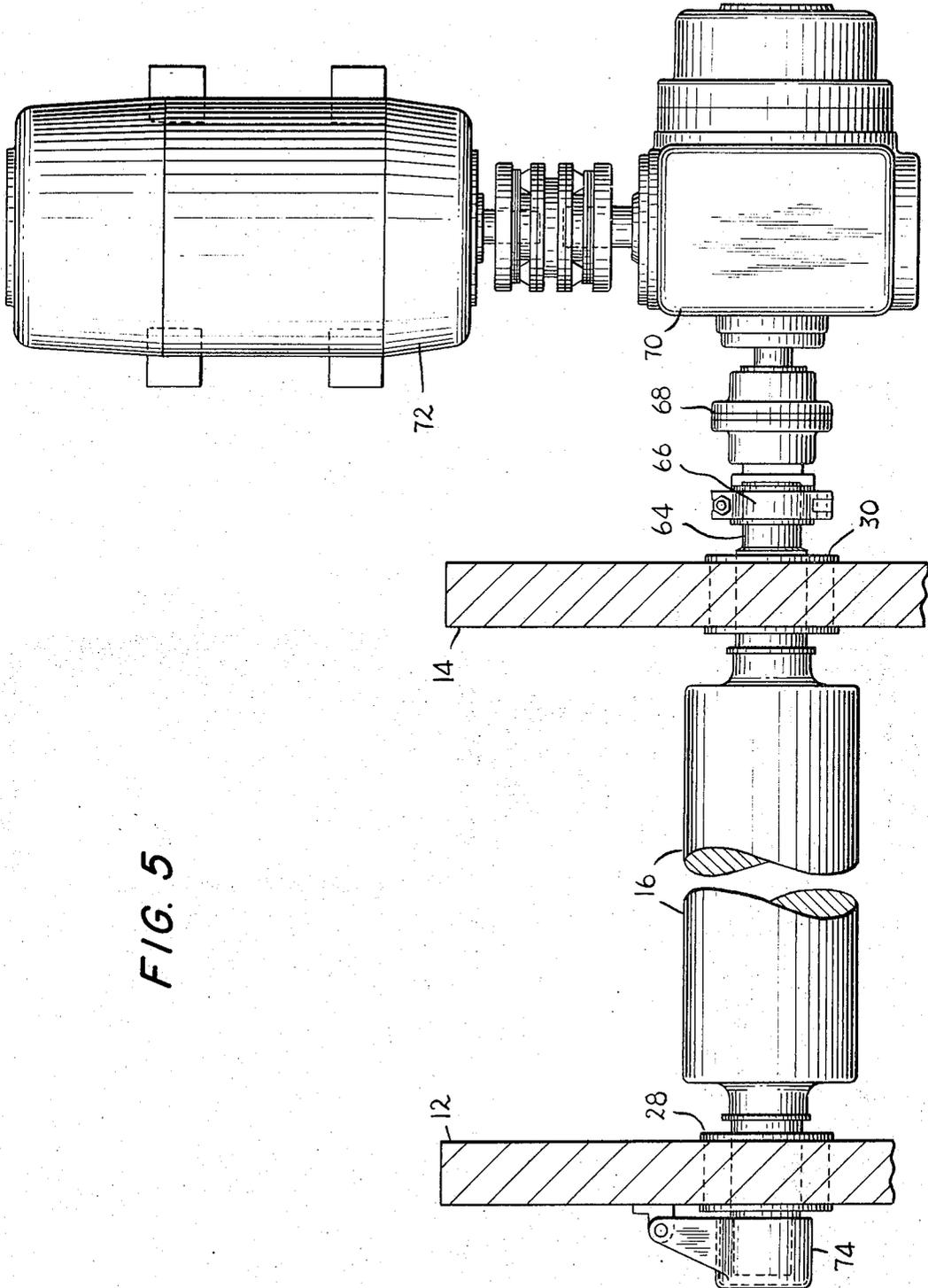


FIG. 5

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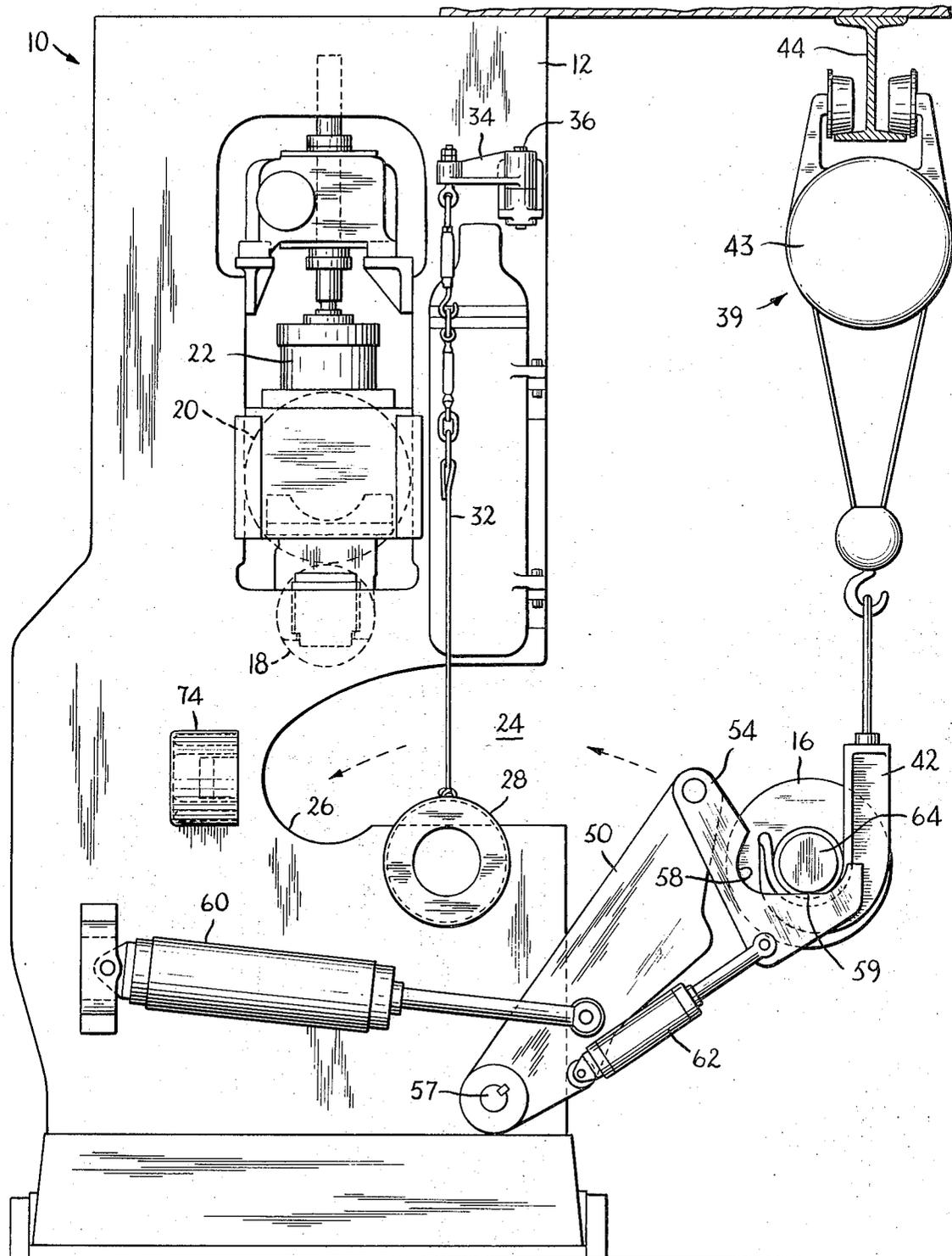


FIG. 6

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PRINTING PRESS HAVING AUTOMATIC PRINTING CYLINDER LOADING AND UNLOADING APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to apparatus for automatically loading and unloading printing cylinders from a rotogravure printing press.

There has long been a need in the printing press art for a device which will quickly and automatically load and unload printing cylinders from a gravure press. Printing cylinders, which for large presses are extremely heavy and bulky, are both difficult and dangerous to manipulate. These printing cylinders are conventionally loaded and unloaded from the press with the aid of two cylinder loading bars manually placed, beneath the printing cylinder journals, between the press and a printing cylinder carrying dolly. When a printing cylinder is to be moved from the dolly to the press or from the press to the dolly, it is rolled by hand along these loading bars which act as bridges between the press and dolly.

Due to the weight of the printing cylinder, at least two men are normally required to manipulate the cylinder along the loading bars. Notwithstanding these personnel, the printing cylinder has a tendency to tilt in the horizontal plane so that its journals do not run smoothly along the loading bars. Some effort is required to prevent this binding and, more particularly, to move both journals of the cylinder the same distance at the same time.

In addition to these difficulties it is necessary for the press personnel to stand close to the printing cylinder while the latter is being transferred to or from the printing press. This condition is inherently unsafe since the loading bars may accidentally shift or drop permitting the printing cylinder to fall, or the printing cylinder may roll against and injure one of the persons attempting to move it.

SUMMARY OF THE INVENTION

It is an object of the present invention, therefore, to provide apparatus, capable of remote control, for quickly and automatically loading or unloading printing cylinders from a printing press.

This object, as well as further objects which will become apparent in the discussion that follows, is achieved, according to the present invention, by providing two transport arms, each pivoted at one end on one of the frame members of the printing press, and two printing cylinder lifting arms, each arranged at the free end of one of the transport arms. By means of mechanical drives for moving the two transport arms in synchronism about their respective pivots and for raising and lowering the two printing cylinder lifting arms, it is possible to automatically lift a printing cylinder by its journals from a cylinder dolly or from a hoist arranged adjacent to the printing press and to transport the cylinder to its operating position in the printing press and vice versa.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a rotogravure printing press and an adjacent dolly for carrying a printing cylinder. The printing press includes apparatus, according to the preferred embodiment of the

present invention, for automatically loading and unloading the printing cylinder from the press.

FIG. 2 is a side elevational view of the printing press illustrated in FIG. 1. In this view, the apparatus for automatically loading and unloading the printing cylinder is shown in its normal or rest position.

FIG. 3 is an end elevational view of the printing press illustrated in FIG. 1. Portions of the apparatus for automatically loading and unloading the printing cylinder have been cut away for greater clarity.

FIG. 4 is a top view of the printing press and dolly illustrated in FIG. 1. The apparatus for automatically loading and unloading the printing cylinder has been omitted for the sake of clarity. This figure illustrates the manner in which the bearings are attached to the journals of the printing cylinder, before the cylinder is transferred from a dolly or hoist to the printing press, and the manner in which the printing cylinder is coupled to the drive train.

FIG. 5 is a top view of the printing press similar to FIG. 4. In this view the printing cylinder has been inserted in the press and coupled to the drive train.

FIG. 6 is a side elevational view of a rotogravure printing press and an adjacent monorail hoist for carrying the printing cylinder. The printing press includes apparatus, according to an alternative preferred embodiment of the present invention, for automatically loading and unloading the printing cylinder from the press.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiments of the apparatus according to the present invention for automatically loading and unloading a printing cylinder from a printing press will now be described with reference to FIGS.

1 - 6 of the drawings. The printing press is shown in side view in FIGS. 1, 2 and 6, in end view in FIG. 3 and in top view in FIGS. 4 and 5. Identical elements of the apparatus shown in the six figures have been designated by the same reference numerals.

Wherever possible, the apparatus shown in FIGS. 1 - 6 has been simplified so as not to obscure the novel features characteristic of the invention with details of conventional parts and elements well known to those skilled in the art.

The printing press 10 shown in FIGS. 1 - 6 is comprised of two side frame members 12, 14 which support the three principal cylinders or rollers 16, 18 and 20 of the press; that is, the cylinder 16, which carries an etched printing surface; the impression roller 18, which is provided with a rubber surface; and the back-up roller 20, which has a smooth hard metal surface. Pressure is applied between the printing cylinder and the impression roller by the combined weight of the impression roller and the back-up roller as well as by a downward force applied to the journals of the back-up roller by a loading mechanism 22. The web to be printed (not shown) is passed through the press between the printing cylinder and the impression roller.

In each of the frame members 12 and 14 is a large opening 24 which terminates in a circular surface 26. Each opening 24 permits the insertion of a journal of the printing cylinder 16 inclusive of the journal bearing. Each surface 26 provides a mating support for the

outer surface of a journal bearing when the cylinder 16 is in its operating position.

The journal bearings for the printing cylinder 16, which are designated as 28 and 30 in the drawings, are supported by straps 32 and arms 34 attached to the press when not in position on the journals of the printing cylinder 16. The arms 34 are hinged on vertical pins 36 and may be swiveled toward or away from the front of the press.

Printing cylinders to be loaded or which have been unloaded from the printing press and carried to or away from the printing press by means of a truck or dolly 38 (FIGS. 1 - 4) or a monorail hoist 39 (FIG. 6). The dolly 38 is comprised of two side members 40 vertically arranged on a base which rolls on casters 41. The hoist 39 is comprised of two side members 42 carried vertically by a winch 43 and a monorail 44. The side members 40 and 42 of the dolly and hoist support the printing cylinder 16 at the inner portion of its two journals.

The dolly 38 may be accurately positioned in front of the printing press during the loading or unloading operation by means of a guide bar 45 and a guide pin 46. The bar 45 determines the proper distance between the dolly and the press while the pin 46, when in place, insures that the dolly is in proper alignment for pickup or discharge of the printing cylinder. As is best shown in FIGS. 1, 2 and 4, the pin 46 is carried by an arm 48 which is hinged to the frame member 12 of the printing press.

The apparatus for transporting the printing cylinder 16 between the mounting surface 26 of the printing press 10 and the dolly 38 or hoist 39 comprises two transport arms 50 and 52 and two lifting arms 54 and 56. The transport arms 50 and 52 are pivoted at one end on the frame members 12 and 14, respectively. The lifting arms 54 and 56 are each provided with a supporting surface 58 which engages and matches the ends of the journals of the cylinder 16. In addition, lifting arms may be provided with a recessed guiding surface 59 (FIG. 6), which is wider than the diameter of the journals, for engaging the journals even when the printing cylinder is not at the proper position in relation to the printing press. Such a guiding surface is especially useful when the printing cylinder is to be carried to the press by a monorail hoist since it permits the journals to be engaged properly with the matched surface 58 notwithstanding hoist swing.

The two transport arms 50 and 52 may be moved in synchronism either toward or away from the printing press frame by means of the hydraulic or pneumatic cylinders 60. The lifting arms 54 and 56 may be moved up or down in synchronism by the hydraulic or pneumatic cylinders 62. The four cylinders 60 and 62 are operated and controlled in the conventional manner by control of the flow of hydraulic fluid or air under pressure. Although the cylinders 62 need provide a force in a single (upward) direction only, the cylinders 60 must be of the "double acting" type capable of moving the transport arms 50 and 52 in either direction.

The journals of the printing cylinder 16 are provided with extensions 64 for quick coupling to a mechanical drive. When the cylinder 16 is inserted in the printing press, one of the extensions 64 fits into an open clamp 66 which forms part of the drive train. When the clamp is closed and tightened around the journal extension,

the printing cylinder may be rotated at the desired printing speed by a universal coupling 68 capable of transmitting rotational movement from one shaft to another not collinear with it a gear case 70 and an electric motor 72.

The cylinder 16 is provided with extensions 64 at both of its journals to permit it to be driven at either end. During operation, the extension of the cylinder which is not being driven is covered by a cap 74 which prevents accidental contact with the rotating member.

The printing cylinder 16 may be loaded in the printing press 10 in the following manner using the apparatus described above.

With the transport arms and lifting arms in their fully retracted (normal) position, the cylinder dolly or hoist, which carries a cylinder to be inserted into the press, is moved into position adjacent the press. If a dolly is used it is locked in position with the guide pin 46. Thereafter, the transport arms 50 and 52 are fully extended and the lifting arms 54 and 56 slowly raised until their surfaces 58 come in contact with the journals of the cylinder 16. At this point in the loading operation the transport and lifting arms will be in the positions shown in FIGS. 1 and 6.

The arms 34 which support the bearings 28 and 30 are next swung outward toward the front of the press as shown in FIG. 4 and the bearings are inserted on the cylinder journals. When the bearings are properly mounted the carrying straps 32 are removed and the arms 34 swung out of the way.

The lifting arms 54 and 56 are next raised to their fully extended position so that the cylinder 16 is raised clear of the support members 40 or 42 of the dolly or hoist, respectively. The transport arms 50 and 52 are then retracted fully until the outer surfaces of the bearings 28 and 30 are positioned in the matching surfaces 26 of the frames of the press. The lifting arms 54 and 56 are thereafter lowered so that they will no longer be in contact with the journals of the cylinder. At this point in the loading operation the transport and lifting arms will be in the positions shown in FIG. 2.

To complete the loading operation, the clamp 66 is closed over one extension 64 at the end of the printing cylinder and the cap 74 placed over the other. The printing cylinder 16 can then be driven to operate the press in the conventional manner.

The printing cylinder 16 may be unloaded from the printing press and placed on the dolly or hoist by reversing exactly the loading steps described above. It should be noted that the entire loading and unloading operation may be performed by one man at a safe distance from the press.

It will be understood that the present invention is susceptible to various modifications, changes and adaptations as will occur to those skilled in the art. It is therefore intended that the scope of the present invention be limited only by the following claims or their equivalents.

We claim:

1. A rotogravure printing press comprising, in combination:
 - a. two upright frame members for supporting the press including a printing cylinder having journals at opposite ends thereof, each of said frame members having a horizontal opening for insertion of one of said journals;

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- b. two transport arm means, each having one end thereof pivoted on one of said frame members, for transporting the journals of the printing cylinder into or out of said horizontal openings in said frame members to thereby respectively load or unload said printing cylinder;
- c. two printing cylinder lifting means, each arranged on the other end of one of said transport arm means and having a surface region for supporting the underside of one journal of said printing cylinder;
- d. means for moving said two transport arm means in synchronism about their respective pivots; and
- e. means for moving said two printing cylinder lifting means in synchronism to thereby raise or lower said surface regions thereof.

2. The apparatus defined in claim 1, wherein each of said printing cylinder lifting means includes lifting arm means having one end thereof pivoted on the other end of one of said transport arm means and having said surface region located on the upper side thereof.

3. The apparatus defined in claim 1, wherein said means for moving said two transport arm means includes transport drive cylinder means, for applying a force to said two transport arm means in a substantially horizontal direction.

4. The apparatus defined in claim 1, wherein said means for moving said two printing cylinder lifting means includes lifting drive cylinder means, for applying a force to said two lifting means in a substantially vertical direction.

5. The apparatus defined in claim 4, wherein said transport drive cylinder means includes two transport drive cylinders, each of which is located on one of said frame members and connected to drive one of said transport arm means.

6. The apparatus defined in claim 5, wherein said lifting drive cylinder means includes two lifting drive cylinders, each of which is located on one of said transport arm means and connected to drive one of said lifting means.

7. The apparatus defined in claim 1, wherein said means for moving said two transport arm means and said two printing cylinder lifting means is hydraulically actuated.

8. The apparatus defined in claim 1, wherein said means for moving said two transport arm means and said two printing cylinder lifting means is pneumatically actuated.

9. The apparatus defined in claim 1, wherein said surface region of each of said lifting means includes a portion having a shape which matches said underside of said one journal.

10. The apparatus defined in claim 9, wherein said surface region of each of said lifting means includes a recessed portion having a width which is wider than the diameter of said one journal, to thereby permit engagement of said one journal by said lifting means when said one journal is located within a zone of said recessed portion.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,789,757 Dated February 5, 1974

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It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 11 "and" should read --are--;
Column 4, line 19, a comma should be inserted
after the word "used";
Column 6, line 1, "4" should read --3--; and
Column 6, line 6, "5" should read --4--.

Signed and sealed this 8th day of October 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents