

Dec. 15, 1936.

A. T. KOPPE
VACUUM PRINTING FRAME

2,064,068

Filed June 5, 1935

4 Sheets-Sheet 1

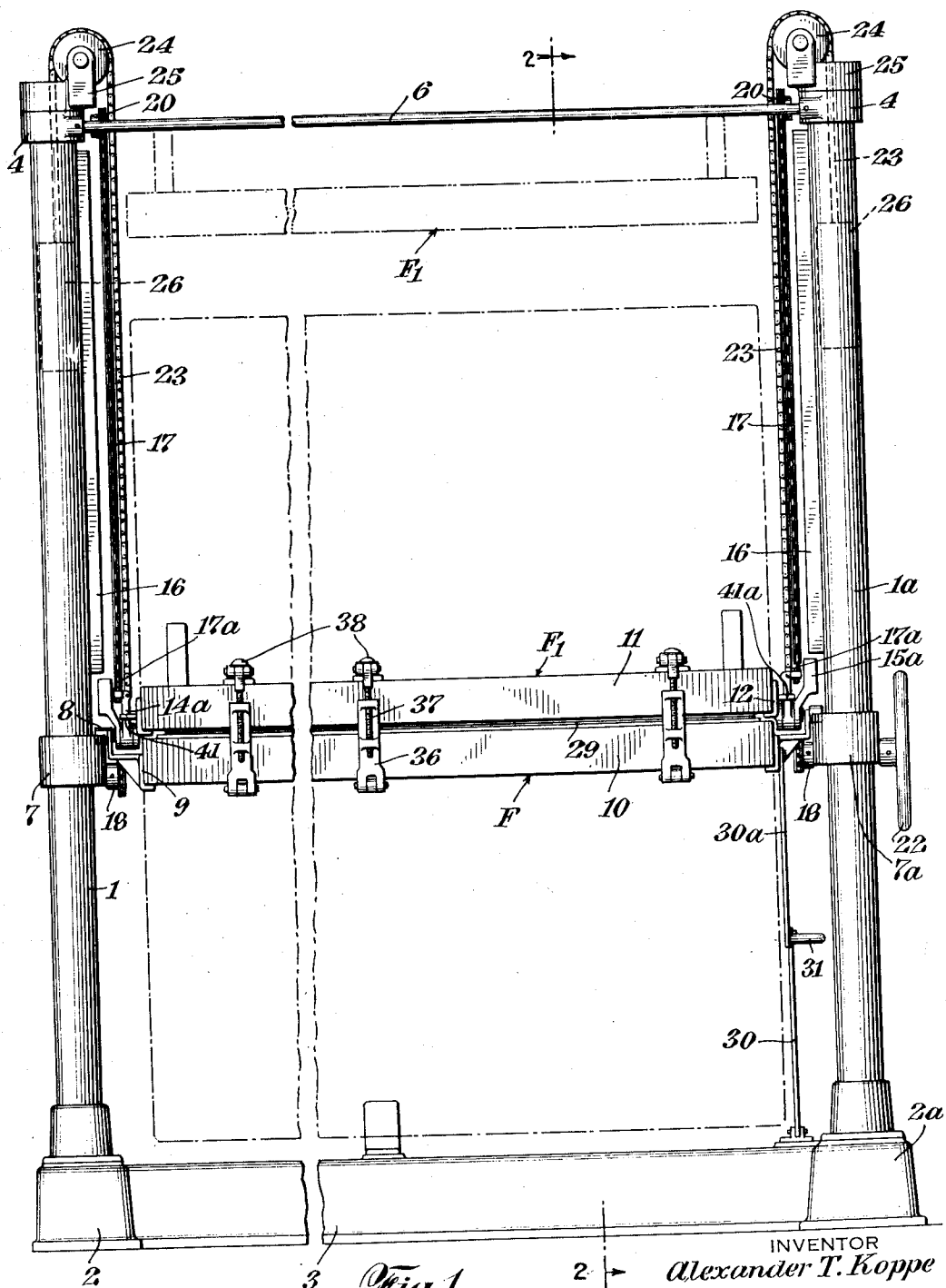


Fig. 1.

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4 Sheets-Sheet 2

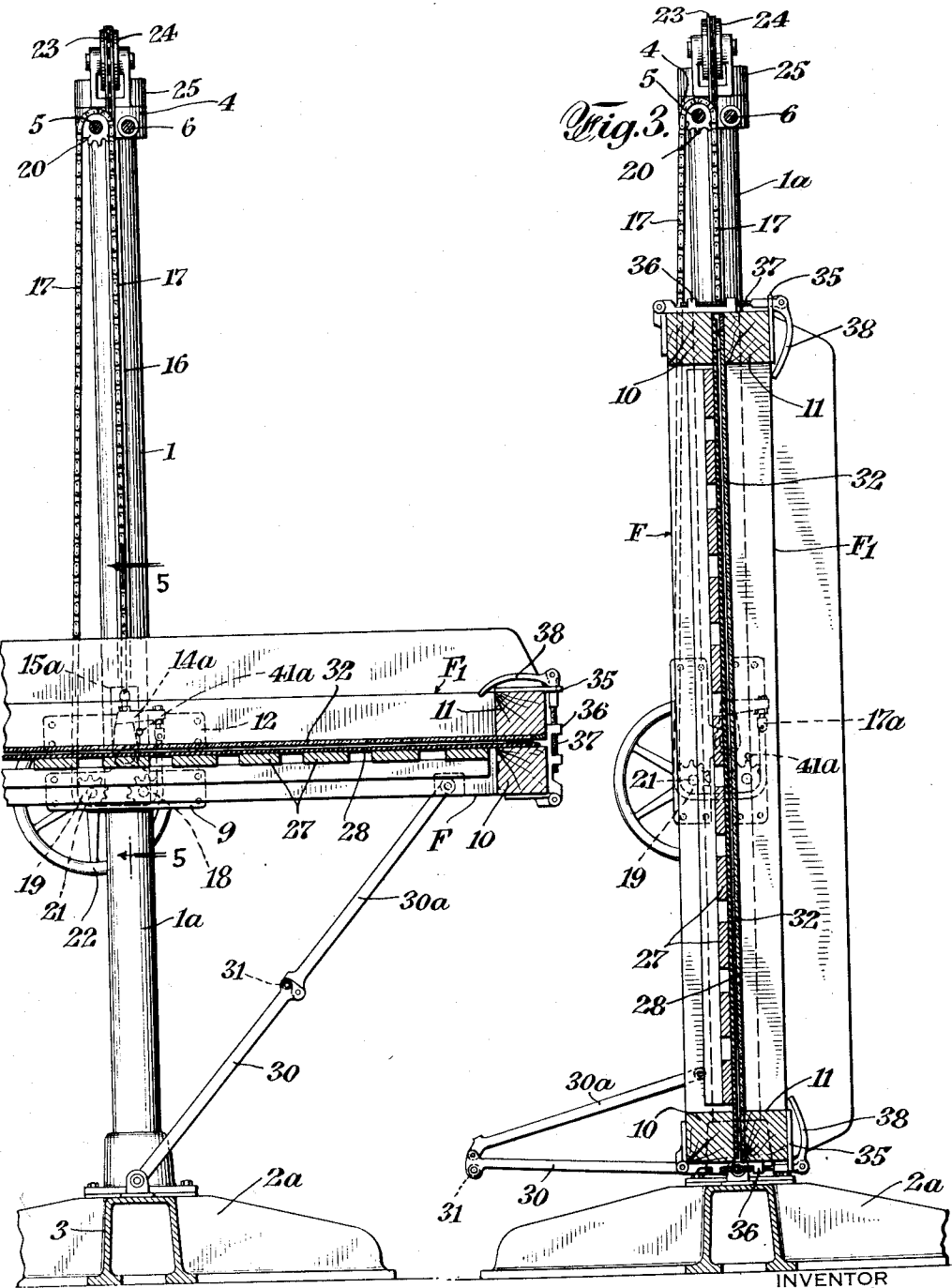


Fig. 2.

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4 Sheets-Sheet 3

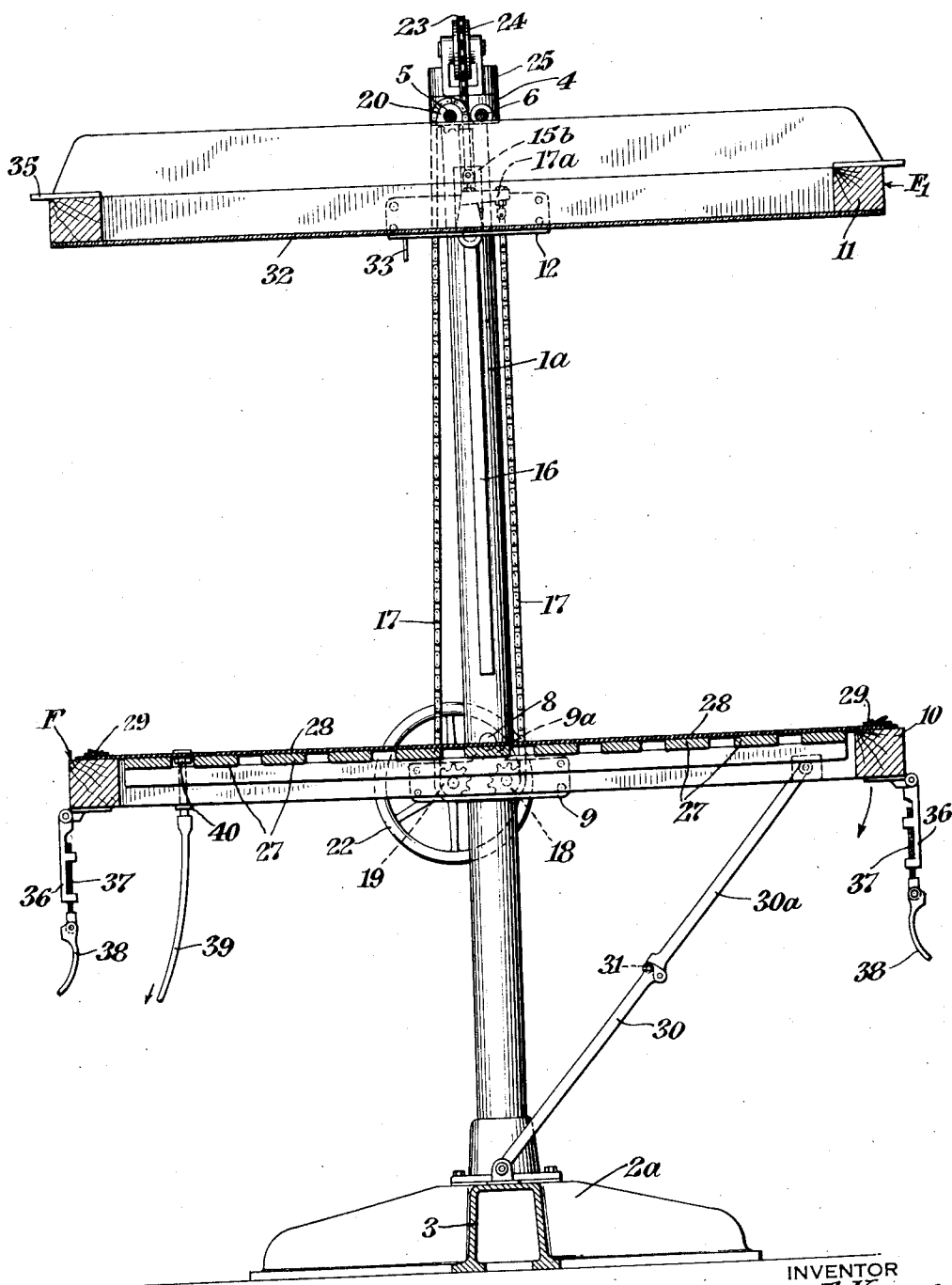


Fig. 4.

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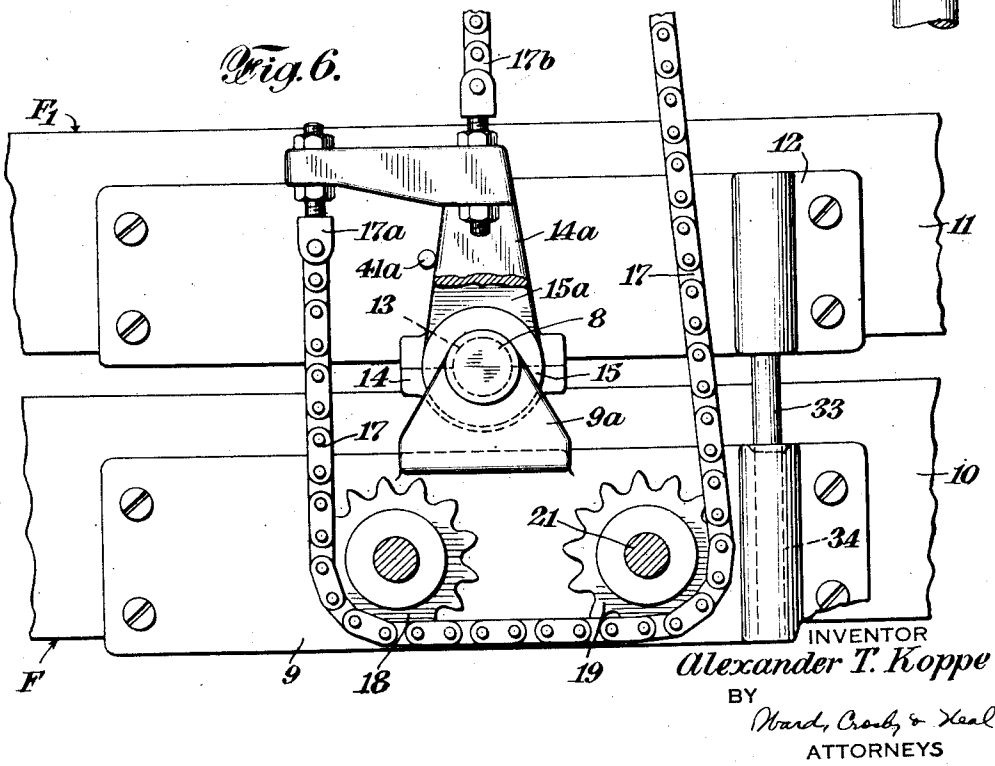
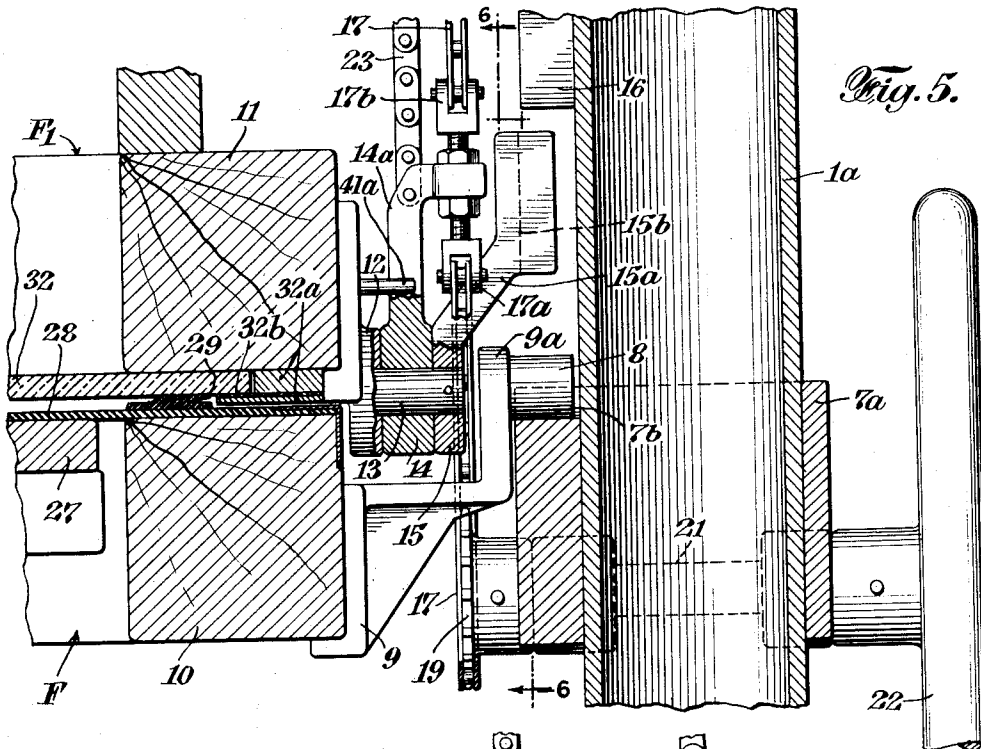
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,064,068

VACUUM PRINTING FRAME

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Application June 5, 1935, Serial No. 25,041

11 Claims. (Cl. 95—76)

My invention relates to vacuum printing frames of the type utilizable for obtaining close contact between a sensitized surface and a suitable representation-bearing member so that an image of the representation may be photographically produced on said sensitized surface.

My invention has further reference to various improved features in vacuum printing frames of the type comprising a pair of sections, one of these sections being adapted to occupy a horizontal position and the other section being movable downwardly into engagement therewith, both sections, after they have been locked together, being pivotally movable into a vertical plane so that the aforesaid representation-bearing member may be illuminated by a light beam of high intensity.

Various other objects, advantages and characteristics of my invention will become apparent from the following detailed description.

My invention resides in the vacuum printing frame, features and details of construction of the character hereinafter described and claimed.

For an understanding of my invention and for an illustration of one of the many forms thereof, reference is to be had to the accompanying drawings, in which:

Figure 1 is a front elevational view of my novel vacuum printing frame;

Fig. 2 is a fragmentary, transverse vertical sectional view, partly in elevation, and is taken on the line 2—2 of Fig. 1 looking in the direction of the arrows;

Fig. 3 is a transverse vertical sectional view, partly in elevation, this view corresponding with Fig. 2 to some extent but showing the frame sections in different positions;

Fig. 4 is a transverse vertical sectional view, partly in elevation, this view corresponding with Figs. 2 and 3 to some extent but showing the frame sections in other positions;

Fig. 5 is an enlarged vertical sectional view, partly in elevation, and is taken on the line 5—5 of Fig. 2 looking in the direction of the arrow; and

Fig. 6 is a vertical sectional view, partly in elevation, and is taken substantially on the line 6—6 of Fig. 5 looking in the direction of the arrows.

In the form of my invention herein illustrated, a pair of spaced vertical standards 1, 1a are provided, these standards being supported by any suitable arrangement such, for example, as is constituted by the bases 2, 2a which are disposed beneath the respective standards 1, 1a. Near

their lower ends the standards above noted are connected together by a transverse member 3 and, immediately adjacent the upper end thereof, each standard carries a collar 4, these collars being connected together by a shaft 5 and a rod 6. With an arrangement of the character described, it will be understood that the standards 1, 1a are securely braced so that they may be utilized as a support in the manner hereinafter described.

As clearly appears from a consideration of Fig. 1, the above noted standards 1, 1a carry the respective collars 7, 7a which are disposed at the same horizontal level. As indicated in Fig. 5, each of these collars is provided with an inwardly facing semi-circular seat or depression 7b, these seats being adapted to receive the respective trunnions or stub shafts 8. Each trunnion 8 projects laterally from and is carried by the vertical arm 9a of a bracket 9, Fig. 5. These brackets 9 are secured to a lower frame section F of square configuration as defined by the frame members 10 which are anchored together so as to form a rigid assembly. As is clearly indicated in Fig. 4, the frame section F is horizontally disposed and the brackets 9 are suitably secured midway between the ends of the respective frame members 10 which extend transversely with respect to the standards 1, 1a.

Cooperative with the above noted frame section F is a second frame section F' likewise of similar square configuration as defined by the frame members 11. The frame section F' carries a pair of brackets 12 which are suitably secured midway between the ends of the respective frame members 11 in correspondence with the attachment of the brackets 9 to the respective frame members 10. Extending laterally from each bracket 12 is a trunnion or stub shaft 13 disposed in aligned passages formed in the respective collars 14 and 15, Fig. 5, each stub shaft 13 being freely rotatable in its associated collar 14 and having its associated collar 15 secured thereto for rotatable movement therewith. Each of the collars 14 comprises an upper angular arm 14a to which certain operating chains are secured in the manner hereinafter described. Each collar 15 comprises an upwardly extending section 15a which is cut away as indicated at 15b to define a vertically extending channel adapted to slidably engage a vertical track member 16 secured to the adjacent supporting standard.

As shown on the drawings, one end 17a of an operating chain 17 is suitably secured in adjustable manner to the end of each of the afore-

said angular arms 14a. As indicated in Fig. 6, each chain 17 extends downwardly, then partly around a pair of spaced sprocket wheels 18 and 19, Fig. 6, then upwardly and over a sprocket wheel 20 secured to the aforesaid shaft 5 for rotatable movement therewith, and then downwardly so that the other chain end 17b is also connected to said angular arm 14a.

The sprocket wheels 18 above noted are mounted as idlers on posts transversely disposed in the respective collars 7, 1a. The sprocket wheel 19 of the collar 7 likewise is of the idler type. However, the sprocket wheel 19 of the collar 1a is rotatable with a shaft 21 to which is fixed an operating hand wheel 22, Fig. 5.

Secured to the aforesaid angular arms 14a are the respective ends of chains 23, or equivalent, these chains extending upwardly between the shaft 5 and rod 6, over the respective rollers 24 carried for free rotatable movement, respectively, by collars 25 disposed at the top of the respective standards 1, 1a. These standards are of tubular form and each of them freely receives a counterweight 26, these counterweights being connected, respectively, to the other ends of the chains 23, Fig. 1.

Disposed interiorly of the frame members 10 of the frame section F is a slat structure 27 which is seated upon a plurality of coiled springs, not shown, the latter being disposed between said slat structure and a plurality of members, not shown, extending transversely of the slats and secured to the lower surface of the frame members 10. Suitably secured to the upper surface of said frame members 10 is a rubber mat 28 having a rubber sealing strip 29 disposed around the border thereof. The slat structure 27 is biased toward and into engagement with the lower surface of the rubber mat 28 by the aforesaid coil springs. As is customary in the art, a sensitized surface and a representation-bearing positive, negative, or equivalent, not shown, are adapted to be secured to the upper surface of the aforesaid rubber mat 28.

Any suitable arrangement may be employed to temporarily retain the frame section F in horizontal position and to swing said frame section in a clockwise direction, Figs. 2 and 4, so as to position the same in vertical position. As herein shown, although not necessarily, there is thus utilized a knuckle joint arrangement comprising the members 30, 30a, which are pivotally secured to each other and are pivoted at their respective ends to the frame section F and the transverse member 3, a suitable handle 31, Fig. 1, being provided to "break" the aforesaid joint and swing the frame section F to vertical position.

As is customary in the art, the frame section F1 supports a plane sheet 32 of transparent glass or equivalent, this glass sheet, in any suitable manner, being fixed to said frame section F1 so as to be in parallel relation with respect to the rubber mat 28 of the frame section F when both of said frame sections are positioned horizontally. As shown, a clamping arrangement 32a is utilized for retaining the plate 32 in position, this clamping arrangement being suitably secured to the frame section F1 and comprising a felt sheet 32b or the like which directly engages said plate 32.

The frame sections F and F1 are shown in Fig. 4 in their normal inoperative positions. That is, they are disposed horizontally with the frame section F1 in its uppermost position.

When thus arranged, the above noted sensitized surface and the representation-bearing member may be secured in superposed relation on the rubber mat 28. As soon as this has been done, the frame section F1 is lowered from the position thereof as shown in Fig. 4 to that shown in Fig. 2.

To this end, the hand wheel 22 is actuated to rotate the sprocket wheel 19 in a clockwise direction, Fig. 4, whereby the chain 17 coactable therewith is moved in such direction that the frame section F1 is lowered while maintained in a horizontal plane by the sections 15b as hereinafter described. As will readily be understood, the chain 17 at the other side of the machine, i. e., the one adjacent the standard 1 partakes of movement similar to that of the above noted chain 17 and, accordingly, the two sides of the frame section F1 remain at the same level during upward and downward movement thereof.

As the frame section F1 moves downwardly as described above, the channeled sections 15b of the respective members 15 slide upon the respective track members 16 to thereby prevent any tilting of said frame section F1. However, as clearly appears from a consideration of Fig. 5, the length of the track members 16 is so chosen that the above noted sections 15b pass out of contact therewith when the frame section F1 reaches its lowermost position. Accordingly, when, in said last named position, the channeled sections 15b are no longer effective to prevent tilting movement of the frame section F1. As indicated in Fig. 6, each bracket 12 of the frame section F1 carries a depending vertically disposed rod 33 which is vertically aligned with a passage vertically formed in a member 34 secured to one side of the lower adjacent bracket 9 of the frame section F. These rods 33 enter their respective passages before the sections 15b separate from their respective tracks 16 and, therefore, the frame section F1 is connected to the frame section F so as to partake of pivotal movement therewith in the manner hereinafter described.

During downward movement of the frame section F1 as described above, the arrangement comprising the chains 23 and weights 26 effectively act in a counterbalancing manner to lessen the manual effort required to shift said frame section F1.

When the frame section F1 reaches its lowermost position, the glass plate 32 thereof comes to rest upon the sealing strip 29 which, as stated above, is disposed on the upper surface of the rubber mat 28. At this time, the two frame sections should be clamped together so as to be movable together as a unit and to form an airtight chamber within the space encompassed by the sealing strip 29 between the rubber mat 28 and the glass plate 32. To this end, a clamping arrangement of any suitable character may be utilized.

Thus, as shown on the drawings, the upper surface of the members 11 forming the frame section F1 carry a plurality of spaced members 35, each of which terminates in a notched end projecting beyond the border of said frame section F1. Pivoted to the lower surface of the members 10 forming the frame section F are a plurality of members 36 which are vertically aligned with the respective members 35. Adjustably connected to each member 36 is a screw-threaded member 37 having a cam lever 38 pivoted to the free end thereof.

Accordingly, when the frame section F' has been moved to its lowermost position so that the glass plate 32 thereof rests upon the sealing strip 29, the members 37 are swung upwardly to thereby cause the upper ends thereof to enter the respective notches of the members 35. As soon as this has been done, the cam levers 38 are actuated to thereby clamp the frame sections F and F' tightly together and seal the space encompassed by the sealing strip 29. At this time, by the utilization of any suitable vacuum-producing arrangement, the air is exhausted from said space whereby, under the influence of atmospheric pressure, the members between the glass plate 32 and rubber mat 28 are forced into intimate contact with each other. This arrangement is herein diagrammatically shown as comprising a hose 39 leading to any suitable air pump, not shown, the open end of the hose extending through the rubber mat 28 and being held in position by a clamping washer 40, Fig. 4.

Upon completion of the foregoing, the operator grasps the handle 31 and moves the same toward the standard 1a to thereby cause the members 30, 30a to collapse whereby the frame sections F, F' are swung in a clockwise direction from the position shown in Fig. 2 so as to bring them to the vertical position shown in Fig. 3. As shown in Fig. 1, a member upstanding from the transverse member 3 is positioned in the path of the frame section F so as to prevent passage of the frame sections beyond a true vertical position.

As soon as the frame sections have been positioned in the manner described above, a suitable source of light, not shown, is disposed adjacent thereto so as to project a light beam in a direction from right to left, Fig. 3, this light beam passing through the glass plate 32 so as to produce a latent image on the sensitized surface of the representation on the adjacent representation-bearing member.

After the termination of a suitable exposure interval, the passage of the light beam along the path above noted is discontinued whereupon the frame sections F and F' are returned to horizontal position. The cam levers 38 of the various clamping arrangements are now released and the frame section F' is moved to its upper position as shown in Fig. 4 so as to permit removal of the representation-bearing member and the sensitized surface. In their separated horizontal positions, the frame sections F and F' are in condition to be operated subsequently in the same manner as hereinbefore described.

The frame section F remains in its horizontal position under the control of the members 30 and 30a which, when in straight-line relation as shown in Figs. 2 and 4, resist movement of the frame section F toward its vertical position.

When the frame section F' is in its horizontal position, a pair of pins 41, 41a carried by and projecting laterally from the respective brackets 12 are in engagement with the respective collar arms 14a. By virtue of this arrangement, there is no jolt or jar when the channeled sections or jaws 15a engage the respective track members or guides 16 upon movement of said frame section F' upwardly from the position shown in Fig. 1. As will readily be understood, these pins 41 and 41a move with the brackets 12 and hence recede from the collar arms 14a when the frame section F' is moved toward and then into its vertical position.

It will be understood that the arrangement should be such that the frame section F' automatically remains in the horizontal position shown in Fig. 4 and, further, the arrangement should be such that the two frame sections F and F' automatically remain in the vertical position shown in Fig. 3. To this end, it is desirable that the material forming said frame sections be so distributed that, under the influence of gravity, the frame section F', when unrestrained, swings to the position shown in Fig. 4 while, similarly, the frame sections F and F' swing to the vertical position shown in Fig. 3 when freed from restraint. Obviously, any suitable arrangement other than that briefly described may be utilized for biasing the frame section to the respective positions noted above.

An important feature of my invention centers around the pivotal arrangement for the upper frame section F'. As clearly appears from a consideration of Fig. 5, this pivotal arrangement comprises the trunnions 13 and the respective supporting collars 14 therefor. The axes of the trunnions 13 remain constantly in horizontal alinement and, when said frame section F' is in its lowermost position, this horizontal axis of the trunnions 13 is in horizontal alinement with the horizontal axis of the trunnions 8. It follows, therefore, when the parts are arranged as last described, that the two frame sections may readily be moved, with but slight manual effort, from horizontal to vertical position and vice versa. The arrangement for accomplishing this end is simple, efficient and durable. It is a feature of decided importance in the art to which this invention appertains.

While the invention has been described with respect to a certain particular preferred example which gives satisfactory results, it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention and it is intended therefore in the appended claims to cover all such changes and modifications.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a vacuum printing frame, an upper frame section, means supporting said frame section for vertical movement, said means comprising trunnions projecting in opposite directions from opposite sides of said frame section, a support for each of said trunnions, and means confining said trunnions to movement in a single vertical plane.

2. In a vacuum printing frame, an upper frame section, means supporting said frame section for vertical movement, said means comprising trunnions projecting in opposite directions from opposite sides of said frame section, a support for each of said trunnions, and a guiding member secured to each trunnion, each guiding member being adapted to slidably engage a track to thereby maintain said frame section in horizontal position.

3. In a vacuum printing frame, an upper frame section, means supporting said frame section for vertical and oscillatory movement, said means comprising trunnions projecting in opposite directions from opposite sides of said frame section, a support in which each trunnion is mounted for rotatable movement, and a guiding member secured to each trunnion for oscillatory movement therewith, each guiding member being adapted to slidably engage a track to thereby maintain said frame section in horizontal position, each guid-

ing member being disengageable from said track to permit oscillatory movement of said frame section.

4. In a vacuum printing frame, upper and lower frame sections detachably secured together, and a pivotal supporting arrangement for each of said frame sections, both of said supporting arrangements being disposed in horizontal alignment while said frame sections are in horizontal position and while they are being swung to vertical position.
5. In a vacuum printing frame, upper and lower frame sections detachably secured together, trunnions projecting in opposite directions from opposite sides of said lower frame section, and trunnions projecting in opposite directions from opposite sides of said upper frame section, said last named trunnions being disposed between said first named trunnions and all of said trunnions being disposed in horizontal alignment.
6. In a vacuum printing frame, upper and lower frame sections detachably secured together, trunnions projecting in opposite directions from opposite sides of said lower frame section, trunnions projecting in opposite directions from opposite sides of said upper frame section, said last named trunnions being disposed between said first named trunnions and all of said trunnions being disposed in horizontal alignment, and a separate support for each trunnion.
7. In a vacuum printing frame, upper and lower frame sections detachably secured together, a pivotal supporting arrangement for each of said frame sections, both of said supporting arrangements being disposed in horizontal alignment while said frame sections are in horizontal position and while they are being swung to vertical position, and means for elevating the supporting arrangement for the upper frame section from such horizontal position whereby said upper frame section is raised to a predetermined position.

8. In a vacuum printing frame, upper and lower frame sections detachably secured together, a pivotal supporting arrangement for each of said frame sections, both of said supporting arrangements being disposed in horizontal alignment while said frame sections are in horizontal position and while they are being swung to vertical position, means for elevating the supporting arrangement for the upper frame section from such horizontal position whereby said upper frame section is raised to a predetermined position, and means for maintaining said upper frame section horizontally during elevation thereof.

9. In a vacuum printing frame, upper and lower frame sections detachably secured together, and a pivotal supporting arrangement for each of said frame sections, both of said supporting arrangements being disposed in horizontal alignment and one of said supporting arrangements being disposed between bearing parts of the other supporting arrangement.

10. In a vacuum printing frame, upper and lower frame sections detachably secured together, a pivotal supporting arrangement for said lower frame section, and a pivotal supporting arrangement for said upper frame section, said last named supporting arrangement being disposed between bearing parts of said first named supporting arrangement.

11. In a vacuum printing frame, upper and lower frame sections detachably secured together, a pivotal supporting arrangement for said lower frame section, and a pivotal supporting arrangement for said upper frame section, said supporting arrangements comprising trunnions disposed in horizontal alignment when said frame sections are secured together, the trunnions for said upper frame section being disposed between the trunnions for said lower frame section.

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