

March 17, 1964

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3,125,336

MOVABLE VACUUM PLATEN FOR REPRODUCING APPARATUS

Filed June 9, 1961

3 Sheets-Sheet 1

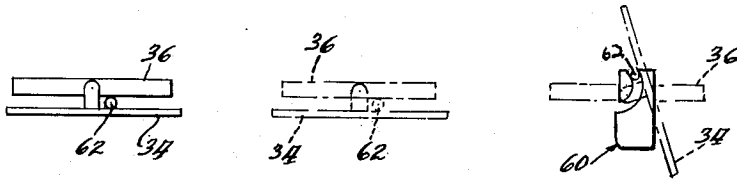
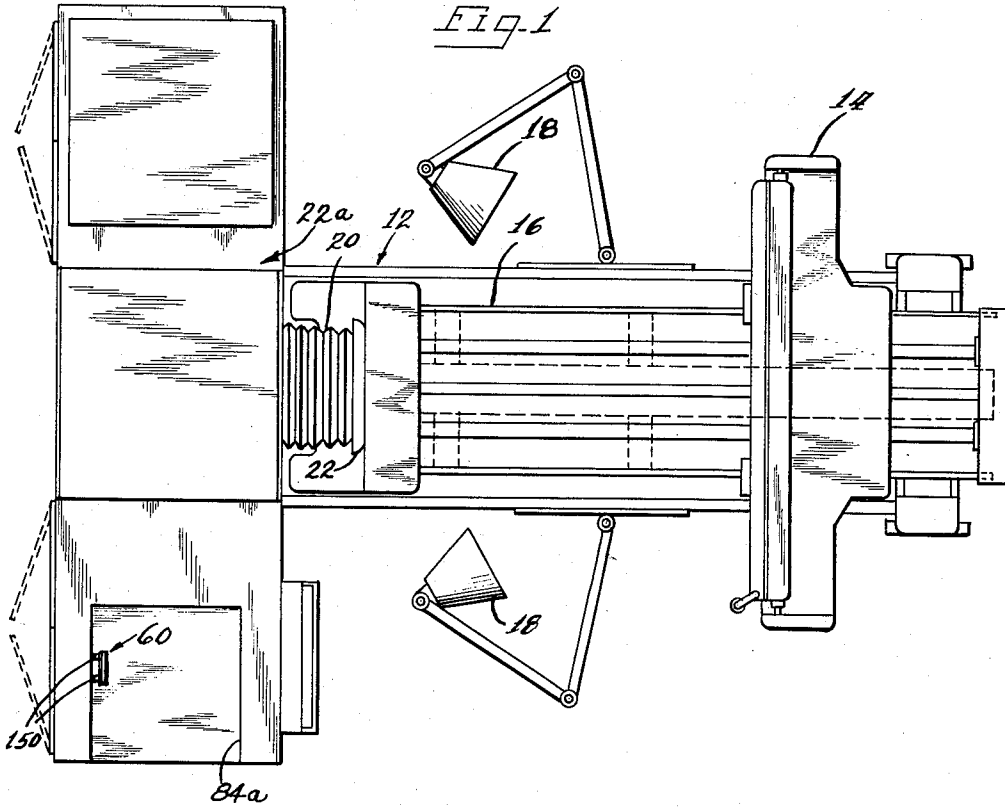


Fig. 4

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3 Sheets-Sheet 2

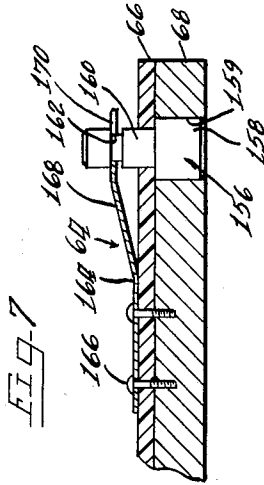
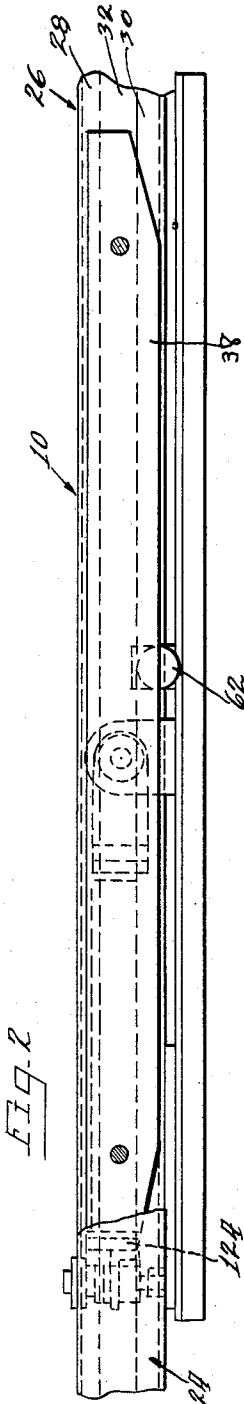


FIG. 6

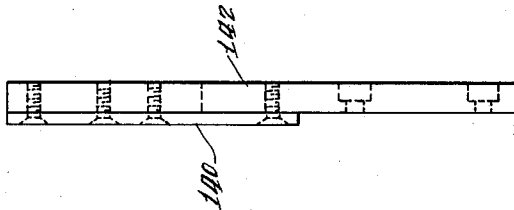
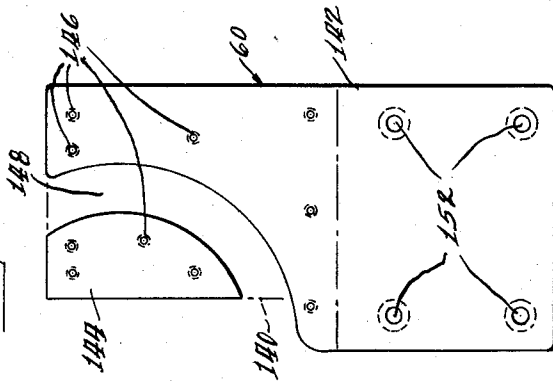


FIG. 5



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Filed June 9, 1961

3 Sheets-Sheet 3

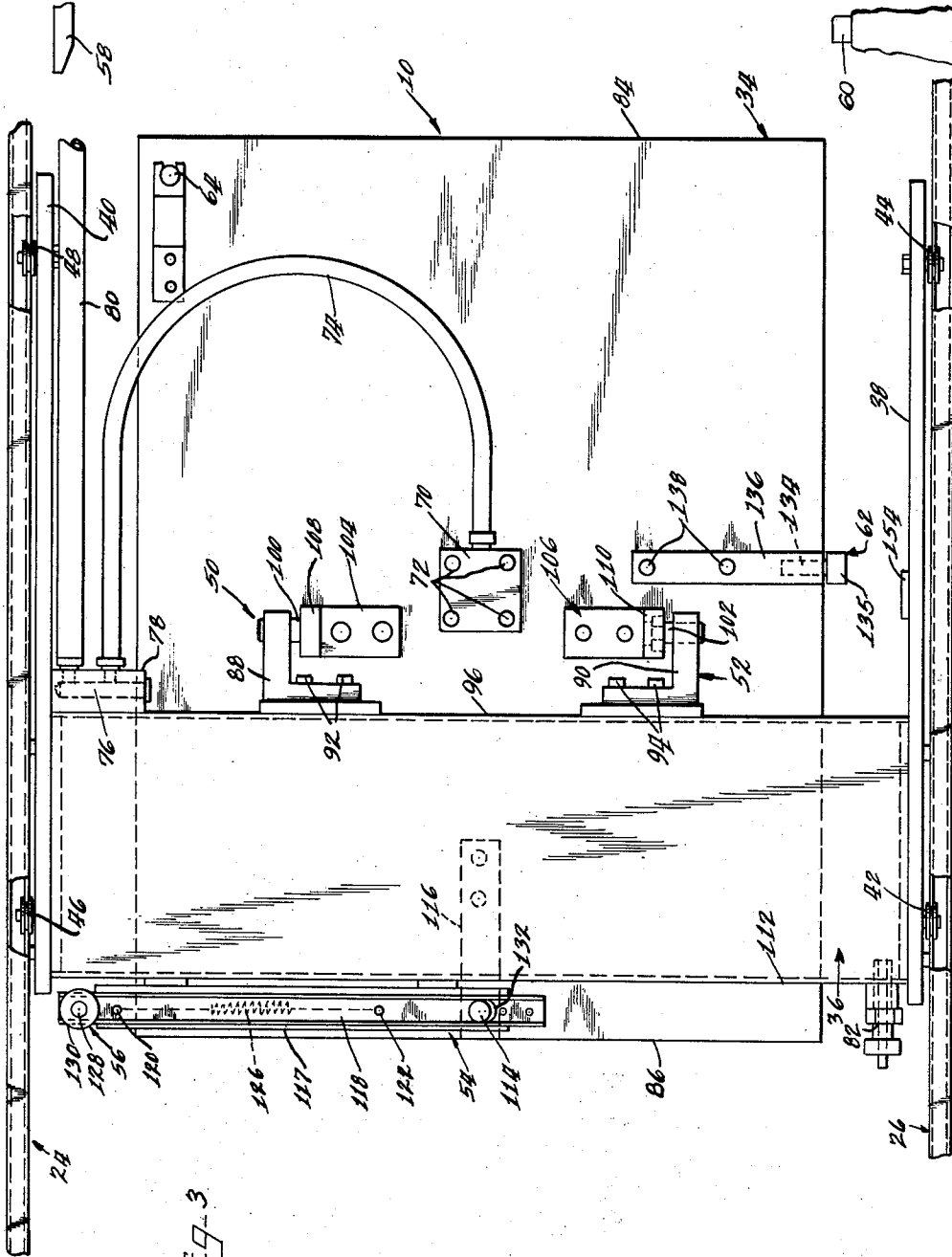


FIG. 3

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3,125,336
**MOVABLE VACUUM PLATEN FOR
 REPRODUCING APPARATUS**

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 Filed June 9, 1961, Ser. No. 116,061
 13 Claims. (Cl. 271-3)

This invention relates to apparatus for transporting materials such as sensitized photographic papers or the like through an operational cycle, and more particularly to a movable vacuum platen which may be used with reproducing equipment or the like and which is cammed from an operating and travel position to a take-off position automatically.

Although vacuum platen means for transporting paper materials and the like are utilized in numerous processing applications, the materials carried by the platen are often relatively inaccessible after the processing or other cycle has been completed, with consequent losses in production time and increases in labor costs. The present invention provides a movable vacuum platen apparatus which resolves this problem by automatically camming the platen into a position where articles carried thereby may readily be removed. Further to this end, the invention provides a spring mounted button which may be pressed at the terminal position of travel of the platen, in order to eliminate the difficulties previously inherent in the removal of thin articles carried by a platen.

The apparatus of the present invention is generally characterized by a carriage which is movable along a track and which carries a vacuum backing plate or platen in pivotal relation thereto. During the major portion of its travel, the platen is locked into predetermined, preferably parallel relationship with the carriage but is releasable from such locked position by cam means so that a roller or the like carried on the platen may enter a cam track to tilt the platen into a changed position for affording ready removal of a sheet form article carried by the backing plate or platen. A corner of the sheet form article may be urged outwardly from the platen by spring mounted button means so that the article may be readily grasped and stripped from the platen.

Accordingly, it is an object of the present invention to provide a movable platen for use with reproducing apparatus or the like which is automatically moved from a transport position to a take-off position at the terminal portions of its movement.

Another object of the invention is to provide a device as described which is guided throughout its travel by carriage means movable along a linear path so as to place the platen in operative relation with cam means changing the position of the platen.

Another object of the invention is to provide a device as described having means for lifting at least a marginal area of a sheet of paper or other sheet form article carried by the platen outwardly of the platen so that stripping may be accomplished with greater facility than heretofore has been possible.

Other objects and advantages of the invention will become apparent as the description proceeds in accordance with the drawings in which:

FIGURE 1 is a top plan view of reproducing apparatus with which the movable platen of the invention may be utilized;

FIGURE 2 is a side-elevational view, partly in vertical section and partly broken away, of the movable platen and carriage of the invention in operative association with track means therefor;

FIGURE 3 is a top plan view of the movable platen, carriage and track means;

FIGURE 4 is a schematic representation of the platen and carriage, representing the movement of the platen into tilted position;

FIGURE 5 is a front-elevational view of cam means for tilting the platen;

FIGURE 6 is a side elevational view of the cam means shown in FIGURE 5;

FIGURE 7 is an enlarged sectional view, partly broken away, of the platen and spring mounted button means for initiating stripping of a piece of paper or the like therefrom.

Referring now to the drawings, a movable vacuum platen assembly 10 is shown in FIGURES 2 and 3 which may be utilized in reproducing apparatus such as a camera processor illustrated in FIGURES 1 and indicated generally by reference numeral 12. In the embodiment shown, the apparatus 12 has a copyboard 14 movable on a track 16 and illuminated by lights 18 for positioning an object or subject to be reproduced in alignment with the lens system of a camera structure 20. The camera structure 20 includes a shutter mechanism 22 which may be of any suitable type for focusing on the sensitized paper or other material an image of the object or subject carried by the copyboard as understood by those skilled in the art.

The device is illustrated in connection with a so-called reflex camera wherein the image is focused in a plane offset angularly relative to the plane of the copyboard to effect a reaction in sensitized sheet form articles or materials carried by the movable platen assembly 10. For this purpose, parallel tracks 24 and 26 are mounted on opposite sides of the housing for the carrying mechanism 22a, or otherwise suitably supported in horizontal spaced apart relationship, the tracks being preferably of a cross-sectionally U-shaped configuration and having upper and lower flanges such as the flanges 28 and 30 formed integrally therewith and in laterally spaced relation to a back wall 32 for the said tracks.

The vacuum platen assembly 10 also includes a vacuum platen 34, a carriage 36, support bars 38 and 40 on the carriage 36 and wheels 42 and 44, and 46 and 48, recessed to track within track flanges such as the flanges 28 and 30.

The vacuum platen 34 is pivotally mounted on the carriage 36 by hinge means 50 and 52, as hereinafter further described, and is normally maintained in a predetermined preferably parallel relationship to the carriage 36 by locking means 54. The locking means 54 includes a follower cam or the like 56 for camming connection with a cam 58, mounted on the mechanism 22a in position to unlock the locking means 54 and release the vacuum platen 34 for pivotal movement. In order to effect controlled pivoting thereof, the platen 34 is guided by a cam structure 60 on the housing for the mechanism 22a which is configured to receive a follower roller or the like 62 carried in laterally extending position on the vacuum platen 34. The vacuum platen also carries spring-biased release mechanism 64 for initiating release of paper or other material carried by the platen on the undersurface thereof, after the platen has been tilted by the cam plate 60, as hereinafter further described.

The vacuum platen 34 includes a backing plate 66, as seen in FIGURE 7, and an applicator plate 68 as also seen in FIGURE 7 and which may be honeycombed with passages communicating with suitably arranged openings in the face thereof, and with a source of vacuum which may be introduced through a fitting 70 secured to the plate 66 by bolts 72, by means of a flexible conduit 74 connected to a passage 76 in a shoulder 78 on the carriage 36, and thence with a flexible conduit 80 leading

to the source of vacuum such as the usual pump provided for that purpose.

In the operation of the device, the vacuum platen assembly 10 is moved back and forth along the tracks 24 and 26 by an actuating mechanism connected to an extension 82 on the carriage 36. For example, the vacuum platen assembly may be reciprocated from a storage or supply position at the back of the mechanism 22a which is shown at the top of FIGURE 1 and where a sheet form article from a stocked supply is vacuum biased against the platen surface to an exposure position in register or alignment with the lens system of the camera and to a delivery position at the front of the mechanism 22a as represented by the release opening 84a, in successive cycles. Thus, a supply of sensitized material such as stacked sensitized paper may be disposed into position for take-up at the rear of the mechanism 22a and suitably placed in contact with the undersurface of the vacuum platen 34 at the initial phase of the cycle of the platen.

An article carried by the platen may thus be passed to an exposure position relative to the camera 20, in accordance with a presettable control cycle, and thence forwardly to the release opening represented by numeral 84a.

In accordance with this invention, the cam member 58 will cam the element 56 to release the lock 54, so that the platen 34 may pivot about the hinge members 50 and 52.

The cam structure 60 is positioned to engage the cam element 62 upon the release of the platen 34 from its locked position, thereby to guide the member 62 and the platen in an upwardly arcuate path determined in accordance with the relative position of the hinge members 50 and 52, as hereinafter further described, and ultimately to dispose the platen at a position which may be displaced through a 100° angle, for example, from its initial horizontal position. In this tilted position, as illustrated schematically at the right-hand side of FIGURE 4, ready access to the sheet material carried by the platen is afforded, and this sheet material may be stripped off easily.

As seen in FIGURES 2 and 3, the hinges 50 and 52 carry the vacuum platen 34 intermediately of its front and rear ends 84 and 86, respectively, and include journal brackets 88 and 90 of an L-shaped configuration, secured by bolt means 92 and 94 to the front edge 96 of the carriage 36. Trunnions 100 and 102 for the journal brackets 88 and 90 are carried by L-shaped brackets 104 and 106 secured to the upper face of the vacuum platen 34 so that the vacuum platen is pivotal about a transverse axis intermediate the edges 84 and 86. The brackets 104 and 106 include upstanding lugs 108 and 110 such that the vacuum platen 34 is spaced vertically a predetermined distance from the carriage 36, in the locked position thereof shown.

In providing a releasable latching connection, the vacuum platen 34 preferably extends rearwardly so that its rear edge 86 is spaced in back of the rear edge 112 of the carriage 36 and a latch or locking pin 114 is mounted vertically in a mounting bar or the like 116 secured longitudinally to the vacuum platen 34. The latching pin 114 thus forms a part of the latching means 54. The latching means 54 further includes a transversely extending angle bracket 117 on the carriage 36 and a latch plate 118 mounted for limited axial movement thereabove by pin and slot means such as the pins 120 and 122. The pin 120, for example, may be secured to the angle plate 117 and slidably receivable in an axially somewhat elongated slot in the latch plate 118. Likewise, the pin 122 may be mounted dependingly from the latch plate 118 and slidably receivable in an axially somewhat elongated slot in the angle plate 117. Thus recessed portions of the pins 120 and 122 serve to guide the latch plate 118 relative to the angle plate 117, which may be welded or

otherwise fixedly secured to an end flange or the like 124 on the carriage 36.

The latch plate 118 is biased laterally outwardly of the carriage 36 to present the camming element 56 on the outer end thereof in position to engage the cam structure 58 and for this purpose a tension spring 126 extends between the pins 120 and 122, along the upper surface of the latch plate 118 in the example shown, the latch plate having upstanding side side flanges to form a receptacle for the spring. The camming element 56 includes an upstanding pin 128 on the outer end of the latch plate 118 and a roller 130 journalled on the pin, the pin 128 preferably having a relatively wide base to support the roller 130. It will, of course, be understood that other constructions for the camming means 56 may be utilized within the scope of the present invention.

The latch pin 114 is normally held in locked relationship by the latch plate 118, as urged by the spring 126, and to this end the latch plate defines an elongated slot or latching aperture such as the slot 132 at the end thereof opposite the camming means 56. The angle plate 117 is cut out to freely receive the pin 114 therethrough while the upper end of the pin 114 is widened to overlie the portions of the latch plate forming the slot 132, so that as the latch plate is urged outwardly as described, a secure engagement between the pin 114 and the latch plate will be afforded. However, the slot or cutout portion 132 is configured to release the pin 114 when the latch plate is moved inwardly laterally, and to permit the pin 114 to move downwardly therethrough and through the angle plate 117 to a release position.

Release of the latching action thus described is occasioned by the camming means 56 as it contacts the cam structure 58 during the forward travel of the assembly 10, and this action takes place immediately prior to the entry of the cam element 62 into the cam 60.

The cam element 62 includes a head 135 having a stem or the like 134 journalled or otherwise secured in a support member 136 mounted by bolt means or the like 138 transversely on the upper surface of the vacuum platen 34. It will also be appreciated that variation in the construction of the camming element 62 is encompassed within the scope of the invention.

The cam structure 60 may include a backing plate 140 to which are attached complementary plates 142 and 144, by screw means 146 or the like. The plates 142 and 144 together define an arcuate path 148, having a curvature determined by the spacing of the camming element 62 from the axis of the hinge means 50 and 52, it being noted that in a preferred form of the invention the camming element 62 is proximate to the axis of the hinges 50 and 52. Thus, the cam head 132 enters the track 148 upon unlatching of the latch 54 by means of the camming element 56, as described, and the track 148 guides the head 132 upwardly as the forward movement of the carriage 36 is continued along the linear tracks 24 and 26. This continued forward movement thus effects a tilting of the released vacuum platen 34 about the axis formed by the pivots 50 and 52, which, in the example shown, is counterclockwise.

The camming structure 60 is preferably supported on posts such as the four posts 150 shown in FIGURE 1, in outwardly spaced relation to the sidewalls of the recessed area 84, thereby to dispose the track 148 in the plane of the movement of the head 132. The supports 150 may be secured in recesses 152 in the plate means 142. This spaced relationship, of course, depends upon the relative width of the platen 34 and the position of the cam element 62, and may be varied to meet particular conditions, the width of the platen 34 being substantially less than the width of the carriage 36. The carriage 36 may travel forwardly until engaged by limit means or the like, such as the depending abutment member 154 or the like on the bar 38 which may be located to contact an abutment shoulder on the mechanism 22a (not shown) or

other means to terminate the movement of the carriage as understood by those skilled in the art. When the head 132 of cam 62 moves upwardly in the track 148, the platen 34 is rotated from a horizontal position to a position which is preferably 100° counterclockwise therefrom, as stated, so that the normally lower surface of the platen is exposed within the recess 84a. In this position manual access to the underside of the platen 34 is readily afforded, as stated, and in order to strip the material carried by the undersurface of the platen from the platen, the release means 64 may be utilized.

The release means 64 includes a button 156 which may have an enlarged head 158 slidably received in a complementary aperture 159 extending perpendicularly through the bottom plate 68 of the platen 34, a reduced stem portion 160 extending axially from the head 158 and received in a complementary opening in the upper backing plate 66 of the vacuum platen, and an annular recess 162 in the stem 160 intermediate the ends of the stem. A relatively elongated spring member 164 is secured by fastening means 166 to the vacuum platen 34 along the upper surface of the backing plate 66. The spring member 164 is angled outwardly at 168 and forwardly at 170, to engage the stem 160 at the recess portion 162 thereof, by means of a bifurcated construction at the end 170 of the spring member. Thus, the spring member 164 urges the button 156 upwardly so that the relatively wide head 158 of the button engages the backing plate 66 as a stop. However, at the described terminal position of the vacuum platen 34 wherein the platen has its lower surface exposed as described, the button may be actuated by manually pressing the exposed end of the stem 160, thereby to move the head 158 outwardly of the plate and to lift a corner of a sheet of sensitized material from the platen so that the corner may be readily grasped and the sheet stripped from the platen.

There has thus been provided a movable vacuum platen which is automatically positionable in operative relation to treatment means and the like and in tilted take-off position in accordance with the progression of the platen through an operating cycle. The latching and unlatching of the platen relative to the carriage therefor is exceptionally reliable and simple, and is also automatically effected so that the platen is released in synchronized relation to its approach to the terminal position thereof and to coating track means for tilting the platen despite continued linear movement of the carriage and as a result of such movement. And because of the ready stripping action afforded by the take-off button of the invention, the removal of a sheet may be performed with a minimum of difficulty, it being noted that the operation as a whole is virtually automatic. Accordingly, the system of the invention may be used in a wide range of operations in addition to the reproduction process with which it has been exemplified.

Although I have herein set forth and described my invention with respect to certain specific principles and details thereof, it will be understood by those skilled in the art that these may be varied without departing from the spirit and scope of the invention as set forth in the hereunto appended claims.

I claim as my invention:

1. In a reproducing apparatus having a processing mechanism with a housing, a system for processing sheet material or the like, a carriage, track means guiding said carriage along a predetermined straight path, a sheet carrying member, means pivotally supporting said sheet carrying member for pivotal movement about an axis perpendicular to the path, latch means releasably securing said sheet carrying member in predetermined angular relation to said carriage, cam means releasing said latch means at a predetermined point in said path, a laterally extending cam element on said sheet carrying member disposed in predetermined spaced relation to said pivotal axis and a cam structure positioned to engage said cam

element upon release of said latch means, said cam structure including a backing plate, means supporting said backing plate, a pair of cam plates secured to said backing plate and defining a cam track, said cam track opening to engage the cam element upon the release of said latch means and being disposed in a plane perpendicular to the carriage and configured to pivot the sheet carrying member during further progress of the carriage along the path, said housing having a vertical wall adjacent one end of the path and said cam backing plate being supported by post means extending perpendicularly from said vertical wall.

2. In a system for transporting sheet material and the like, a carriage, track means guiding said carriage along a predetermined path, a sheet carrying member, means pivotally mounting said sheet carrying member on said carriage, latch means releasably securing said sheet carrying member in predetermined angular relation to said carriage, said latch means including an upstanding post on said sheet carrying member, a guide plate forming an opening releasably receiving said post, a latch plate slidably mounted on said guide plate and defining a lock opening releasably receiving said post, means urging said latch plate to locking relationship with said post, said post and said lock opening being configured to maintain said post and said sheet carrying member in predetermined angular relation to said carriage during the locking engagement of said latch plate with said post, a cam element carried on said latch plate and means for camming said cam element toward said post to open said latch plate and said lock opening to release said post for movement from said lock opening and said opening in said guide plate whereby said sheet carrying member may pivot relative to said carriage.

3. In a system for transporting sheet material and the like, a carriage, track means guiding said carriage along a predetermined path, a sheet carrying member, means pivotally mounting said sheet carrying member on said carriage, latch means releasably securing said sheet carrying member in predetermined angular relation to said carriage, said latch means including an upstanding post on said sheet carrying member, a guide plate forming an opening releasably receiving said post, a latch plate slidably mounted on said guide plate and defining a lock opening releasably receiving said post, means urging said latch plate to locking relationship with said post, said post and said lock opening being configured to maintain said post and said sheet carrying member in predetermined angular relation to said carriage during the locking engagement of said latch plate with said post and a cam element carried on said latch plate, said cam element being movable toward said post to release said post for movement from said lock opening and said opening in said guide plate whereby said sheet carrying member may pivot relative to said carriage.

4. In a sheet carrying member having a first surface for transporting a sheet member spread thereover and a second surface spaced from said first surface, release means comprising an elongated spring element connected to said second surface and extending outwardly therefrom at an acute angle thereto, a button member having a stem secured to a free end of said spring member and a head with a face normally adjacent the first surface of said sheet carrying member, said sheet carrying member having an opening for said head and an opening for said stem, and forming a shoulder between said openings, said spring member urging said head against said shoulder, said button member being manually actuatable by said stem to move said head outwardly from said shoulder and outwardly of said first surface to displace a portion of a sheet member carried by said sheet carrying member outwardly of said first surface of said sheet carrying member to permit ready grasping of the sheet member for stripping the sheet from said sheet carrying member.

5. In a vacuum platen for carrying sheet material and

the like and having a vacuum plate and a backing plate secured to said vacuum plate, said vacuum plate having a lower surface for retaining a sheet of material for transport or the like by application of a vacuum thereto, means for supplying a vacuum to said vacuum plate, an elongated spring mounted on said backing plate, said vacuum plate defining a relatively wide opening there-through on said backing plate defining a relatively narrow opening therethrough communicating with said relatively wide opening and forming a shoulder in back of said relatively wide opening, and a button having a stem secured by a free end of said elongated spring member and extending through said narrow opening and a head disposed in said relatively wide opening and urged by said spring member against said shoulder, said head having a surface normally disposed by said spring and said shoulder in substantially flush relationship with the lower surface of said vacuum plate, said button being manually movable to axially displace said head outwardly of said opening in said vacuum plate to displace a sheet of material on said vacuum plate outwardly thereof whereby the sheet may be readily grasped and stripped from the vacuum plate.

6. In a processing apparatus having a housing with up-standing side walls, an elongated track extending along each of said side walls, each of said tracks being parallel for their entire length and including a back wall, inwardly extending upper and lower walls and upper and lower flanges parallel to the back wall and defining longitudinally extending openings therebetween, a carriage, a pair of wheels secured to each side of said carriage peripherally recessed to engage in the adjacent tracks with the flanges of the track received in said recesses, a sheet carrying member, pivot means pivotally connecting the sheet carrying member to said carriage, latch means releasably connecting said sheet carrying member in predetermined angular relation to said carriage, cam means in said housing camming said latch means to release the sheet carrying member at a predetermined point of movement of said carriage along said tracks, a cam element extending from said sheet carrying member in predetermined spaced relation to said means pivotally supporting said sheet carrying member and a cam track secured in said housing in position to engage said cam element upon release of said latch means, and configured to co-act with said cam element to tilt the sheet carrying member about said pivot means to a desired take-off position.

7. A sheet transport device comprising a relatively wide carriage, a pair of parallel tracks, means supporting said tracks, a pair of wheels on each side of said carriage received in an adjacent track, a vacuum platen, means pivotally supporting said vacuum platen in depending relation from a front edge of said carriage, said vacuum platen being of substantially greater length than said carriage axially of said tracks and said means pivotally supporting said vacuum platen being connected to said vacuum platen intermediate the ends of said vacuum platen, latch means at the rear of said carriage, said vacuum platen extending rearwardly from beneath said carriage and being releasably retained in substantially parallel relation to said carriage by said latch means, cam means for releasing said latch means at a predetermined point of travel of said carriage along said tracks and cam means for pivoting said vacuum platen upon release of said latch means by continued travel of said carriage along said tracks.

8. In a graphic arts reproducing machine having an optical system for projecting an image on a focal plane, means for transporting a sheet form copy media through an operational cycle including an exposure step and com-

prising, a carriage, track means guiding said carriage through a predetermined path including an exposure station, a member for carrying said sheet form copy media, means pivotally securing said member to said carriage to carry the copy media in the plane of movement of the carriage, said carriage positioning said copy media in the focal plane of the optical system at the exposure station, latch means releasably latching said member in predetermined relationship to said carriage after said exposure step, cam means for releasing said latch means by travel of said carriage along said track means, and cam means for tilting said member relative to said carriage by further movement of said carriage after said release of said latch means to facilitate removal of the exposed copy media.

9. In a graphic arts reproducing machine as defined in claim 8, manually operable release means carried by said member and operable to release a sheet of material carried by said member upon tilting of said member by said cam means for effecting said tilting.

10. In a graphic arts reproducing machine as defined in claim 8, said member comprising a vacuum platen for receiving and retaining a copy sheet under a vacuum bias.

11. In a graphic arts reproducing machine as defined in claim 8, treatment means for conditioning the copy media carried by said sheet carrying member after exposure but before tilting.

12. In a graphic arts reproducing machine as defined in claim 10, a flexible conduit connected to said vacuum platen to communicate a vacuum condition thereto, said flexible conduit being connected to said carriage, a passage in said carriage for transmitting a vacuum condition to said flexible conduit and means for transmitting a vacuum condition to said passage in said carriage.

13. In a graphic arts reproducing machine as defined in claim 8, said cam means for tilting said member comprising a laterally extending cam element on said sheet carrying member disposed in predetermined spaced relation to said pivotal axis and a cam structure positioned to engage said cam element upon release of said latch means, said cam structure including a backing plate, means supporting said backing plate, a pair of cam plates secured to said backing plate and defining a cam track, said cam track opening to engage the cam element upon the release of said latch means and being disposed in a plane perpendicular to the carriage and configured to pivot the sheet carrying member.

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