Nov. 11, 1952 J. H. McMAHON 2,617,338

FILM TRANSFER MACHINE

Filed April 24, 1950 2 SHEETS—SHEET 1

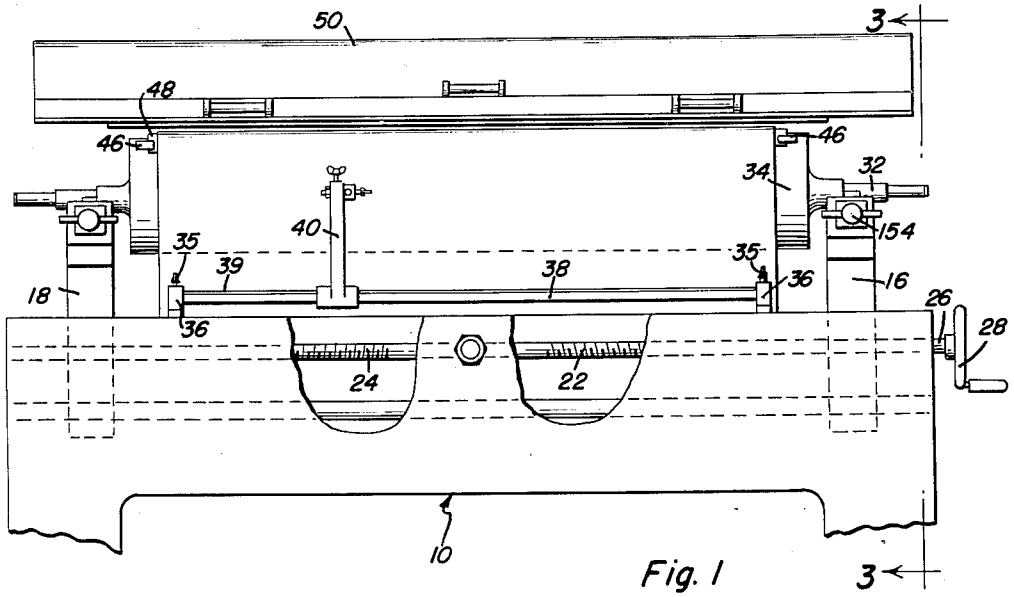

Fig. 1

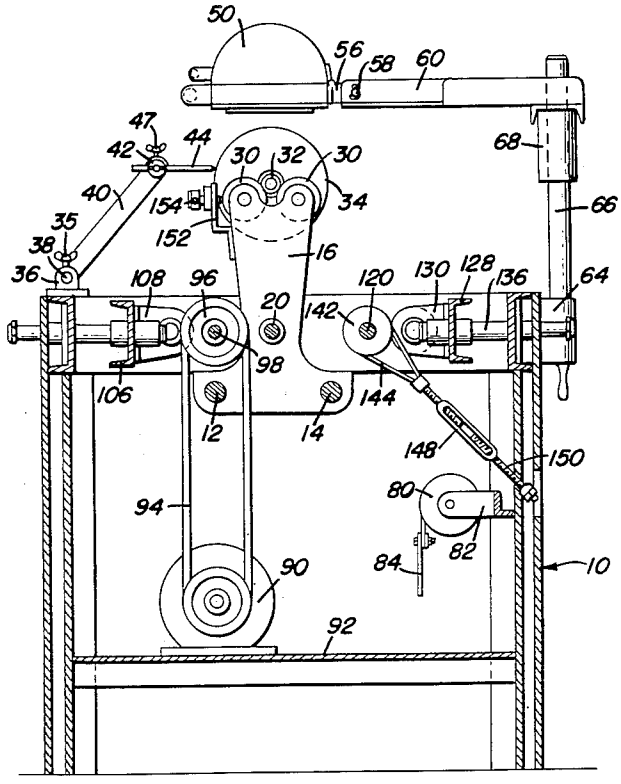

Fig. 3

Joseph H. McMahon
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

Nov. 11, 1952 J. H. McMAHON 2,617,338

FILM TRANSFER MACHINE

Filed April 24, 1950 2 SHEETS—SHEET 2

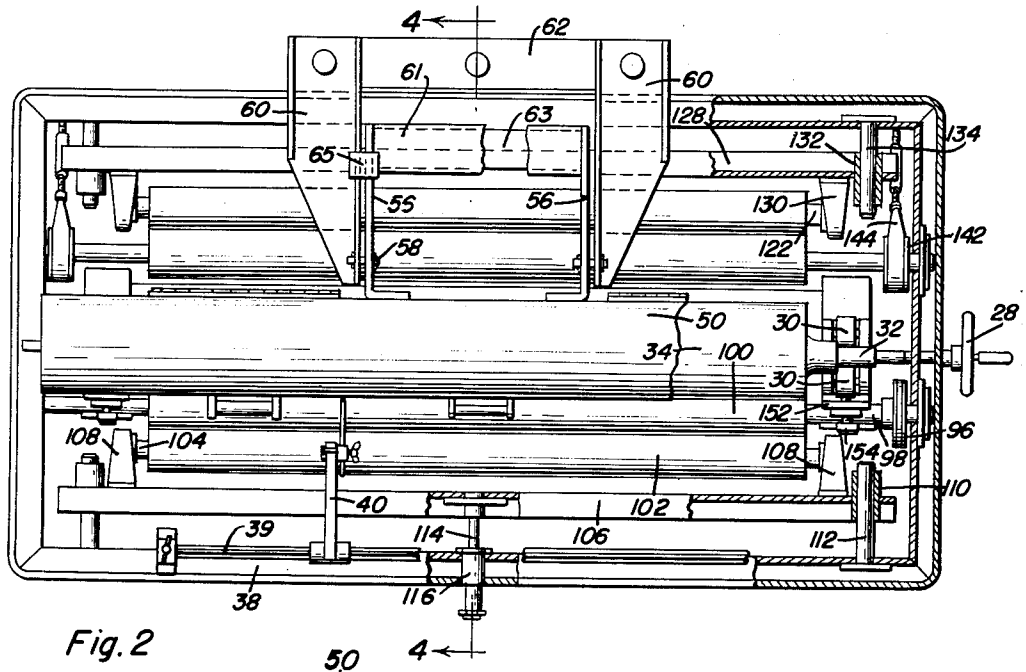

Fig. 2

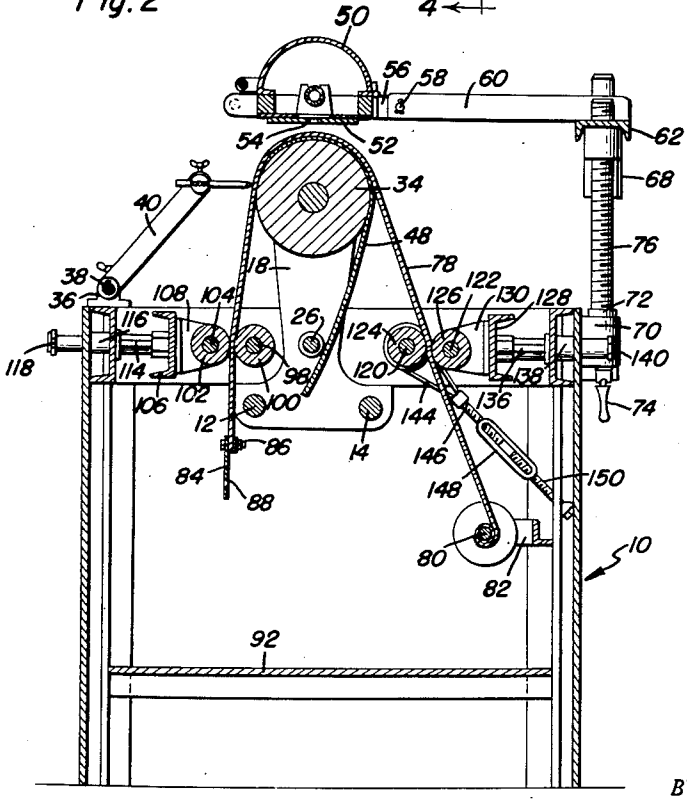

Fig. 4

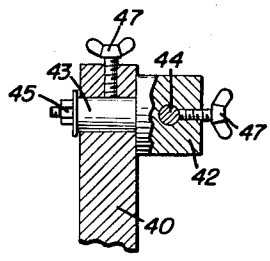

Fig. 5

Joseph H. McMahon
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

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UNITED STATES PATENT OFFICE

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FILM TRANSFER MACHINE

Joseph H. McMahon, Newark, N. J.

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9 Claims. (Cl. 95—73)

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This invention comprises novel and useful improvements in a film transfer machine and more specifically pertains to photographic transfer machine or apparatus for exposing sensitized printing cylinders and especially sensitized cylinders employed for etching in photo-engraving processes.

The primary object of this invention is to provide a photographic transfer apparatus of an improved construction, ease of operation and adjustment, which shall be readily adjustable for handling various sizes of sensitized cylinders, and having improved means for insuring registry of the photographic transparency with the surface of the cylinder and for rotating the same.

A further important object of the invention is to provide a photographic transfer machine in conformity with the preceding objects which shall have an improved manner and means for rotatably supporting a sensitized cylinder; for retaining the cylinder against rotation while attaching a photographic transparency thereto; and for maintaining the transparency in perfect registration with the cylinder during operation.

Yet another important object of the invention is to provide a photographic transfer machine in conformity with the foregoing objects having improved means for maintaining the photographic transparency in intimate and perfectly registered contact with the sensitized cylinder during all phases of operation of the same.

A still further important object of the invention is to provide a photographic transfer machine as set forth in the foregoing objects, which shall have a greatly improved manner of supporting and adjusting the developing source of illumination for the machine; which shall have an improved feeding and tensioning means for a pliable sheet maintaining the transparency upon the sensitized cylinder.

These, together with various ancillary features and objects of the invention, which will later become apparent as the following description proceeds, are attained by the present invention, a preferred embodiment of which has been illustrated, by way of example only, in the accompanying drawings, wherein:

Figure 1 is a side elevational view, parts being broken away, showing a suitable embodiment of a photographic transfer machine incorporating the principles of this invention therein;

Figure 2 is a top plan view of the construction of Figure 1, parts being broken away and shown in section;

Figure 3 is a vertical transverse sectional view

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through the embodiment of Figures 1 and 2, the same being taken substantially upon the plane indicated by the section line 3—3 of Figure 1;

Figure 4 is a vertical transverse sectional view through the embodiment of Figures 1 and 2, taken substantially upon the plane indicated by the section line 4—4 of Figure 2; and

Figure 5 is a fragmentary detail view, partly in section, of the scriber construction.

Referring now more specifically to the accompanying drawings, wherein like numerals designate similar parts throughout the various views, it will be seen that numeral 10 designates generally any suitable form of supporting frame by means of which the various instrumentalities of this apparatus are mounted. Suitably secured to the supporting frame 10, in any desired manner, the actual securing means itself forming no part of the present invention, are a pair of parallel, longitudinally extending guide rods 12 and 14, upon which are slidably received a pair of supporting standards 16 and 18. Each of these support standards is substantially T-shaped in construction, the base of these standards being provided with suitable bores for slidably receiving the guide rods 12 and 14, whereby the standards may be moved or adjusted laterally of the machine as set forth hereinafter. Intermediate their ends, these standards are provided with screw-threaded bores or apertures 20 for engaging the reversely threaded portions 22 and 24, see Figure 1, of an adjusting rod 26, which extends beyond one end of the supporting frame 10 and is provided with a manual adjusting means 28.

Suitably journaled upon the upper ends of each of the standards 16 and 18, are a pair of supporting rollers 30, which may conveniently be mounted upon any suitable anti-friction bearings, not shown, these rollers being appropriately disposed to rotatably support upon their upper surfaces, the extending axles or pintles 32 which extend from the opposite ends of a conventional form of sensitized cylinder 34. This cylinder may be of any suitable construction, the same being well known in the photo-engraving art and in itself forming no part of the present invention, it being understood that this cylinder is provided with a sensitized coating upon which the design of a photographic film or other photographic transparency is to be transferred or reproduced.

As will now be readily understood, the feed screw 26 may be adjusted by means of the crank 28 to cause the standards 16 and 18 to be laterally adjusted with respect to each other, in order to

properly accommodate different sizes of cylinders 34 thereon.

A scribing means is provided for making an index or reference line upon the surface of the sensitized cylinder 34 to assist in positioning a film, negative or other transparency upon the sensitized surface of the cylinder for transfer of the image thereto. This scribing means comprises a pair of supporting lugs 36 journaling a longitudinally extending rod 38 therebetween, see Figures 1 and 2, this rod having a longitudinal key 39 thereon slidably but non-rotatably receiving the hub of an arm 40, which arm, in turn, has a holder provided with a pivot pin 43 rotatably extending through the arm 40 and secured thereto by a fastener such as the nut 45, a thumb screw 47 serving to secure the holder 42 in rotationally adjusted position. A finger 44 constituting a scriber, and of any desired character, is slidably adjustable in a bore in the holder 42, by a thumb screw 47. By means of the pivotal connection 43 and rotation of rod 38 in the support 36 and the members 40 and 44, the scribing device may be adjusted to different size cylinders, and an index or reference line may be readily drawn upon the sensitized surface of the same and parallel to the axis of the cylinder to constitute a guide for positioning the edge of a film or other photographic transparency thereon, it being intended that the edge of this transparency shall be retained upon the surface of the cylinder as by a piece of adhesive tape or the like, as shown at 46 in Figure 1. The photographic transparency itself is indicated at 48, and is particularly illustrated in Figure 4. The rod 38 is rotatably adjustable in the lugs 36, being locked in position by thumb screws.

In order to transfer the image from the transparency to the surface of a sensitized cylinder therebeneath, a source of illumination is provided, the same consisting of a longitudinally extending housing 50 having a flat undersurface 52, in which is provided a longitudinally extending slot 54 adapted to emit a thin beam of light along the length of the sensitized cylinder. The axis of the housing 50 is disposed parallel to and above the longitudinal axis of the cylinder 34.

The source of illumination may be of any conventional design, preferably including an electric light of any desired character, the same being supplied with electric current in any desired manner. Since the construction of the source of illumination does not in itself form a part of the present invention, further description of the same is believed to be unnecessary. However, this source of illumination is counter-balanced and adjustably supported above the sensitized cylinder by an improved construction and arrangement which is to be now described. Suitable laterally extending lugs 56 on the housing 50 are connected by a cross member 61, the latter having a counterweight 63 secured to its under surface pivotally attached as at 58 between the extremities of a U-shaped platform or carriage which consists of a pair of side members 60 having the aforesaid lugs 56 pivoted therebetween at one end, and being rigidly attached as by a base member 62 at the other end. One of the members 62 is provided with a bracket 65 comprising a stop engaging the members 56 to limit pivoting movement of the housing 50. In order to vertically adjust and support the platform or carriage, the frame 10 is provided with a plurality of laterally extending lugs 64, one of these lugs being provided adjacent but on opposite sides of the transverse medial plane of the frame. The two lugs 64 are provided with vertically disposed guide passages or bores for slidingly receiving guide rods 66 for vertical movement therein, these rods at their upper ends being extended through depending bushing 68 carried by the platform at the opposite ends of the base member 62 thereof. Likewise provided upon the framework 10, and preferably at substantially the medial transverse plane of the same, is a further lug 70 having a vertically disposed bore receiving a tubular, internally threaded nut or sleeve which is provided with a laterally extending flange 72 at its upper extremity and which rests upon and rotates upon the upper surface of the lug 70. The lower end of this nut or sleeve extends through and beneath the lug 70, and is provided with a handle 74 by means of which the nut may be rotated. A vertical adjusting means for the platform is provided consisting of an externally threaded rod 76 having its lower end screw-threadedly received in the screw-threaded sleeve or bushing, and its upper extremity being screw-threadedly engaged with the mid-portion of the base member 62 of the platform.

By the foregoing arrangement it will be seen that upon rotation of the nut through the agency of the handle 74, the screw-threaded post 76 which is fixedly secured to the platform, will be vertically raised or lowered, carrying with it the housing 50 for the source of illumination. Thus, the distance of the light slot 54 above the sensitized surface can be very accurately and easily adjusted.

One of the chief problems encountered by those desiring to make photographic transfers from transparencies to a sensitized cylinder of this type is that of maintaining the transparency in perfect registry with the surface of the sensitized cylinder, during the rotation of the cylinder as the sensitized surface and the registering transparency of successively exposed to light source through the slot 54. This difficulty is overcome in the present invention by providing a transparent, flexible sheet of material such as a cellulose acetate material, this sheet being indicated at 78. In order to expedite the application of the sheet to the sensitized cylinder, and its removal therefrom, and to facilitate storage and convenient access to the sheet, it is preferred to attach one end of the same to a roller 80 which preferably is of substantially the same construction as that of well known forms of shade or curtain rollers, and which is provided with resilient means for yieldingly urging the roller in a direction to reel in and store the attached sheet. Conveniently, this roller may be detachably secured in suitable mounting brackets 82 carried by the frame 10, and extending into the interior of the same and below and to one side of the guide rods 14 as will be readily apparent from Figures 3 and 4. The free end of the pliable sheet 78 has attached thereto a combined reinforcing or stiffening member and hand gripped element in the form of a plate 84 of any suitable material, the plate being detachably secured to the end of the flexible sheet as by fastening means 86, and this plate being provided with a hand-hold opening 88 therein. By means of the plate which constitutes a handle or grip for the sheet, the same may be readily unreeled from the resilient, self-winding roller 80, from the normally stored position shown in Figure 3, to be entrained over the sensitized sheet and the photographic transparency attached thereto, and disposed as shown

in Figure 4. When the photographic transferring operation is completed, the sheet is permitted to be wound up upon the roller 80 by the operation of the customary spring, not shown, associated with such types of rollers.

The present invention comprises an improved means for effecting the rotation of the sensitized cylinder, and for maintaining the transparent sheet 78 firmly upon the photographic transparency 48 while maintaining the latter in proper registry with the sensitized surface of the cylinder 34. This means consists of any suitable source of power such as an electric motor or the like 90, which may be conveniently mounted within the supporting framework 10 upon any suitable supporting platform 92, this motor being powered from any suitable electric source and controlled by any desired electric circuit and control switches, not shown. By means of the motor 90, and a driving belt 94 associated therewith, a pulley 96 attached to one extremity of a shaft 98 is operated. Fixedly secured to this shaft 98 is a feed roller 100, and a similar feed roller 102 is fixedly secured to a parallel shaft 104, the shafts 98 and 104 being suitably journaled, as shown in Figure 2, in the opposite ends of the supporting frame 10. While the shaft 98 is preferably fixedly journaled in the supporting frame, it is preferred to mount the shaft 104 in such a manner that the same may be adjusted laterally towards and from the shaft 98.

For this purpose, as will be best seen from Figure 2, there is provided a longitudinally extending supporting member 106 in the form of a beam or the like, the same having laterally extending supporting brackets 108 at its extremities, these brackets having journaled therebetween the ends of the shaft 104.

Preferably outwardly of the brackets 108, the supporting beam 106 is provided with laterally extending guide bushings 110 which are slidably received upon laterally extending guide pins or rods 112 carried by the supporting frame 10. By this means, the feed roller 102 and its supporting carriage are slidably carried by the frame for movement towards and from the other feed roller 100. In order to impart the desired movement to the feed roller 102, the supporting beam 106 has fixedly secured thereto a laterally and outwardly extending shaft 114 which is slidably received in a bushing 116 extending through the side wall of the supporting frame 10. At its outer extremity, the member 114 is provided with a nut 118 screw-threadedly engaging the threaded extremity of the shaft 114, and abutting against the bushing 116, for adjustably effecting lateral movement of the supporting framework of this feed roller. Obviously, various desired means can be provided for accurately adjusting or positioning the two feed rollers with respect to each other, and for securing the movable roller in adjusted position.

In operation, it is contemplated that the feed rollers shall be separated in order to permit the insertion of the handle member 84 and the flexible sheet 78 between these rollers, when the flexible sheet is applied about the sensitized cylinder, or to remove this flexible sheet when the photograph transferring operation has been completed. When this sheet has been applied as shown in Figure 4, the feed rollers are clamped against each other to frictionally grip the flexible sheet therebetween. At this time, the motor 90 will be energized, causing rotation of the flexible roller 100 which, in turn, will roll the sheet in a counter-clockwise direction as viewed in Figure 4,

thereby rotating the sensitized cylinder, the registering photographic transparency attached thereto, and the overlying transparent pliable sheet. At the same time that the rotation of the sensitized cylinder is starting, the source of illumination is energized, so that the light will pass through the transparent sheet 78, through the photographic transparency 48, and will transfer the image to the sensitized surface of the cylinder 34.

As above noted, the feed rollers will effect the rotation of the cylinder 34, and will draw the transparent sheet 78 and the photographic transparency 48 beneath the light source. To some extent, the tensioning means in the roller 80 will impart a tensioning to the sheet 78. However, it is preferred not to rely upon this to secure the necessary tension to the pliable sheet by means of which perfect registry of the photographic transparency with the sensitized cylinder is effected. Instead, a pair of tensioning rolls are provided to be now described.

These tensioning rolls comprise a pair of shafts 120, which are suitably fixedly journaled for rotation in the end members of the supporting frame 10, and a parallel shaft 122 which is mounted for lateral sliding movement relative to the shaft 120. Each of these shafts has fixedly secured thereto a tensioning roller 124 and 126, which are adapted to frictionally grip or embrace the opposite sides of the transparent sheet 78 therebetween.

The movable shaft 122 and its tensioning roller 126, are journaled and supported in the same manner as the movable feed roller shaft 104 and its feed roll 102. For this purpose, there is provided a longitudinally extending support beam or the like 128 having adjacent its extremities supporting brackets 130 between which is journaled the shaft 122. Outwardly of the supporting brackets 130, the beam 128 is provided with transversely extending guide bushings 132 fixedly secured thereto, these bushings being guidingly and slidingly received upon laterally extending guide pins 134 carried by the frame 10. The adjustment of the movable support beam 128 is similar to that of the previously described supporting beam 106, being effected by the provision of a laterally extending rod 136 which has a splined or keyed surface engaged in and sliding in but secured against rotation relative to a fixed bushing 136 attached to the frame 10. Extending through this bushing, the outer extremity of the shaft 136 is provided with an adjusting nut 140 of any desired character, whereby the longitudinal support beam 128 may be positively advanced towards or withdrawn from the feed roller 124, and locked in adjusted position. At one or both ends of the shaft 120, there is provided a pair of brake drums 142 which are frictionally engaged by a brake band 144 in the form of a strip of friction material, such as leather or the like. This band, in the form of a sling, is attached to one end of a screw-threaded bolt 146 received in a turnbuckle 148, which likewise engages the oppositely threaded extremity of a fastening bolt 150 suitably rigidly attached to the supporting frame 10. Obviously, by tightening the turnbuckles 148, the tension of the sling 144 upon the brake drum 142 may be regulated so that any desired tension or drag may be applied to oppose the relative rotation of the tensioning rolls, and therefore any desired resistance or tensioning effect may be applied to the opposite portion of the transparent sheet 78.

In operation, the movable tensioning roller is moved away from the fixed tensioning roller in order to permit the handle portion 84 and the transparent sheet 78 to be inserted therebetween or withdrawn therefrom as desired.

In order to facilitate the application of the photographic transparencies in registry with the sensitized cylinder 34, and to hold the sensitized cylinder and the attached transparency in a stationary manner as the flexible transparent sheet 78 is being applied, a locking means is provided. This locking means may conveniently comprise a mounting bracket or the like 152 carried by each of the supports 16 and 18, and having an adjusting screw 154 adapted to frictionally engage the surface of one of the supporting rollers 30. As will be evident, by adjusting the screw 154 to cause the same to engage the roller 30, rotation of the latter is prevented, and consequently rotation of the sensitized cylinder 34 resting upon the supporting rolls 30 will likewise be prevented. Thus, the sensitized cylinder will be held stationary in order to apply or remove the photographic transparency and in order to apply or remove the transparent sheet.

From the foregoing, the construction and operation of the device will now be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art after a consideration of the foregoing specification and accompanying drawings, it is not desired to limit the invention to the exact construction shown and described, but all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. In a photographic transfer machine, a supporting frame, means carried by said frame for rotatably supporting a sensitized cylinder, a transparent sheet having an intermediate portion thereof disposed over said cylinder for holding a photographic transparency upon said sensitized cylinder and for rotating said cylinder in response to movement of said sheet, a self-winding roller mounted on said frame, said sheet having one end thereof secured to said roller, a pair of tensioning rolls rotatably mounted upon said frame and frictionally clamping the portion of said sheet disposed between said cylinder and roller therebetween, brake means operatively connected with one of said tensioning rolls and opposing rotation thereof, and means engaging the end of said sheet remote from said roller for moving said sheet across said cylinder and rotating the latter.

2. In a photographic transfer machine, a supporting frame, means carried by said frame for rotatably supporting a sensitized cylinder, a transparent sheet having an intermediate portion thereof disposed over said cylinder for holding a photographic transparency upon said sensitized cylinder and for rotating said cylinder in response to movement of said sheet, a self-winding roller mounted on said frame, said sheet having one end thereof secured to said roller, a pair of tensioning rolls rotatably mounted upon said frame and frictionally clamping the portion of said sheet disposed between said cylinder and roller therebetween, means for mounting one of said rolls for sliding movement towards and from the other roll, means to adjust and secure in adjusted position said one roll relative to the other roll, and means engaging the end of said sheet remote from said roller for moving said sheet across said cylinder and rotating the latter.

3. In a photographic transfer machine, a supporting frame, means carried by said frame for rotatably supporting a sensitized cylinder, a transparent sheet having an intermediate portion thereof disposed over said cylinder for holding a photographic transparency upon said sensitized cylinder and for rotating said cylinder in response to movement of said sheet, a self-winding roller mounted on said frame, said sheet having one end thereof secured to said roller, a pair of tensioning rolls rotatably mounted upon said frame and frictionally clamping the portion of said sheet disposed between said cylinder and roller therebetween, means for mounting one of said rolls for sliding movement towards and from the other roll, means to adjust and secure in adjusted position said one roll relative to the other roll, said mounting means including a carriage, guide means connecting said carriage to said frame, and means engaging the end of said sheet remote from said roller for moving said sheet across said cylinder and rotating the latter.

4. In a photographic transfer machine, a supporting frame, means carried by said frame for rotatably supporting a sensitized cylinder, a transparent sheet having an intermediate portion thereof disposed over said cylinder for holding a photographic transparency upon said sensitized cylinder and for rotating said cylinder in response to movement of said sheet, a self-winding roller mounted on said frame, said sheet having one end thereof secured to said roller, a pair of tensioning rolls rotatably mounted upon said frame and frictionally clamping the portion of said sheet disposed between said cylinder and roller therebetween, brake means operatively connected with one of said tensioning rolls and opposing rotation thereof, means for mounting one of said rolls for sliding movement towards and from the other roll, means to adjust and secure in adjusted position said one roll relative to the other roll, said mounting means including a carriage, guide means connecting said carriage to said frame, and means engaging the end of said sheet remote from said roller for moving said sheet across said cylinder and rotating the latter.

5. In a photographic transfer machine, a supporting frame, means on said frame for rotatably supporting the ends of a sensitized cylinder, a transparent sheet having an intermediate portion thereof disposed over the sensitized cylinder for holding a photographic transparency upon said sensitized cylinder and for rotating said cylinder in response to movement of said sheet, a self-winding roller mounted on said frame, said sheet having one end thereof secured to said roller, a pair of feed rolls, means for journaling said feed rolls for rotation upon opposite sides of the other end portion of said sheet for frictionally gripping the same, means for causing rotation of one of said feed rolls to rotate said sensitized cylinder.

6. In a photographic transfer machine, a supporting frame, means on said frame for rotatably supporting the ends of a sensitized cylinder, a transparent sheet having an intermediate portion thereof disposed over the sensitized cylinder for holding a photographic transparency upon said sensitized cylinder and for rotating said cylinder in response to movement of said sheet, a self-winding roller mounting on said frame, said

sheet having one end thereof secured to said roller, a pair of feed rolls, means for journaling said feed rolls for rotation upon opposite sides of the other end portion of said sheet for frictionally gripping the same, means for causing rotation of one of said feed rolls, means for adjustably moving one of said feed rolls relative to the other.

7. In a photographic transfer machine, a supporting frame, means on said frame for rotatably supporting the ends of a sensitized cylinder, a transparent sheet having an intermediate portion thereof disposed over the sensitized cylinder for holding a photographic transparency upon said sensitized cylinder and for rotating said cylinder in response to movement of said sheet, a self-winding roller mounted on said frame, said sheet having one end thereof secured to said roller, a pair of feed rolls, means for journaling said feed rolls for rotation upon opposite sides of the other end portion of said sheet for frictionally gripping the same, means for causing rotation of one of said feed rolls, means comprising a carriage for rotatably supporting said one feed roll.

8. In a photographic transfer machine, a supporting frame, means on said frame for rotatably supporting the ends of a sensitized cylinder, a transparent sheet having an intermediate portion thereof disposed over the sensitized cylinder for holding a photographic transparency upon said sensitized cylinder and for rotating said cylinder in response to movement of said sheet, a self-winding roller mounted on said frame, said sheet having one end thereof secured to said roller, a pair of feed rolls, means for journaling said feed rolls for rotation upon opposite sides of the other end portion of said sheet for frictionally gripping the same, means for causing rotation of one of said feed rolls, means for adjustably moving one of said feed rolls relative to the other, means comprising a carriage for rotatably supporting said one feed roll.

9. In a photographic transfer machine, a supporting frame, means on said frame for rotatably supporting the ends of a sensitized cylinder, a transparent sheet having an intermediate portion thereof disposed over the sensitized cylinder for holding a photographic transparency upon said sensitized cylinder and for rotating said cylinder in response to movement of said sheet, a self-winding roller mounted on said frame, said sheet having one end thereof secured to said roller, a pair of tensioning rolls rotatably mounted upon said frame and frictionally clamping the portion of said sheet between said cylinder and said roller therebetween, brake means operatively connected with one of said tensioning rolls and opposing rotation thereof, a pair of feed rolls, means for journaling said feed rolls for rotation upon opposite sides of the end portion of said sheet remote from said roller for frictionally gripping the same, means for causing rotation of one of said feed rolls.

JOSEPH H. McMAHON.

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