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Oltra

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[54] **TAKEOFF ASSIST APPARATUS AND ASSEMBLY**

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[52] **U.S. Cl.** ..... **271/85,** 101/232, 214/1 BB

[51] **Int. Cl.** **B65h 29/10**

[58] **Field of Search** ..... 271/85.84, 54.55, 60, 53, 271/204, 82, 58, 14; 214/1 BB, 1 BT, 8.5 C; 101/232, 126

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[57] **ABSTRACT**

A takeoff assist to facilitate removal of printed stock positioned on the bed of a printing press, having drop edge means pivotally mounted on the printing bed of the press and forming an edge portion of the stock-supporting surface of the printing bed to support a leading edge of the stock and movable relative to the bed and stock to permit the leading edge of the stock to be securely grasped. A takeoff assist assembly having drop edge means, linkage means operatively connected to the drop edge means and movable relative to the printing bed, and cam assembly means mounted on a takeoff conveyor positioned adjacent the printing press and movable in timed relationship to the movement of a stock gripping portion of the takeoff conveyor to move the linkage means and thereby pivot the drop edge means relative to the printing bed to expose the leading edge of the stock for easy and secure gripping by the gripping portion of the takeoff conveyor for removal from the printing bed.

12 Claims, 4 Drawing Figures

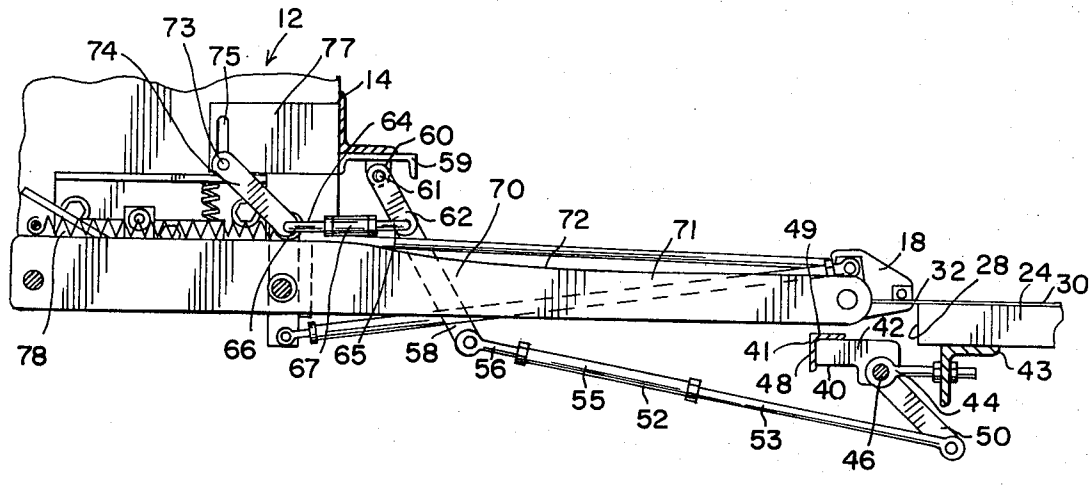

FIG. 1

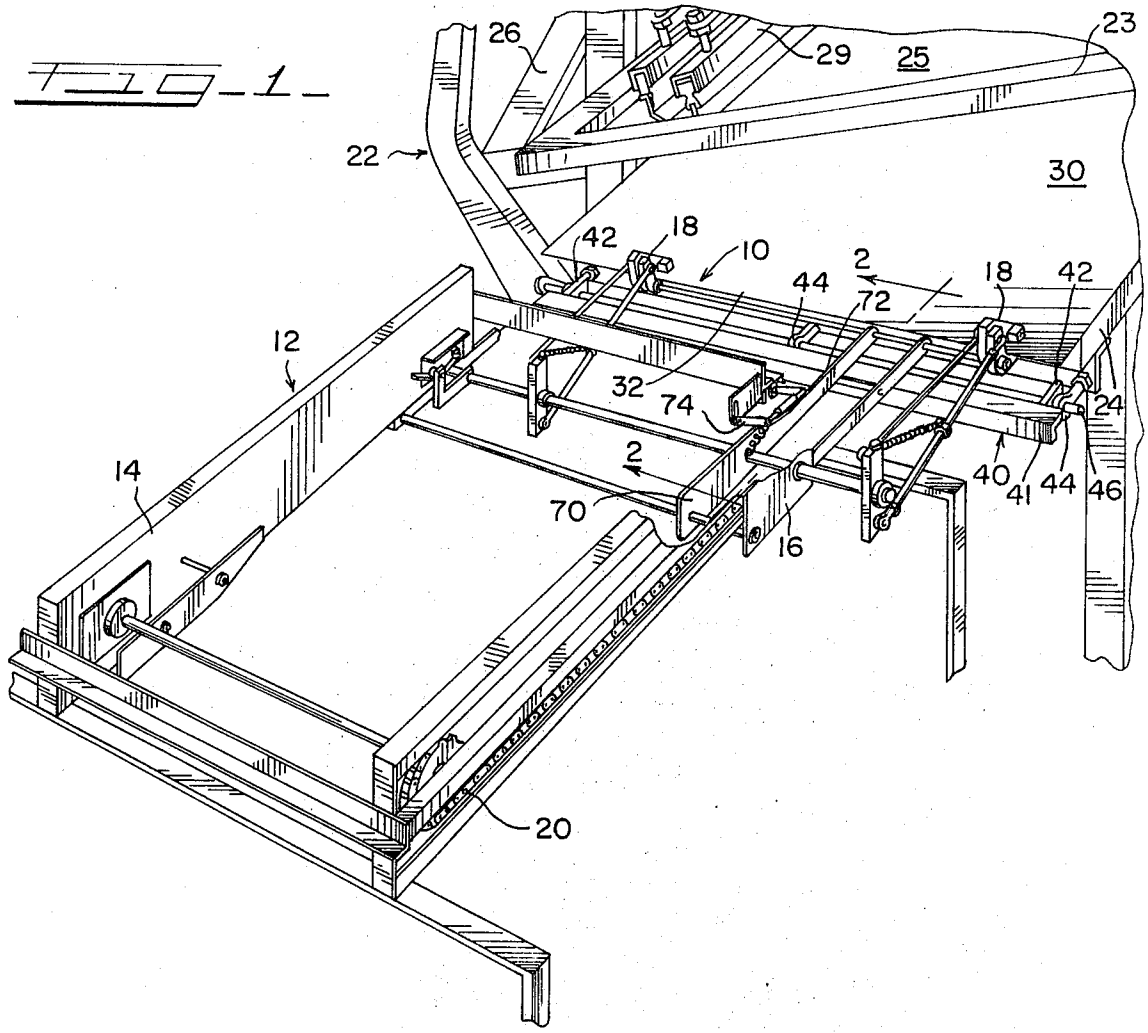
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FIG. 2

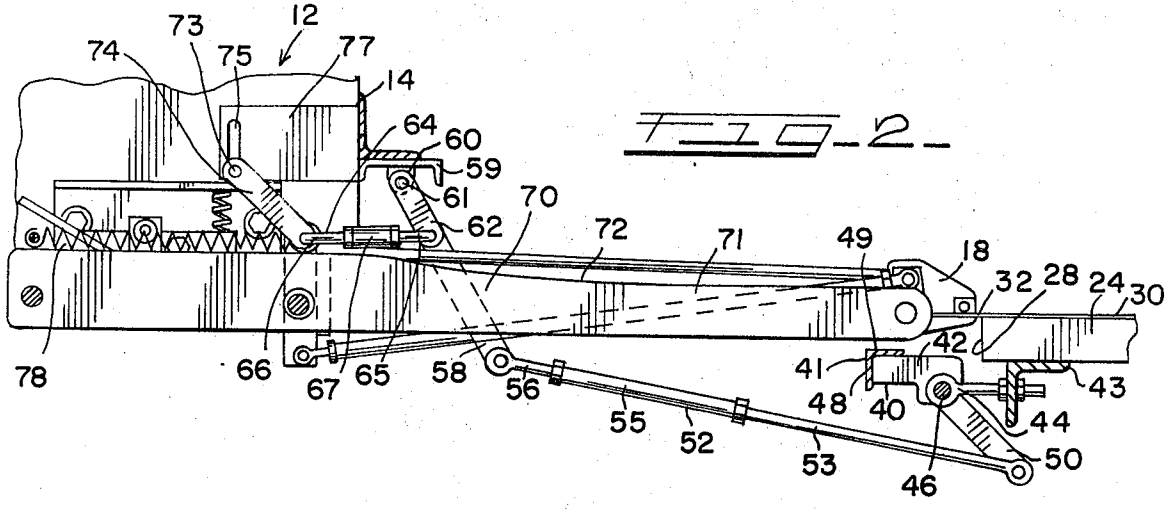
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FIG. 3

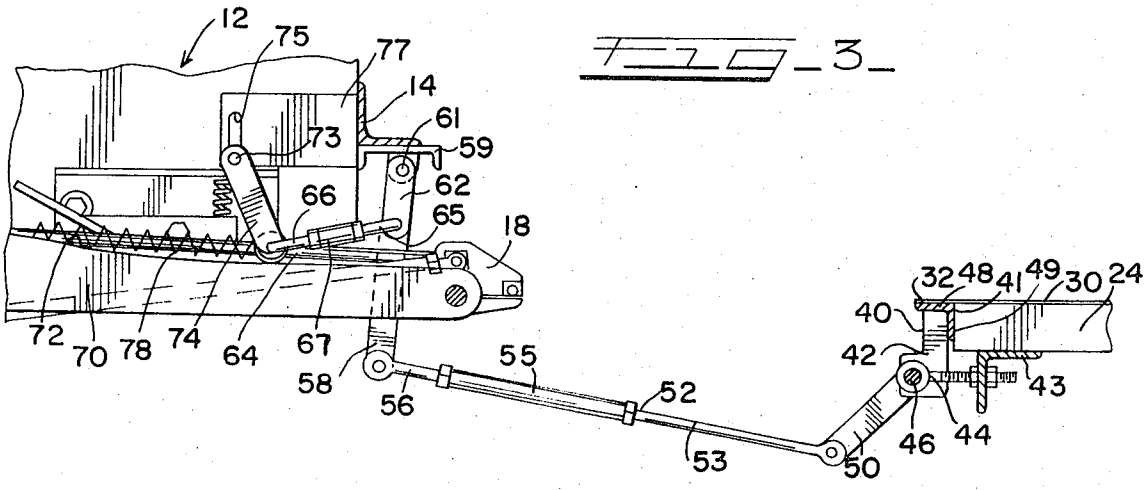
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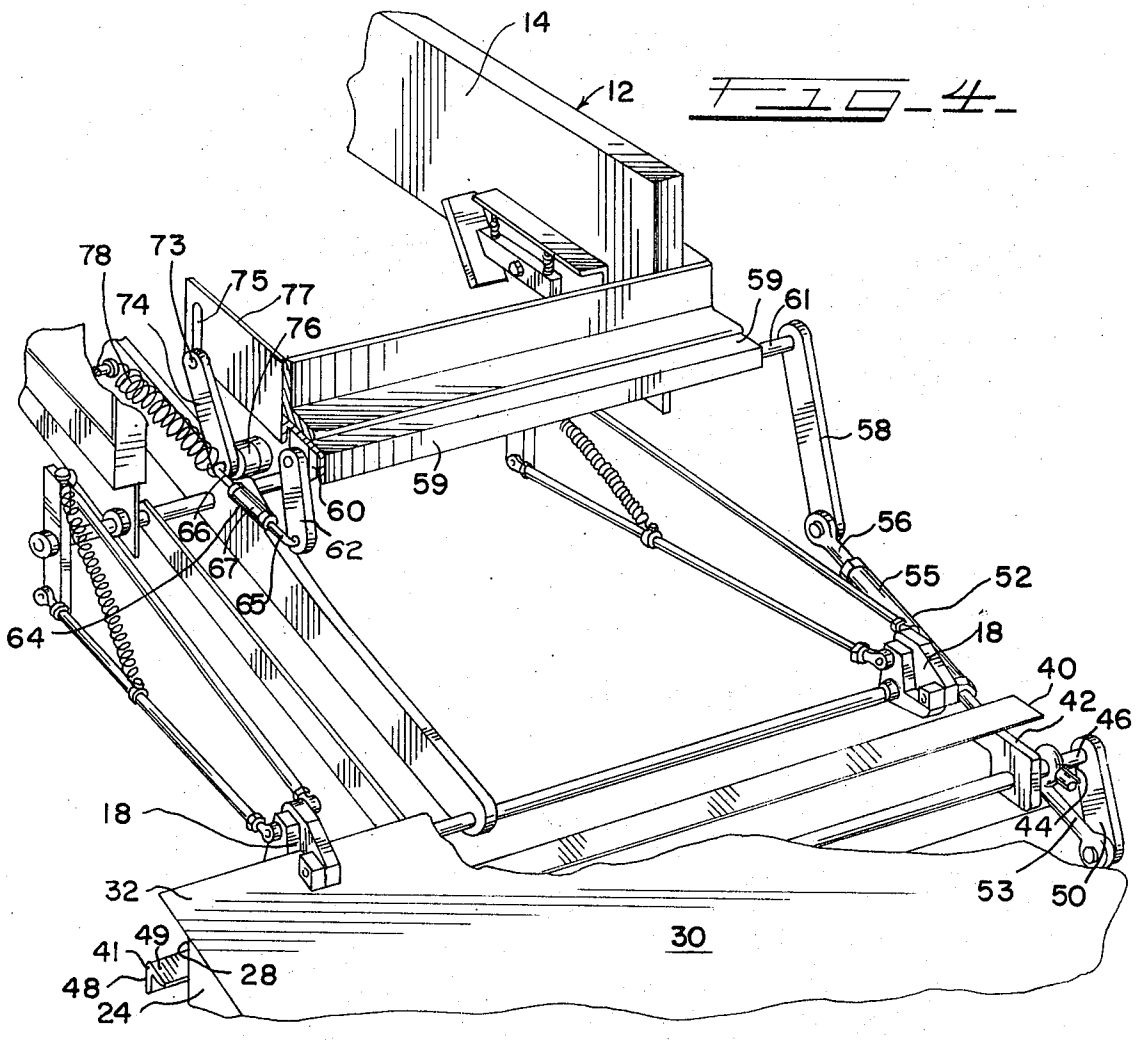
FIG. 4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TAKEOFF ASSIST APPARATUS AND ASSEMBLY

BACKGROUND OF THE INVENTION

This invention relates to means for facilitating removal of stock from a printing bed of a printing press and, in particular, to a movable takeoff assist which allows access to a leading edge of printed stock by a takeoff conveyor or other means to assure secure gripping and positive removal.

In various types of printing operations, particularly screen printing, it becomes necessary, upon completion of the printing of a piece of paper or stock, to remove this stock from the printing bed of the printing press and transfer it to another location to allow the printed stock to dry and also to permit repetition of the printing cycle on subsequent pieces of stock. For maximum efficiency, it is desirable that transfer of the stock be accomplished by an automatic means which is reliable and yet operates quickly and efficiently. Several such means, commonly known as takeoffs or takeoff conveyors, are presently known. These may either simply convey the stock from the printing bed to a second location or both remove and convey the stock from the printing bed to that location.

An improved type of this latter takeoff and conveyor is set forth in U.S. application Ser. No. 282,709 now U.S. Pat. No. 3,792,857 filed Aug. 22, 1972 and entitled "Takeoff Apparatus." The novel takeoff apparatus disclosed in that application includes a carriage assembly which is reciprocated toward and away from the printing bed of a printing press on a frame, in timed relationship to the printing of stock during a press cycle, to remove the stock from the printing bed and transfer it to a second location. The carriage assembly includes a number of gripping fingers which extend toward the printing bed and open as the assembly nears the printed stock to clamp themselves upon the stock and remove it from the printing bed.

While such a takeoff constitutes a significant improvement over prior takeoff conveyors, it has been found that the location of the printed stock itself on the printing bed, and the different weights of stock printed often present obstacles to positive gripping of the stock by the gripping fingers. In addition, the gripping fingers require access to a minimum marginal extent of the leading edge of the stock in order to assure proper gripping.

Attempts have been made to solve these problems by forming cutouts in the edge of the printing bed itself to enable the gripping fingers to move beyond the edge of the bed and better grip the stock. However, such cutouts are somewhat impractical unless originally formed as part of a printing bed, since they require much time and expense to form in beds of existing printing presses.

Moreover, despite use of such cutout areas, another problem consistently occurs when lightweight stock is being printed by a press such as a screen printing press having an upwardly movable head. When the printing head is moved rapidly upward relative to the printing bed, as is normal, the negative pressure created by the lifting of the head will cause the edge of the stock to move with the head, thereby "peeling" the stock off the bed as the head moves. The stock is thereby displaced on the bed, making removal by the gripping fingers or other takeoff means extremely difficult and unreliable.

DESCRIPTION OF THE INVENTION

The present invention relates to a takeoff assist which acts to provide access to a substantial marginal portion of the leading edge of stock or work disposed on a printing press bed to assure positive gripping of the stock by a takeoff means, and which also, in so doing, equalizes the forces above and below the leading edge of the stock to maintain the stock in position for removal and facilitate easy removal of the stock from the bed of the press.

This invention overcomes the problems of the prior art and accomplishes the above objectives by a takeoff assist or drop edge which is pivotally mounted on the printing press bed and has a relatively flat surface which, during printing of stock, forms an edge portion of the printing bed itself and supports the leading edge of the stock to be printed. While this drop edge may be manually moved during the printing cycle to achieve the objects of the invention, it is preferably linked for automatic operation by a series of levers and adjustable connecting rods to a spring-biased cam means which is pivotally mounted on the frame of a takeoff conveyor, such as that described above, to form a takeoff assist assembly. The cam means is disposed to operatively engage the upper inclined edge of a cam plate which is mounted on the carriage assembly of the takeoff and moves along the takeoff frame with this carriage assembly in timed relationship to the movement of the printing head during the printing cycle.

Thus, at the point in the printing cycle in which the printing head begins to raise from the stock that is printed so that the stock may be removed from the printing bed, the carriage assembly is activated and moves toward the printing bed, causing a roller on the cam follower to engage the surface of the cam plate. The inclined surface of the cam plate is purposely shaped so that the cam follower will be moved angularly in timed relationship to the movement of the carriage assembly and the gripping fingers. When the cam follower is angularly moved, it also moves the shaft on which it is mounted, thereby moving a lever arm disposed on the opposite end of the shaft which, in turn, through a series of adjustable connecting rods, ultimately moves a lever arm mounted on the end of the shaft or axis on which the drop edge is mounted and about which it pivots. Thus, the movement of the cam follower causes a corresponding angular movement of the drop edge. This movement, as mentioned above, is timed so that the supporting surface of the drop edge is initially moved slowly away from the printing bed, then more rapidly and then slowed again so that the edge does not strike the printing bed at its lower point of movement.

During the pivoting of the drop edge, the gripping fingers on the carriage assembly continue to move toward the printing bed. The relative movement of the carriage assembly and the drop edge are timed, through the unique structural relationship of the cam plate and the cam follower, to allow the gripping fingers to just clear the downwardly moving drop edge to grip the now unsupported printed stock and remove it. Since the drop edge begins to move from under the stock as the printing head moves upwardly, the pressures on opposite sides of the stock are equalized and the stock will not move with the head. During the subsequent removal and transfer of the stock, the cam follower,

which is urged against the cam plate by a spring connected at one end to the frame and at its opposite end to the cam follower, is moved in a reverse manner causing an opposite upward movement of the drop edge, while allowing time for the gripping fingers and stock to clear the area through which the drop edge is pivoted.

The drop edge is formed by an angle pivoted about a point located forward of its center of gravity, so that any extraordinary or excessive force exerted on the cam follower or against the drop edge will only serve to force the drop edge more tightly against the printing bed. The entire takeoff assist assembly is constructed so that if any portion of it fails for any reason, the drop edge will remain in a downward position, away from the edge of the printing bed, so that the gripping fingers will not be damaged should the operation of the press and takeoff be continued.

Accordingly, it is an object of the present invention to provide a takeoff assist apparatus which supports a leading edge of stock to be printed during printing and, alternately, is movable to provide access to the entire leading edge of the stock and equalize forces above and below this leading edge to allow easy and efficient removal of the stock from the bed of a printing press.

It is also an object of this invention to provide a takeoff assist apparatus which is strong, simple and inexpensive in construction and has no moving parts so that it is mechanically reliable in operation.

It is another object of this invention to provide a takeoff assist apparatus which may be easily and quickly incorporated into a takeoff assist assembly to allow automatic operation of the takeoff assist apparatus.

It is still another object of this invention to provide a takeoff assist assembly which is simple and inexpensive in construction, is mechanically reliable and may be used in connection with a new or existing printing press and takeoff conveyor system.

It is a further object of this invention to provide a takeoff assist assembly useful in connection with a printing system, including a printing press and a takeoff conveying means, which moves automatically, in timed relationship to the movement of the takeoff conveying means relative to the printing press, to permit easy and efficient removal of the printed stock from the bed of the printing press.

These and other objects of this invention will become evident from the following detailed description of the invention taken in conjunction with the drawings wherein:

FIG. 1 is a perspective view of the takeoff assist assembly of this invention shown mounted in a printing system which includes a screen printing press having a pivotally movable printing head and a takeoff apparatus having a reciprocating carriage assembly with gripping fingers to remove printed stock;

FIG. 2 is a fragmentary side-elevational view of the takeoff assist assembly of this invention showing the drop edge in the "down" position and the gripping fingers actually gripping the leading unsupported edge of the stock;

FIG. 3 is a fragmentary side-elevational view of the takeoff assist assembly of this invention as shown in FIG. 2, illustrating the drop edge in its upward position supporting a leading edge of the just printed stock and the gripping fingers of the takeoff apparatus in a position just beginning forward movement toward the printing bed; and,

FIG. 4 is a perspective view of the takeoff assist assembly of this invention taken in an opposite direction from FIG. 1 and showing the interior of the takeoff apparatus and the assist assembly.

Referring now to the drawings, and, in particular, to FIG. 1, the takeoff assembly of this invention is shown at 10 as mounted for timed movement with a takeoff conveyor 12 and a printing press 22. The takeoff conveyor 12 which is shown is similar to that manufactured by American Screen Printing Equipment Company and disclosed in co-pending U.S. application Ser. No. 282,709, now U.S. Pat. No. 3,792,857, filed Aug. 22, 1972 by Henry J. Bubley and Claude H. Oltra, which is incorporated by reference herein. This takeoff conveyor 12 has a frame 14, a carriage assembly 16 mounted for reciprocal movement on the frame, drive means 20 to drive the carriage assembly and gripping means 18 mounted for movement with the carriage assembly which may be actuated to grip the leading edge of a piece of stock or work. The printing press 22 shown is a screen printing press similar to those manufactured and sold by American Screen Printing Equipment Company of Chicago, Ill. under the trademark "GLIDER PRESS" and disclosed in co-pending U.S. application Ser. No. 299,689 filed Oct. 24, 1972 and Ser. No. 83,800, now U.S. Pat. No. 3,731,623 filed Oct. 26, 1970, now allowed, by Henry J. Bubley and Claude H. Oltra.

Such a printing press 22 normally includes a printing bed 24 having a generally flat top surface to support a piece of stock or work 30 to be printed. A printing head 26 is mounted on the printing press 22 for pivotal movement relative to the printing bed during a printing cycle. This printing head includes, in the embodiment shown, a frame 23, a printing screen 25 and a squeegee assembly 29. When the printing head is moved adjacent the stock 30 and printing bed 24, the squeegee assembly 29 may be moved across the screen 25 to accomplish screen printing of the stock. The printing press 22, of course, could be any printing means used to print stock which includes a reciprocal head and a support bed.

The takeoff assist apparatus of this invention includes a drop edge 40 preferably formed from an angle 41 having a top face 48 and a bed abutting face 49 and extends substantially the length of the outside edge of the printing bed 24. This drop edge 40 is mounted along its length on a series of L-shaped press mounting brackets 42. These mounting brackets 42 are, in turn, mounted at a forward portion of one of their legs on an angularly movable shaft 46 likewise extending the length of the edge of the printing bed 24. This shaft 46 is mounted for rotation relative to printing bed 24 through a plurality of spherical bearings 44 having a rearwardly extending threaded portion engaging an elongated angular mounting support 43 which is affixed to the underside of the printing bed 24 by bolting, welding or other suitable means.

A takeoff assist apparatus or drop edge 40 is thus formed which is mounted on, but pivotally movable relative to the printing bed 24 of a printing press 22 so that the generally flat top face 48 of the angle 41 forms a marginal edge portion of the surface of the printing bed 24 and actually supports a leading edge portion 32 of the stock to be printed 30. When the stock has been

printed, the drop edge **40** may be rotated forwardly and downwardly relative to the printing bed **24**, either manually or automatically, as will be explained below, to expose this leading edge portion **32** of the stock **30** to permit it to be easily grasped for removal from the printing bed **24**. When the drop edge **40** is moved in this manner, it also allows the pressure above and below the leading edge portion **32** of the stock to be equalized, thereby preventing the stock from being lifted with the printing head **26** of the printing press **22** due to the vacuum normally created between the head and the stock.

The spherical bearings **44** insure easy, nearly friction-free movement of the angle **41** and brackets **42** mounted on the shaft **46** about the central axis of the shaft **46**. The angle **41** and mounting brackets **42** are uniquely mounted relative to the central axis of the shaft **46** so that the center of gravity of angle **41** is positioned rearwardly of the central axis of shaft **46** in the up position of the drop edge. Thus, the drop edge **40** tends to self-lock into the position shown in FIG. **3**, whereby it forms an edge portion of printing bed **24**. Thus, any forces exerted on the drop edge or on the shaft **46** will, because of the forward position of the pivot point of the drop edge at shaft **46**, only serve to more securely position angle **41** adjacent the printing bed **24**.

While the takeoff assist apparatus of this invention including the drop edge means **40** may be moved manually during a printing cycle, it is usually desirable that this apparatus be used in connection with a takeoff conveying means **12** and a printing press **22** by a unique assembly which automatically moves the drop edge **40** in timed relationship to the movement of the printing head **26** during a printing cycle. This unique assembly is mechanically reliable and provides a fast, efficient and sure system of gripping and removing printed stock, permitting maximum operation of an automatic printing press.

In the construction of this assembly, shown in more detail in FIGS. **2–4**, a first lever arm **50** is mounted near an end of shaft **46** for angular movement with shaft **46**. This first lever arm is connected by a first connecting means **52** having a forward rod **53** and a rearward rod **56** which are threadedly engaged by opposite ends of an adjusting sleeve **55**. The movement of the adjusting sleeve relative to rods **53** and **56** permits adjustment in the length of first connecting means **52**, for purposes which will be explained in detail below. The opposite end of the first connecting means **52** is pivotally connected to a second rear lever arm **58**. This second rear lever arm **58** is mounted near the end of a second lever arm shaft **61** for angular movement with the shaft about its central axis. The shaft **61** is supported for angular movement on the forward end of the takeoff frame **14**, that is, the end adjacent the edge of the printing bed **24** of printing press **22**, by a mounting channel or bracket **59** joined to an angle portion of frame **14** by welding or other suitable means. A series of downwardly extending mounting eyelets **60** are attached to the underside of channel **59** and shaft **61** is inserted through the openings in these eyelets **60** for rotation about its central axis therein. The opposite or forward end of shaft **61** has second forward lever arm **62** mounted on it for angular movement about its central axis with it. The second forward lever arm **62** and second rear lever arm **58** are generally aligned in the same radial plane, as shown in FIGS. **2** and **3**, for movement in unison with shaft **61**.

The end of second forward lever arm **62**, opposite its point of mounting on shaft **61**, is pivotally connected to second connecting means **64** having a forward rod **65**, a rear rod **66** and an adjusting sleeve **67** threadedly engaging ends of forward rod **65** and rear rod **66** to permit adjustment of the length of second connecting means **64**. The opposite end of second connecting means **64** is pivotally connected to a lower end of a cam follower **74**. Mounted near this end of cam follower **74**, opposite the point of connection of the second connecting means **64**, is a roller contact **76** which preferably includes side-by-side freely rotatable rollers as shown in FIG. **4**. This roller contact **76** is mounted for free rotating movement about a short shaft or pin (not shown), projecting from the side of cam follower **74**. Cam follower **74** is mounted on frame **14** of takeoff **12** on a pin which is inserted into a generally vertical slot **75** formed in a cam mounting plate **77** fixedly mounted on the takeoff frame **14**, to permit vertical adjustment of the cam follower **74**.

The cam follower **74** is moved, during operation of the assembly, by an elongated cam plate **70** which is mounted between the forward and rearward portions of carriage assembly **16** of takeoff **12** for reciprocal movement relative to the takeoff frame **14** with the carriage assembly. Cam plate **70** is purposely formed with a forward portion **71** having a generally upwardly inclined surface **72** of a width sufficient to permit roller contacts **76** to ride along it. Cam follower **74** and roller contacts **76** are maintained in position for constant engagement with the surface **72** of cam plate **70** by a spring **78** having one end joined to the lower end of cam follower **74** and connected at its opposite end to frame **14**, thereby urging the lower end of the cam follower into engagement with the cam plate.

The unique operation of this takeoff assist assembly **10** can be better understood by explanation of its operation in a typical screen printing cycle. As shown in FIG. **3**, the stock **30** to be printed is initially positioned on the printing bed **24** of press **22**. This stock is normally positioned so that its leading edge portion **32** overlays the top face **48** of the angle **41** forming drop edge means **40**. The printing head **26** is then moved to its down position adjacent the printing bed **24** over stock **30** and the flood and printing strokes are completed, thereby printing the stock. At this point, the printing head begins to rotate upwardly off the stock to permit its removal. At the completion of the print stroke, however, the takeoff apparatus **12** has been actuated, as is more clearly explained in the above-mentioned applications and patents, so that the carriage assembly **16** begins to move toward the edge of the printing bed for removal of the stock.

Upon actuation by a timer, by the means driving the printing head or other suitable means, the carriage assembly **16** moves forward as shown in FIG. **3**, against the cam follower **74**, whose lower end supporting roller contacts **76** is urged into engagement with the inclined surface **72** of the cam plate **70** by the spring **78**. The roller contacts **76** ride along the surface **72** of the moving cam plate **70**, being moved upwardly by the upward slope of the surface **72**. Since the cam follower **74** is vertically fixed in slot **75** through pin **73** and a fastening means (not shown), the increasing slope of surface **72** acts to pivotally move the cam follower **74** in a gener-

ally counter-clockwise direction about its point of mounting.

This rotational movement of cam follower **74** is translated into linear movement through second connecting means **64** which imparts a similar rotational movement to second forward lever arm **62** and, through shaft **61**, a corresponding movement to second rearward lever arm **58**. This translated rotational movement is again transformed into linear movement through first connecting arm **52** and imparted to first lever arm **50**, causing rotational movement of lever arm **50** about the central axis of shaft **46**. Since lever arm **50** is fixedly mounted on shaft **46**, it again translates the linear movement of connecting means **52** into rotational movement of shaft **46** and the drop edge **40** mounted on it about the central axis of the shaft. Through this series of pivotally mounted levers and connecting arms, the drop edge **40** is rotated through an angular distance proportional to the angular distance through which the cam follower **74** is rotated by cam plate **70**.

The initial slope of surface **72** on cam plate **70** is not great, so that the drop edge **40** is initially moved slowly away from the edge of printing bed **24**. However, it can be seen from FIGS. **2–4** that near the mid-portion of the forward end of the cam plate, the slope increases, thereby causing the drop edge to be moved more rapidly about the central axis of shaft **46**. Near the upper end of inclined surface **72**, however, the upward slope of surface **72** again lessens so that the movement of the drop edge, as it approaches the frame of the printing press, is slowed in order that control of the angular movement of the edge may be maintained to prevent damage.

The angular movement of the drop edge **40** should begin at approximately the same time as the lifting movement of the printing head **26**. Thus, the leading edge **32** of the stock will suddenly be subjected to an equalization of forces or pressure on both its top and bottom surfaces, thereby relieving the vacuum condition which may be created between it and the stock by the rapid upward lifting of the printing head **26** alone. This allows the stock to be maintained in position on the surface of the printing bed **24** and permits the leading edge **32** of the stock to extend over the edge of printing bed for easy gripping by the grippers **18**.

When the carriage assembly **16** is moved to its forward position to permit gripping of the leading edge **32** of the stock **30** by the grippers **18**, the cam follower **74** will be in the position shown in FIG. **2**, with the drop edge **40** having just rotated downwardly and out of the path of travel of the grippers to permit the access to this leading edge. The carriage assembly will then reverse, with the cam follower **74** retracing its path of travel along inclined surface **72** of cam plate **70**, causing the drop edge to be moved slowly upwardly to permit the grippers to pass, then more rapidly, and then slowly, as it nears the edge of the printing bed, to prevent damage.

The exact shape and slope of the inclined surface **72** of cam plate **70** may be determined by simple trial and error experimentation with the assembly through a printing cycle. Surface **72** is basically a series of connected straight lines of varying slope designed to permit initially slow, then more rapid and then slow movement of the drop edge.

The adjusting sleeves **55** and **67** which form portions of first and second connecting means **52** and **64**, respectively, permit adjustment of these connecting means to adapt the drop edge assembly to various sizes or types of presses and takeoff conveying means and/or those disposed in different positions relative to one another. The length of the connecting rods and lever arms should be such that the drop edge, at the point of its greatest rotation, provides room for the gripper fingers to just clear its top portion. The spring **78** is preferably a low force spring, so that should the apparatus fail for any reason, during its operation, the drop edge means will remain in the downward position shown in FIG. **2**, since the force of the spring will not be sufficient to overcome the weight of the drop edge **40**.

The materials used in constructing the connecting means, levers and drop edge of this invention are those which are reliable and suitable for repeated use in a printing assembly such as steels and steel alloys.

It is clear that the takeoff assist assembly **10** may be used in connection with takeoff conveying apparatus and/or printing presses other than those shown in the preferred embodiment. Moreover, the takeoff assist apparatus is also useful with manual methods of removing stock from the printing bed, since it eliminates adherence of the stock to the moving printing head.

While this invention has been described in relation to a preferred embodiment thereof, it is apparent to those skilled in the art that the structure is capable of wide variation without departing from the principles of the invention.

I claim:

1. A takeoff assist assembly particularly adapted to allow a takeoff conveying means to easily grip stock positioned on a generally flat surface of a support means for printing or the like and to positively remove said stock from said surface, including drop edge pivotally mounted on a support means, and movable to a first or upward position to form an edge portion of a generally flat surface of said support means and thereby support a leading edge of stock positioned on said surface, drop edge actuating means mounted on a takeoff conveying means, and linkage means operatively connecting said actuating means and said drop edge means, movement of said takeoff conveying means causing movement of said drop edge actuating means mounted thereon to thereby pivot said drop edge means between said first position and a second, downward position in which the leading edge of said stock is exposed to facilitate gripping and removal of said stock by said takeoff conveying means.

2. The takeoff assist assembly set forth in claim **1** wherein said drop edge means has a generally flat supporting surface pivotally mounted on said support means for disposition in the same plane as the surface of said support means and along an edge of said support means to support the leading edge of the stock placed on said support means, said edge supporting surface of said drop edge means being alternately pivotal away from said edge of said support means to leave said leading edge of said stock unsupported and thereby equalize the pressure above and below this entire leading edge to eliminate mispositioning of the stock prior to removal and thereby facilitate uniform and complete removal of the stock.

3. The takeoff assist assembly of claim **1** wherein said linkage means includes first lever arm means mounted

on said support means and operatively connected to said drop edge means, said first lever arm means being pivotal relative to said support means to move said drop edge means, and second lever arm means pivotally mounted on said takeoff coneying means, said second lever arm means having one end thereof connected to said first lever arm means and the opposite end thereof connected to said actuating means for moving said linkage means and being pivotally movable thereby to move said first lever arm means and said drop edge means upon movement of said takeoff conveying means.

4. The takeoff assist assembly of claim **3** wherein said first lever arm means is connected to said second lever arm means by first connecting means of adjustable length and said second lever arm means is operatively connected to said actuating means for moving said lever arms by second connecting means of adjustable length, to allow said assist assembly to be easily adapted to takeoff conveying means and support means of various sizes and to permit fine adjustment of the relative movement of said takeoff conveying means and the movement of said drop edge means.

5. The takeoff assist assembly of claim **1** wherein said actuating means includes cam means mounted on a portion of said takeoff conveying means which is movable relative to said support means, and cam follower means pivotally mounted on a stationary portion of said takeoff conveying means, said cam means engaging said cam follower means upon movement of said movable portion of said takeoff conveying means with respect to said stationary portion, said cam follower means being adjustably connected to said linkage means to move said linkage means in adjustable timed relationship to the movement of said cam means and said movable portion of said takeoff conveying means relative to said stationary portion of said takeoff conveying means and said support means to thereby pivot said drop edge means relative to said support means and out of the path of travel of said movable portion of said takeoff conveying means.

6. The takeoff assist assembly of claim **5** wherein said cam follower means is urged by resilient means into engagement with said cam means, said cam follower means being pivotally mountd in slot means disposed on said stationary portion of said takeoff conveying means for vertical adjustment with respect to said cam follower means.

7. The takeoff assist assembly of claim **5** wherein said cam means includes an elongated cam plate mounted on said movable portion of said takeoff conveying means for movement therewith, said cam plate having a generally upwardly inclined surface along which said cam follower rides, said slope of said inclined surface being such that said cam follower is pivoted with respect to said stationary portion of said takeoff conveying means as it moves along said inclined surface to move said linkage means and thereby cause said drop edge means to move in a generally harmonic manner relative to said supporting surface.

8. An improvement in a takeoff apparatus adapted to move stock by movable transfer means from a generally flat surface of a first support location and transfer the stock to a second support location, including drop edge means pivotally mounted on a first support location such that a portion of said drop edge means forms an edge portion of a generally flat surface of said first support location and acts to support a leading edge of the stock, first lever means mounted on said first support location and operatively connected to said drop edge means, said first lever means pivotal relative to said first support location to move said drop edge means with respect thereto, second lever means pivotally mounted on a takeoff apparatus, said second lever means operatively connected to said first lever means, and actuating means on said takeoff operated by the movement of said transfer means on said takeoff apparatus to move said second lever means and thereby move said first lever means and pivot said drop edge means relative to said flat surface of said first support location to allow said transfer means access to the leading edge of the stock supported thereon to facilitate removal of the stock from said first support location, said drop edge means being returnable to its original supporting position by subsequent movement of said actuating means to move said second lever means upon movement of said transfer means.

9. The improvement set forth in claim **8** wherein said transfer means is a carriage assembly which is movable toward and away from said first support location on a frame of said takeoff apparatus and has, at its forward end, a plurality of gripping fingers to grip and hold the stock during transfer, and said actuating means to move said second lever means includes cam means mounted on said carriage assembly for movement therewith and cam follower means mounted on said frame, said cam means engaging said cam follower means during movement of said transfer means along said frame of said takeoff apparatus, said cam follower means being connected to said second lever means by second adjustable connecting means allowing fine adjustment of the operation of said drop edge means and thereby moving said second lever means, said second lever means being connected to said first lever means by first adjustable connecting means, said second lever means thereby moving said first lever means in timed relationship to the movement of said carriage assembly on said takeoff apparatus relative to said first support location to pivot said drop edge means relative to said first support location out of the line of linear motion of said gripping fingers to allow said gripping fingers unobstructed access to an unsupported leading edge of the stock to grip the stock for transfer to said second location.

10. The improvement set forth in claim **9** wherein said cam means includes an elongated cam plate mounted on said carriage assembly for movement therewith along said frame of said takeoff apparatus, said cam plate having a generally upwardly inclined surface which said cam follower means engages and rides along, said slope of said inclined surface being such that cam follower means will be pivoted with respect to said frame as it moves along said inclined surface to move said first and second lever means and thereby cause said drop edge means to move in a generally harmonic manner relative to said first support location.

11. A takeoff assist apparatus particularly adpated to facilitate access to stock positioned on a surface of a support means for printing or the like to permit positive removal of said stock from said surface of said support means, including drop edge means mounted on a support means, a portion of said drop edge means forming an edge portion of a surface of said support means to

support a leading edge portion of stock positioned thereon, said drop edge means being alternately movable relative to said surface of said support means and said stock in timed relationship to the movement of a takeoff conveying means relative to said support surface to expose the leading edge portion of said stock thereby equalizing the forces acting on opposite sides of said leading edge portion to allow said takeoff conveying means to be brought adjacent said leading edge of said stock to grip said leading edge securely and thereby remove said stock from said surface for transfer to another location, said takeoff conveying means and said drop edge means being operatively connected to one another by linkage means actuated upon movement of said takeoff conveying means toward and away from said support means to cause pivotal movement of said drop edge means.

12. In a takeoff conveying system particularly adapted for removing stock positioned on a generally flat surface of a support means for printing or the like and transferring said stock to a second location, having a takeoff apparatus to grip said stock and positively remove it from said surface of said support means, said takeoff apparatus including frame means, drive means mounted on said frame means, gripper assembly means mounted on said frame means for movement therealong, gripper actuating cam means mounted on said frame means and disposed for interaction with said gripper assembly means, drive arm means having one end attached to said gripper assembly means and an opposite end attached to said drive means, said drive means thereby driving said gripper assembly means reciprocally along said frame means, the geometrical relationship of said drive arm means and said drive means being effective to cause suspension of the movement of said gripper assembly means adjacent said support means a sufficient amount of time to allow said gripper assembly means to properly grip the stock positioned on the surface of said support means, the improvement comprising a takeoff assist assembly adapted to facilitate access of said gripper assembly means to a leading edge portion of stock positioned on support means and including drop edge means mounted on said support means, a portion of said drop edge means forming an edge portion of a generally flat surface of said support means to support the leading edge portion of said stock, said drop edge means being alternately movable relative to said surface of said support means and said stock upon movement of a gripper assembly means relative to a takeoff apparatus frame to expose the leading edge portion of said stock thereby equalizing the forces acting on opposite sides of said leading edge portion and permitting said leading edge portion to be securely gripped by said gripper assembly means to allow removal of said stock from said surface by said takeoff apparatus, said gripper assembly and said drop edge means being operatively connected to one another by linkage means actuated by movement of said gripper assembly relative to said takeoff apparatus to move said drop edge means.

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