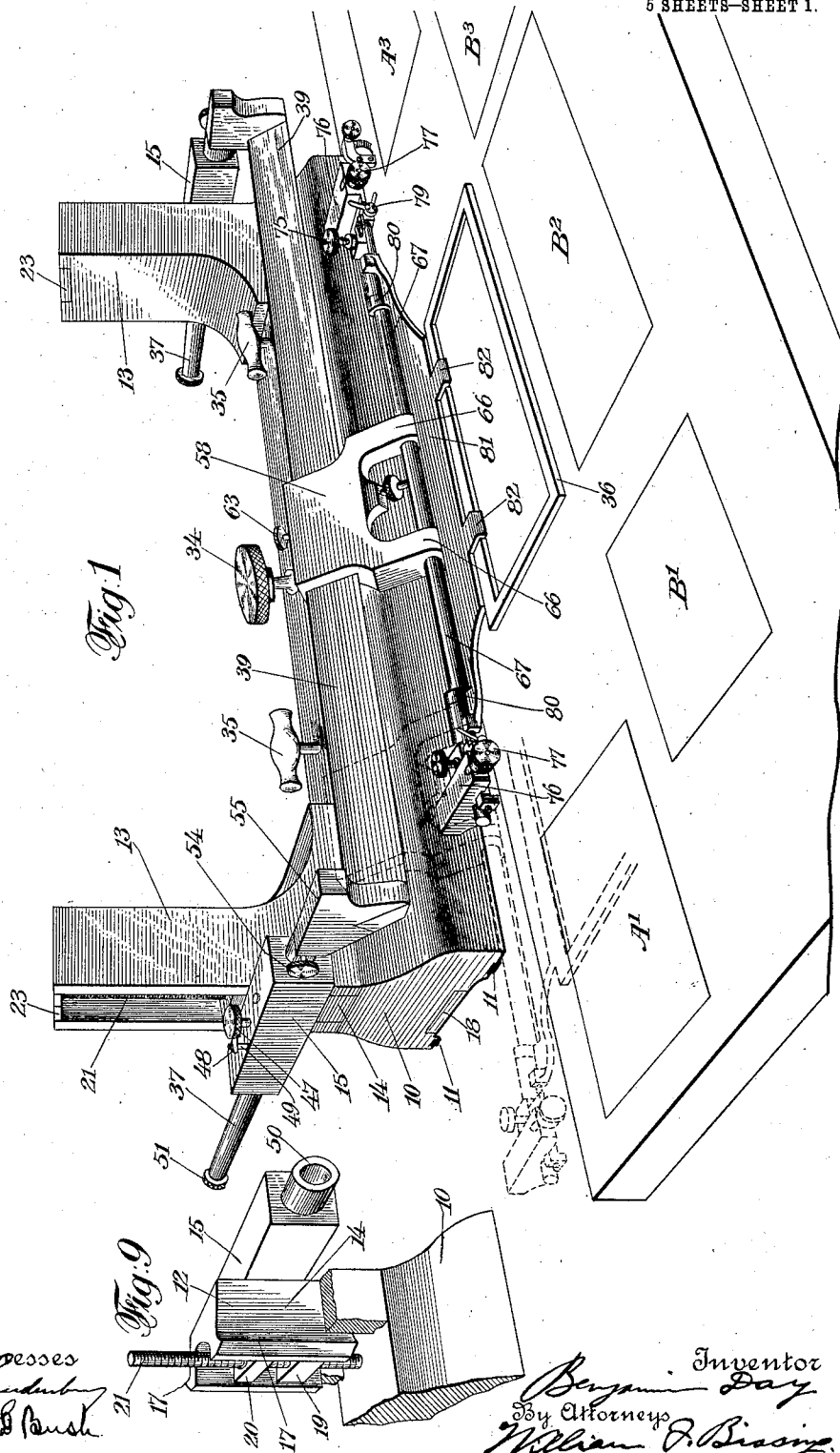


1,063,015.

B. DAY.
FILM FRAME APPARATUS.
APPLICATION FILED APR. 3, 1911.

Patented May 27, 1913.

5 SHEETS—SHEET 1.



Witnesses
H. C. Caudenbury
D. Harold Bush

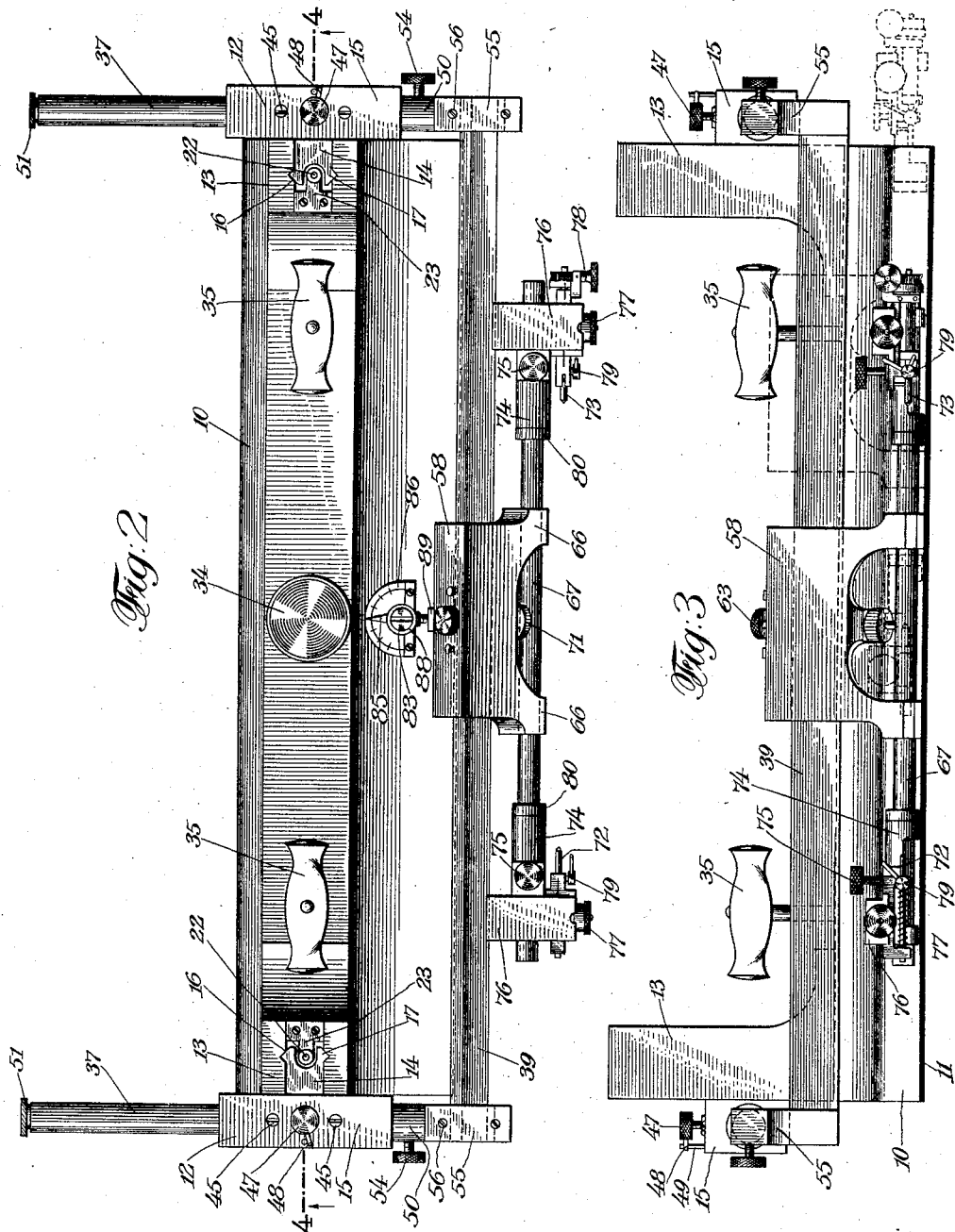
Inventor
Benjamin Day
By Attorneys
William O. Bissinger

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5 SHEETS—SHEET 2.



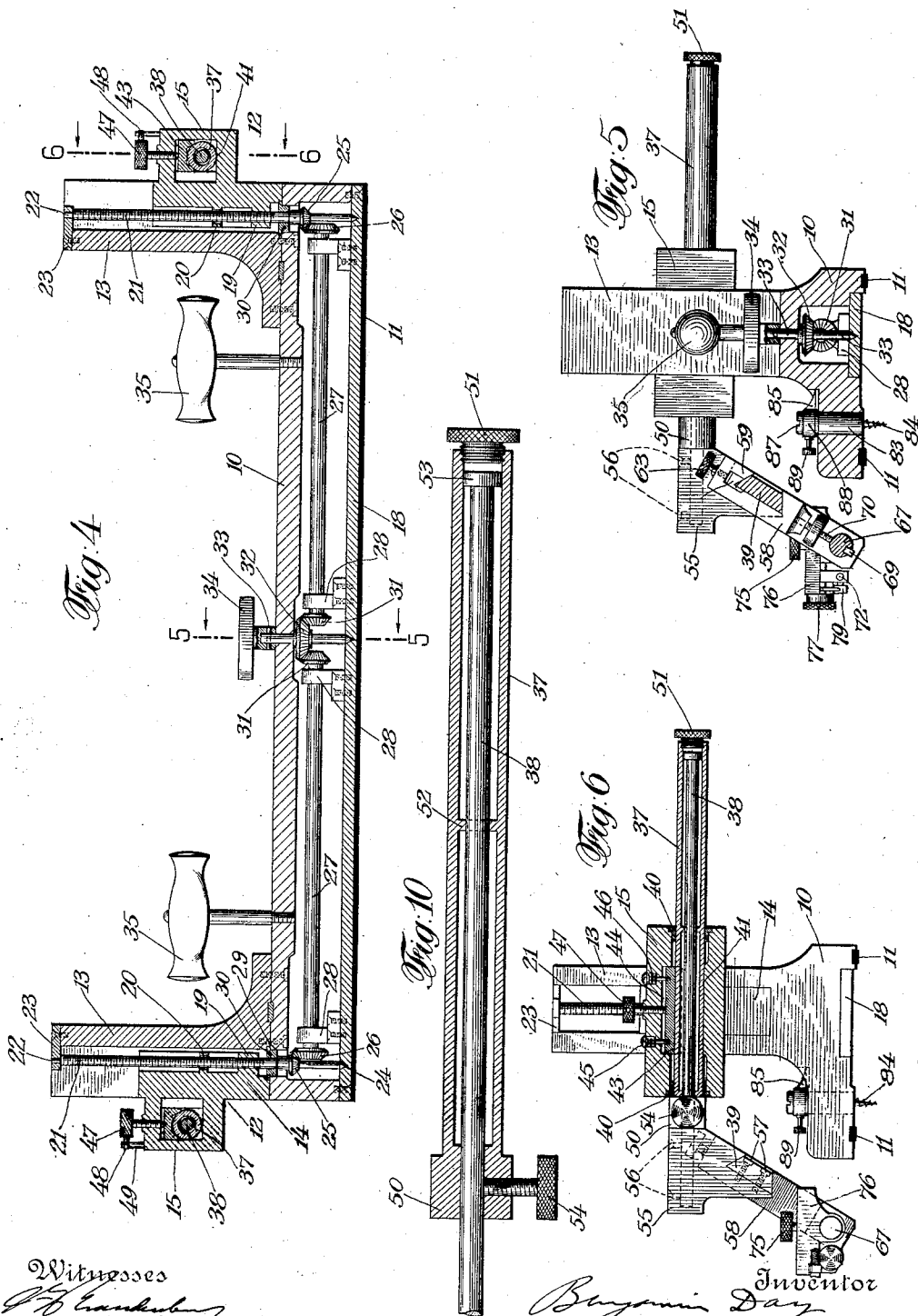
Witnesses
B. H. ...
H. ...

Inventor
Benjamin Day
By Attorneys
William O. Boring

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5 SHEETS—SHEET 3.



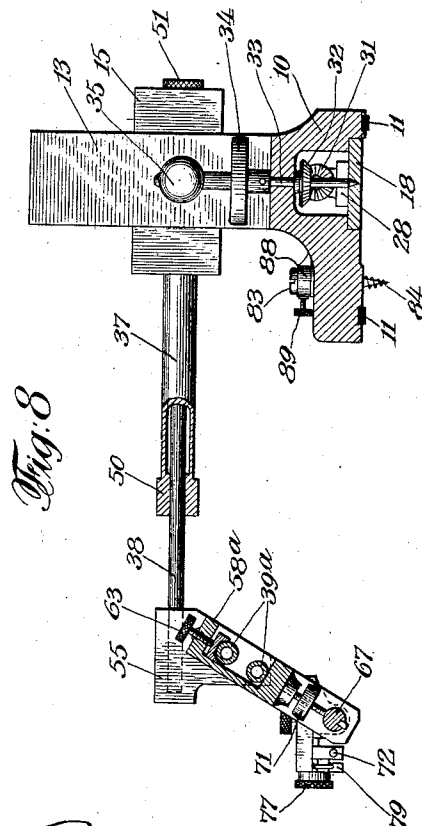
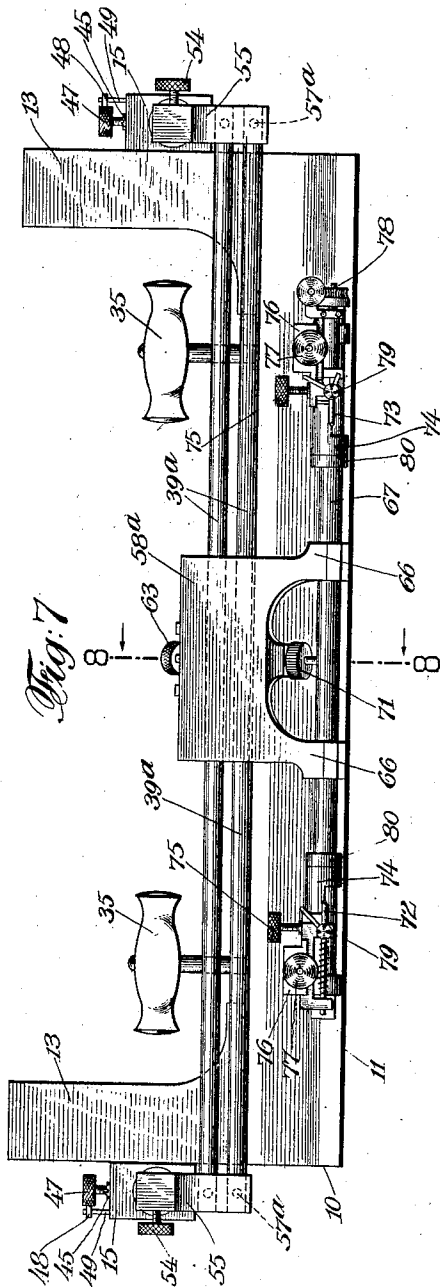
Witnesses
J. H. Lamb
D. H. Rusk

Inventor
Benjamin Day
By Attorneys
William F. Bessing

1,063,015.

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APPLICATION FILED APR. 3, 1911.

Patented May 27, 1913.
5 SHEETS—SHEET 4.



Witnesses
W. H. H. H. H.
W. H. H. H. H.

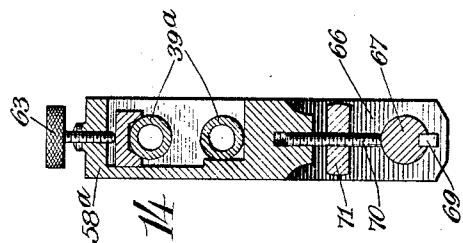
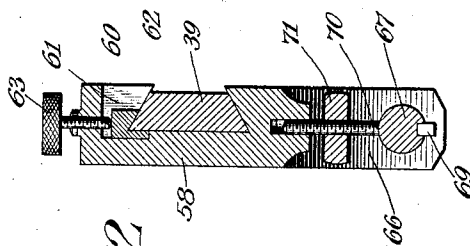
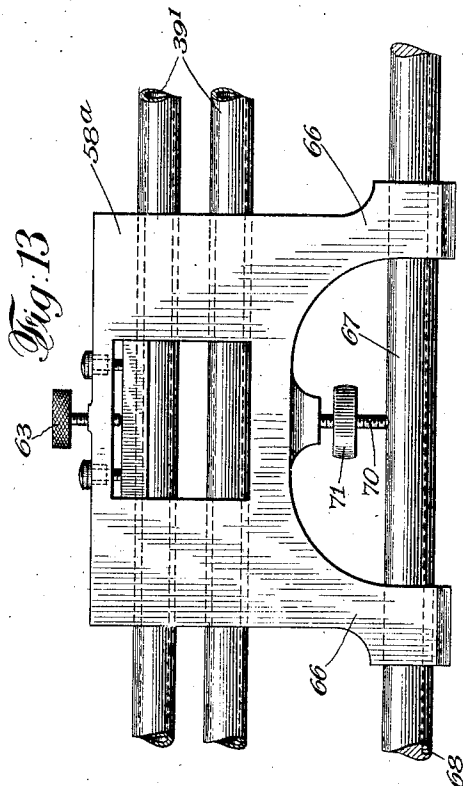
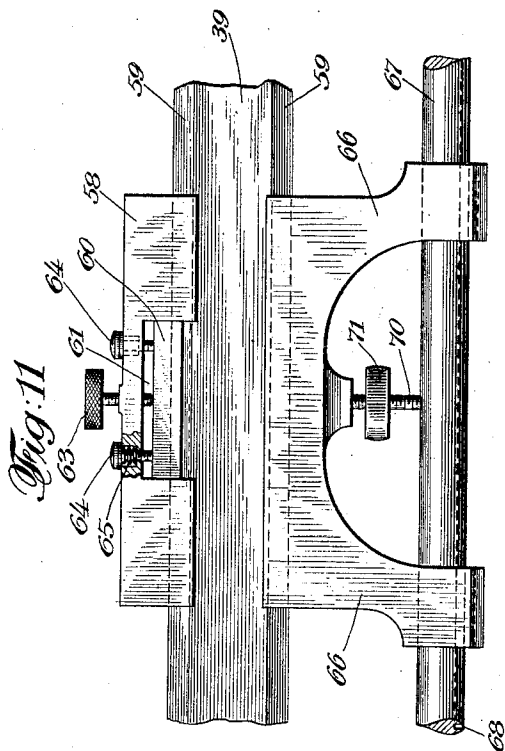
Inventor
Benjamin Day
By Attorneys
William J. Bissell

1,063,015.

B. DAY.
FILM FRAME APPARATUS.
APPLICATION FILED APR. 3, 1911.

Patented May 27, 1913.

5 SHEETS—SHEET 5.



Witnesses
W. H. L. L. L.
A. Harold Bush

Inventor
Benjamin Day
By Attorneys
William J. Bessing

UNITED STATES PATENT OFFICE

BENJAMIN DAY, OF SUMMIT, NEW JERSEY, ASSIGNOR TO BEN. DAY, INC., A CORPORATION OF NEW JERSEY.

FILM-FRAME APPARATUS.

1,063,015.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed April 3, 1911. Serial No. 618,571.

To all whom it may concern:

Be it known that I, BENJAMIN DAY, a citizen of the United States, residing at Summit, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Film-Frame Apparatus, of which the following is a specification.

This invention relates to film-frame apparatus for utilizing shading mediums for shading and perfecting drawings on zinc, stone or cardboard.

The special object of the invention is to provide a thoroughly efficient, strong and well designed machine adapted to support the film-frame over any region within a very large area, whereby an unusually large working range is attained both forward and backward and from side to side.

A particular object of the invention is to provide novel vertically movable carriages for raising and lowering the film-frame in an improved manner and for accurately adjusting it to the level of the stone.

A further object is to effect the shifting of the vertically traveling carriages by means of common operating mechanism assuring the simultaneous and coördinate movement of the carriages.

Another object is to provide a novel and effective flying structure for enabling the film-frame to be shifted from a position adjacent the base or holdfast forward to a position remote therefrom, or to any position in between.

Still another object of the invention is to provide double lateral shifting mechanism, whereby the film-frame may be moved from side to side within wide limits.

In general the object of the invention is to provide numerous novel and improved features of construction, all of which may be combined in one advantageous machine as illustrated in the annexed drawings, or subcombinations of which may be utilized to advantage, as in machines of different specific construction but included within my invention in one or other of the aspects thereof.

To these ends the invention consists in the parts, improvements and combinations hereinafter described and more particularly pointed out in the claims.

In the accompanying drawings showing by way of illustration the preferred and

complete embodiment of my invention: Figure 1 is a perspective view of the machine; Fig. 2 is a plan view; Fig. 3 is a front view; Fig. 4 is a vertical transverse section through the line 4—4 of Fig. 2; Fig. 5 is a vertical section at right angles to the last on the line 5—5 of Fig. 4; Fig. 6 is a section parallel to the last taken on the line 6—6 of Fig. 4; Fig. 7 is a front view of a modified form of machine; Fig. 8 is a side view of this form of machine showing the flying structure projected from the base to the limit of forward movement; Fig. 9 is a perspective view of one of the vertically-movable carriages and its operating screw; Fig. 10 is a detail sectional view through the telescopic parts at one side of the machine; Fig. 11 is an enlarged view of a portion of the way-bar shown in Fig. 1 and the carriage with its rod slidable thereon, the figure representing a view looking perpendicularly at the surface of the bar and carriage; Fig. 12 is a transverse section through the parts shown in Fig. 11; Fig. 13 is a view corresponding to Fig. 11 showing the modified construction illustrated in Fig. 7; and Fig. 14 is a sectional view of this form of construction.

In these views the numeral 10 indicates a transversely elongated weighted base or holdfast, which constitutes the primary support for the parts. This holdfast preferably rests on the table or other underlying support by means of felt strips 11 disposed parallel with and adjacent to the front and back edges of the base and preferably held in longitudinal slots cut in the under surface thereof. Between these strip-like supporting areas or regions the base may be arched or elevated beneath. In this way a superior friction or gripping effect is secured, thus greatly promoting the stability of the machine.

In accordance with the invention vertically-movable carriages 12 are provided at the opposite sides or ends of the holdfast, for raising and lowering the film-frame to or from the height of any stone within a considerable range of thickness and for leveling the film-frame accurately to the surface of such stones. Also in accordance with the invention these carriages are preferably guided and supported on standards 13 which rise from the ends of the base. In the best embodiment of the invention these stand-

ards are boxed structures, having a vertical recess opening through a side of each standard, preferably the outer side thereof. The carriages 12 in their most advantageous form comprise each two parts rigidly secured together, a vertical part 14 formed to slide in and receive solid support from the interior of the corresponding standard, and a horizontal portion or box 15, the function of which will be particularly described hereinafter. For the purpose of enabling the carriages 14 to slide without hitch or jam and without the production of an undesirable amount of friction, and for affording the carriage perfectly solid support against tipping in any direction, I form each standard 13 with internal V-shaped grooves or ways 16, these being most desirably formed in the inner surfaces of the front and back walls of the standard, and provide the carriage at front and back with corresponding V-shaped engaging portions 17 of considerable length.

According to my invention the vertically-movable carriages 12 are actuated or caused to move in unison by means of mechanism common to both; and it is also characteristic of my invention that I inclose this mechanism, for protection and sightliness, in the interior of the holdfast. To this end I tunnel or chamber the interior of the base, preferably closing the same by means of a removable bottom-plate 18. The particular form of common actuating or controlling mechanism may be widely varied, but it is preferably operated by a centrally located handle member and preferably comprises gearing such as will now be described. The portions 14 of the vertically-movable carriages guided within the standards also constitute nut portions, which may be effected by providing an internally-threaded bridge or web part 19 crossing a channel or recess in the outer side of the carriage, which recess may also be bridged by another web part 20 which has a plain opening in alinement with but larger than the threaded-opening in the part 20 which has a plain opening in the bridge part 19. A vertical screw 21 is provided for each carriage, being received within the recess therein and in the corresponding standard, and having threaded engagement with the bridge part 19. The screw may have a reduced journal portion 22 at its upper end received in a bearing in a plate 23 screwed or otherwise secured to the top of the standard, and may have a point bearing 24 in the plate 18 at its lower end. Each screw 21 carries a bevel pinion 25 within the tunnel in the base, these pinions meshing with bevel gears 26 on the outer ends of oppositely extending horizontal shafts 27 suitably journaled in bearings 28 on the base plate. Each screw 21 passes through an opening 29 leading from the end

portion of the tunnel in the base through the top wall thereof. These openings are large enough to permit the passage of the bevel pinions 25; and the screws receive intermediate support by means of collet bearings 30 held in these openings and encircling plain journal portions of the screws. The inner ends of the horizontal shafts 27 carry bevel pinions 31 which mesh with a bevel gear 32 mounted on the lower end of a shaft 33 journaled in a central opening in the top wall of the base and having a hand-wheel or other suitable manual-operating device 34 on the top of the base. Each vertical screw 21 is in horizontal alinement with the V-shaped guide-ways 16 and the engaging V-shaped portions of the carriages at opposite sides thereof, that is the axis of the screw and the bottoms of the guide-ways 16 lie substantially in the same vertical plane. This construction contributes materially to the smooth action of the carriages sliding in the standards.

The base is provided with suitable lifting handles 35 whereby the whole structure may be lifted and moved.

In accordance with the invention a flying structure is provided for projecting the film-frame 36 forward over an area remote from the base or holdfast. Such means may be widely varied, but I prefer to make use of a flying-frame or carriage having telescopic supporting connection with the carriages 12. In the particular construction illustrated the flying-frame or carriage includes telescopic side members carried by and adapted to be projected forward from the boxes 15 of the carriages 12, and a transverse member connecting the forward ends of these telescopic side members and extending across the front of the machine. In the particular embodiment of the invention shown upon the drawings the side members of this frame or carriage comprise tubes 37 and rods 38 and the transverse member may be either the bar 39 of Figs. 1 to 6 or the pair of transverse rods 39^a of Figs. 7 and 8. As shown more particularly in Fig. 6 the tube 37 is mounted slidably in the box 15. In the preferred construction the longitudinal opening through this box 15 is materially larger than the diameter of the tube, and the latter slides in short collet bearings 40 held in the front and rear ends of the opening. Suitable means are provided for clamping the tube 37 in any position to which it may be longitudinally shifted, and such means are designed with a view to avoid crushing or distorting of the tube. In the particular construction illustrated the box 15 is provided interiorly with a flat bearing surface 41 beneath the tube, and an elongated clamping block 43 is provided for applying pressure to the top of the tube. This clamping block 43 bears upon a considerable por-

tion of the length of the tube between the collet bearings 40 and the flat bearing surface 41 is of equal extent, so that the pressure at any one point is rendered comparatively small. The clamping block is preferably V-shaped on its underside engaging the tube, that is it has converging bearing surfaces, which afford a particularly efficient grip on the sides of the tube and insure that this grip will not be impaired by wear. The block 43 may be and preferably is received in a recess 44 constituting an enlargement of the opening through the box, and is provided with means for releasing it from engagement with the tube when the pressure is removed, such as screws 45 threaded into the block and sliding in openings in the box 15 together with springs 46 beneath the heads of the screws and tending to raise the same and the block. Pressure is applied to the block and by the latter distributed over a considerable length of the tube by means of a set-screw 47 which has threaded engagement in the top of the box 15 and bears at its lower end against the top of the block. A stop projection 48 on the screw 47 and a stop pin 49 rising from the box afford means for limiting the movement of the set-screw to a partial revolution, thus guarding against loss of the screw.

Suitable means are provided for limiting the movement of the tube 37 in both directions so as to prevent removal thereof from its bearings, and such means may consist of an enlargement 50 at the front end of the tube outside of the box 15 and a plug 51 screwed into the rear end of the tube and provided with a head of larger diameter than the tube.

The rod 38 is preferably of materially smaller diameter than the bore of the tube 37, and the two are provided with short encircling bearing surfaces so as to reduce friction and prevent gagging as the telescopic parts are moved in and out. In the particular construction shown the rod 38 slides in a bearing afforded in the enlarged portion 50 and in an intermediate bearing 52 formed internally and substantially centrally of the tube. The rod is also provided at its rear end with an enlarged head or bearing portion 53 which has slidable engagement with the inner walls of the tube. These two bearing parts 52 and 53 also serve as stops to limit the forward movement of the rod in the tube. It will thus be seen that when the parts are extended to their limit of forward movement the tube 37 receives solid support from the full length of the box 15 and the rod receives like support from half the length of the tube 37, which is approximately twice the length of the box. By means of this construction I am enabled to utilize telescopic parts, with their attendant advantages of extended range of

adjustment and compactness when not extended, while insuring an absolutely firm and rigid support for the film-frame and the micrometric adjusting mechanism therefor.

Suitable means are provided for locking the rod 38 to the tube 37 at all relative positions of the parts, and such means preferably consists of a set-screw 54 threaded into the enlarged stop-portion 50 of the tube.

Heads 55, preferably of substantially triangular form, are secured to the forward ends of the rods 38, preferably receiving the latter in openings and being locked thereto by screws 56. These heads 55 project downward from the rods 38 so as to support the transverse member 39 or 39^a at a level considerably below the plane of the rods. The ends of the bar 39 may be received in suitable recesses in the rear sides of the heads 55, and secured therein by suitable means such as screws 57 (see Fig. 6). The rods 39^a may be received in suitable transverse openings in the heads and there secured by set-screws 57^a.

The transverse member consisting of the bar 39 or of the two rods 39^a constitutes a way-member for supporting and permitting lateral adjustment of a carriage 58. This carriage is slidable on the way-member in opposite directions from a central position across the front of the machine to either side thereof. In both forms of construction the carriage 58 (for engagement with the way-bar 39) or 58^a (for engagement with the way-rods 39^a) is slidable and lockable along the way-member. The way-bar 39 is provided at top and bottom with edge ride-ways, preferably formed by beveling the top and bottom of the bar at the rear side, as indicated at 59 (see Fig. 5). The upper part of the carriage 58 is recessed at the rear for the reception of the way-bar, and is provided at top and bottom of the recess with slide surfaces formed to correspond with the angled ride-ways of the bar. One of the engaging portions of the carriage is movable so as to clamp the carriage to the way-bar at any point and also to permit the carriage to slide freely thereon. This is preferably accomplished by providing a clamping block 60 received in a downward opening recess 61 at the top of the main recess in the carriage, this block 60 being grooved along the bottom to correspond with the beveled top of the bar. The clamping block 60 is actuated by a set-screw 63 threaded through the top of the carriage 58, and means are provided for automatically lifting the block away from the way-bar when this screw is released. Such means preferably consists of screws 64 threaded into the top of the block 60 and guided in openings in the top of the carriage and urged in an upward direction by expansion springs 65 held between the

heads of these screws and the bottoms of chambers formed therefor in the top of the carriage. In both forms of construction the transverse member consisting of the way-bar 39 or the pair of transverse rods 39^a is transversely inclined in a downward and forward direction, so that the lower part of the carriage 58 or 58^a is materially below and in front of the way-bar, the carriage being disposed at substantially the same inclination as the way-member. Both forms of carriage 58 or 58^a are provided with laterally-spaced arms 66 which receive a second laterally-movable carriage 67. This carriage 67 is preferably in the form of a cylindrical rod as shown. Means are provided for preventing rotation of this rod while permitting free longitudinal movement thereof. Such means may be widely varied but preferably consist of a longitudinal groove 68 formed in the rod and pins or splines 69 carried by the arms 66 and received in this groove. Means are provided for locking the rod 67 to the carriage 58 or 58^a at any relative position of the two parts, such means being suitably embodied in a screw 70 disposed between the two arms 66 and threaded at its upper end into the carriage 58 or 58^a, with its lower end adapted to contact with the side of the rod. A knurled wheel or disk 71 fixed to the central part of the screw affords convenient means of operation. The cylindrical rod 67 which is thus supported parallel to and materially below and in advance of the transverse way-member preferably constitutes the support for the devices which carry and micrometrically adjust the pintles 72 and 73 of the film-frame 36. In the particular construction illustrated each of these devices consists of a carriage 74 longitudinally and rotatably movable on an end portion of the rod and lockable thereon by means of a set-screw 75, and a carriage 76 slidable backward and forward on the carriage 74, being actuated and held at any position by means of suitable micrometric adjusting means 77. These carriages 76 carry the pintles 72 and 73, one of which, as 72, is preferably spring-pressed toward the other, the latter being provided with positive micrometric adjusting means 78 for moving it axially toward and away from the pindle 72 and holding it at any degree of adjustment within the range allowed. Set-screws 79 constitute suitable means for locking the pintles. Stops, such as collars 80 are formed on or fixed to the rod 67. These stops are spaced apart at a distance materially greater than the distance between the cooperating abutment faces formed on the outer sides of the arms 66, so as to provide the rod or carriage 67 with an extended range of adjustment in either direction. These stops being interposed between the carriages 74 of the micrometric devices and

the arms 66 constitute barriers between these parts for protecting the micrometric devices from the shock of direct contact with the arm 66 when the rod 67 is slid to one extreme or the other.

The film-frame 36 is removably clamped in a holder 81 which is hinged on the pintles 72 and 73. The clamp lugs 82 of this holder permit an additional lateral-shifting movement of the film-frame.

In accordance with the invention I provide means for securing the base or holdfast to a table or other underlying support and for enabling angular adjustment of the holdfast in a plane parallel to this underlying support. Such means may be widely varied but preferably consists of a vertical pivot member 83 received in a vertical bearing located centrally of the front part of the base and provided with a screw portion or extension 84 adapted to take into the wood of the table. The pivot member 83 carries a pointer 85 for coöperation with an underlying angle dial or scale 86 secured to or formed on the base of the holdfast. The pointer 85 is rotatably adjustable on the pivot 83, so that it can be set to central position after the pivot member has been turned by means of its kerf 87 to force the gimlet point 84 down into the table. This may be accomplished by forming the pointer 85 with a collar 88 encircling the upper part of the pivot member and adapted to be clamped thereon by means of a set-screw 89. All the parts are constructed and designed with a view to affording a degree of stability and rigidity entirely sufficient for the extended range of movement provided and for the extremely delicate and exact work which the machine must perform. I may call attention, for example, to the location of the standards 13 well back toward the rear side of the holdfast, so that when the flying structure is projected forward as far as possible there will be no danger of overbalancing.

In operation the film-frame is inserted in the clamping holder 81 and the latter is inserted between the pintles 72 and 73, the former being forced back against the tension of its spring for the purpose. The micrometric adjustment of the pintles and therefore of the film-frame may now be effected and the pintles locked, or this micrometric adjustment may be deferred until the film-frame has been transported to the desired position by means of the vertically, forwardly and laterally-movable carriages. The film-frame is raised or the pintles therefor are raised and lowered to the level of the stone or other surface being worked on and adjusted accurately to that level by means of the vertically-traveling carriages 12 actuated from the central manipulating device 34. The gearing for actuating these

carriages is self-holding so that the pintles will be reliably held at the desired level, or if desired additional locking means for the purpose may be provided. Extended movement forward or backward of the film-frame may be effected by drawing the flying frame outward or pushing it inward. In this connection it may be noted that it is desirable so to proportion the parts that the members 37 and 38 of the telescopic side members of this flying structure correspond to the several distinct transverse rows of areas over which the film-frame may be positioned. Thus, when either the set-screw 47 or the set-screw 54 is loosened, permitting the tube 37 to be drawn forward to the limit in the box 15 or the rod 38 to be drawn forward to its limit in the tube, the film-frame will be positioned over any one of the areas in the row indicated by the rectangles A' and A³ in Fig. 1. When the other set-screw is loosened and the further forward movement is effected the film-frame will be positioned over an area of the transverse series represented by the rectangles B', B² and B³. By means of the lateral movement of the carriage 58 or 58^a on the transverse way-member the film-frame may be positioned over an area within a considerable transverse range. This range may be extended by shifting the rod or carriage 67 on the carriage 58 or 58^a. The field of operation in opposite lateral directions may be still further extended by shifting the film-frame in its clamping holder. All of these transporting movements may be effected without disturbing the adjustment of the micrometric devices and the holding of the film-frame thereby. When desired the whole machine may be swung horizontally to any desired angle by means of the pivot member 83.

While I have thus particularly described and in the annexed claims have pointed out certain features of construction and modes of operation of my invention, it will be understood that numerous changes, substitutions, omissions and alterations in forms, proportions, sizes, materials, details and arrangements may be made without departing from the invention.

I claim:

1. In a film frame apparatus for utilizing printing films, the combination of a shiftable holdfast having an elongated, weighted base, vertically translatable carriages arranged on opposite ends of said base, mechanism for raising and lowering the carriages and film frame supporting and adjusting mechanism supported from said carriages in front of the base.

2. In a film-frame apparatus for utilizing printing-films, the combination of a weighted base or holdfast, vertically translatable carriages thereon, film-frame supporting and adjusting mechanism supported from

said carriages in front of the base, and operating means for simultaneously and equally adjusting said carriages vertically in unison.

3. In a film-frame apparatus for utilizing printing-films, the combination of a support, vertically movable secondary supports thereon, operating means and gearing connecting said secondary supports for producing simultaneous adjustment thereof, and film-frame holding and micrometric-adjusting mechanism supported from said secondary supports.

4. In a film-frame apparatus for utilizing printing-films, the combination of a support, vertically movable secondary supports thereon, a common intermediate manual operating device and means connecting the same with said carriages for producing simultaneous vertical adjustment thereof, and film-frame holding and micrometric-adjusting mechanism supported from said secondary supports.

5. In a film-frame apparatus for utilizing printing-films, the combination of a shiftable holdfast having an elongated tunneled weighted base, vertically movable secondary supports thereon, operating mechanism therefor concealed and protected in said tunneled base, and film-frame holding and micrometric-adjusting mechanism supported from said secondary supports.

6. In a film-frame apparatus for utilizing printing-films, the combination of a tunneled weighted base or holdfast, vertically movable secondary supports thereon, operating mechanism therefor concealed and protected in said base, a substantially central common manual operating device projecting from the top of said base, and film-frame holding and micrometric-adjusting mechanism supported from said secondary supports.

7. Film-frame apparatus for utilizing printing-films, comprising a shiftable holdfast having a weighted base with laterally-spaced vertically projecting guide members, and vertically movable carriages mounted on said guide members, mechanism for raising and lowering the carriages, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the base of the holdfast.

8. Film-frame apparatus for utilizing printing-films, comprising a shiftable holdfast having a weighted base with laterally-spaced upward projecting members, and vertically slidable carriages thereon, said members and carriages having engaging V-shaped bearing and guide surfaces mechanism for simultaneously raising and lowering the carriages, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the base of the holdfast.

9. Film-frame apparatus for utilizing printing-films, comprising a shiftable holdfast having a transversely elongated weighted base with boxed guide standards at its ends, and vertically slidable carriages having guide portions received in the interior of said standards, mechanism for raising and lowering the carriages, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the base of the holdfast.
10. Film-frame apparatus for utilizing printing-films, comprising a transversely elongated weighted base or holdfast having at its ends upstanding guide standards each provided with a vertical recess opening through its outer side and furnished with guide-ways, and vertically slidable carriages having portions received in said recesses and formed to fit and engage said guide-ways, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the holdfast.
11. Film-frame apparatus for utilizing printing-films, comprising a transversely elongated weighted base or holdfast having at its ends upstanding guide standards each provided with a vertical recess opening through one side and furnished with guide-ways formed on two other opposite sides of the recess, and vertically slidable carriages having portions received in said recesses and provided with bearing and guiding surfaces formed to interengage with said guide-ways, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the holdfast.
12. Film-frame apparatus for utilizing printing-films, comprising a transversely elongated weighted base or holdfast having standards at its ends provided interiorly with slide-ways, vertically movable carriages provided with guide and bearing surfaces engaging said slide-ways, and vertical operating screws in the interior of said standards having threaded engagement with said carriages, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the holdfast.
13. Film-frame apparatus for utilizing printing-films, comprising a shiftable holdfast having a transversely elongated weighted base with hollow standards at its ends, vertically movable carriages thereon, and operating means for raising said carriages contained in said standards, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the base of the holdfast.
14. Film-frame apparatus for utilizing printing-films, comprising a transversely elongated weighted base or holdfast having standards at its ends each provided with a vertical recess opening through one side, vertically movable carriages mounted on said standards and having portions received in said recesses, and gearing contained in said recesses connecting with said portions, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the holdfast.
15. In a film-frame apparatus for utilizing printing-films, the combination of a tunneled weighted base or holdfast having laterally-spaced hollow standards, vertically movable carriages on said standards, operating means for said carriages contained in the interiors of said base and standards, and film-frame holding and micrometric-adjusting mechanism supported from said secondary supports.
16. A film-frame apparatus for utilizing printing-films, comprising a tunneled weighted base or holdfast having laterally-spaced hollow standards, vertically traveling carriages guided thereby and provided with portions entering therein, operating mechanism comprising members inside the standards engaging said portions, a common manual operating device, and connections in the interior of the base, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the holdfast.
17. A film-frame apparatus for utilizing printing-films, comprising a tunneled weighted base or holdfast having laterally-spaced hollow standards, vertically movable carriages guided thereby and provided with nut portions entering therein, vertical screws inside said standards engaging said nut portions, shafts in the interior of the base geared to said screws, and a common manual operating device connected with said shafts, in combination with suitable film-frame holding and adjusting mechanism supported from said carriages.
18. A film-frame apparatus for utilizing printing-films, comprising a tunneled weighted base or holdfast having laterally-spaced hollow standards, vertically movable carriages guided thereby and provided with nut portions entering therein, vertical screws inside said standards engaging said nut portions and provided at their lower ends with bevel gears, shafts in the interior of the base having bevel gears at their outer ends meshing with the aforementioned bevel gears and provided also at their inner ends with bevel gears, and a common manual operating device provided with a bevel gear meshing with the last-mentioned bevel gears, in combination with suitable film-frame holding and adjusting mechanism supported from said carriages.
19. A film-frame apparatus for utilizing printing-films, comprising a tunneled

weighted base or holdfast, laterally-spaced hollow standards fixed thereon, vertically movable carriages guided thereby and having nut portions received therein, vertical screws inside said standards engaging with said nut portions and having gears at their lower ends inside the base, said base having openings in its top receiving the lower parts of said shafts and of a size to permit of the passage of said gears, collet bearings in said openings encircling journal portions of said screws, and gearing inside the base engaging with said gears, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the holdfast.

20. A film-frame apparatus for utilizing printing-films, comprising a hollow weighted base or holdfast provided with a removable bottom plate, laterally-spaced standards on said base, vertically traveling carriages guided on said standards, and common operating mechanism located largely within said base and accessible by removal of said bottom plate, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the holdfast.

21. Film-frame apparatus for utilizing printing-films, comprising a base or support, standards thereon provided with vertical recesses opening through one side, and vertically traveling carriages each comprising two parts at right angles to each other, one part being a vertical sliding portion received and guided in the recess of the standard and the other being a horizontal box, in combination with forward projectable parts received slidably in said boxes, and suitable film-frame holding and adjusting mechanism supported from said parts.

22. Film frame apparatus for utilizing printing films, comprising a shiftable holdfast having in combination a weighted base, a standard rising from said base, a vertically sliding carriage mounted in said standard, a telescopic supporting structure supported on said carriage, the members of which structure are freely extensible forward to a considerable distance from said base, and suitable film-frame holding and adjusting mechanism carried by said telescopic structure, said standards and base being constructed and arranged to sustain the weight of the parts including said telescopic structure projecting forward therefrom without overbalancing.

23. Film-frame apparatus for utilizing printing-films, comprising a shiftable holdfast having a weighted base, vertically movable carriages thereon, a horizontally telescopic structure including a transverse bar connecting said carriages, mounted on said carriages with its members freely extensible forward therefrom to a considerable dis-

tance, and suitable film-frame holding and adjusting mechanism supported from said transverse bar.

24. Film-frame apparatus for utilizing printing-films, comprising the combination of a shiftable holdfast having a transversely elongated weighted base, vertically movable secondary supports arranged on opposite sides of said base, laterally spaced members slidable forward and rearward each on one of said secondary supports, a frame slidable forward and backward on said members, and film-frame holding and adjusting mechanism supported from said frame.

25. Film-frame apparatus for utilizing printing-films, comprising in combination a shiftable holdfast having a transversely elongated weighted base, a supporting structure carried thereby and adapted to be projected forward therefrom to a considerable distance, said structure comprising freely extensible telescopic side members and transverse means connecting the forward ends of the forward members, and suitable film-frame holding and adjusting mechanism supported from said transverse means.

26. A shiftable holdfast having a weighted base, standards rising from opposite ends of said base, horizontally sliding members mounted in carriages, said carriages being guided by said standards, telescoping members sliding in the horizontal members, a transverse bar connecting said telescoping members, a transverse sliding flying structure supported from said bar and film frame holding and micrometric adjusting mechanism supported from said flying structure.

27. Film-frame apparatus for utilizing printing-films, comprising a shiftable holdfast having a transversely elongated weighted base with standards at its ends, carriages mounted in said standards, means for simultaneously raising said carriages, a flying structure including a transverse bar supported from said carriages, and film-frame holding and micrometric-adjusting mechanism supported from said flying structure so as to be projectable forward to a point remote from said holdfast.

28. Film-frame apparatus for utilizing printing-films, comprising a shiftable holdfast having a weighted base provided with laterally-spaced standards, vertically movable carriages on said standards, tubes slidable forward and rearward in said carriages, rods slidable in said tubes, transverse means connecting the forward parts of said rods, and a film-frame supported from said transverse means.

29. Film-frame apparatus for utilizing printing-films, comprising a support provided with parts affording laterally spaced parallel horizontal bearings, tubes slidable in said bearings forward and rearward of

said base, rods slidable in said tubes, and means for locking said tubes to their bearings and said rods in said tubes, in combination with means for holding and micrometrically-adjusting a film-frame supported from said rods.

30. Film-frame apparatus for utilizing printing films, comprising a base provided with parts affording parallel horizontal bearings, tubes slidable in said bearings forward and rearward of said base, rods slidable in said tubes, said tubes having enlargements at their front ends constituting limit stops for engagement with the bearing parts and set screws in said enlargements for locking said rods, said tubes being provided also with rear limit stops, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the holdfast.

31. Film-frame apparatus for utilizing printing-films, comprising a base provided with parts affording parallel horizontal bearings, tubes slidable in said bearings forward and rearward of said base, rods slidable in said tubes, said tubes having plugs closing their rear ends and constituting stops to limit the forward movement of said tubes, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the holdfast.

32. Film-frame apparatus for utilizing printing-films, comprising a base provided with parts affording parallel horizontal bearings, tubes slidable in said bearings and provided with internal limit stops intermediate their ends, and rods slidable in said tubes and having projections for contact with said stops, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the holdfast.

33. Film-frame apparatus for utilizing printing-films, comprising a base provided with parts affording parallel horizontal bearings, tubes slidable in said bearings, and rods of materially smaller diameter than the bore of said tubes slidable therein, said tubes and rods being provided between them with short bearings, in combination with film-frame holding and adjusting mechanism supported from said carriages in front of the holdfast.

34. Film-frame apparatus for utilizing printing-films, comprising a base provided with parts affording parallel horizontal bearings, tubes slidable in said bearings, and rods of materially smaller diameter than the bore of said tubes slidable therein, said tubes being provided internally with a short bearing at its front end and a stop intermediate its ends, and said rods being provided with an enlargement at their rear ends constituting a short bearing and also a stop for contact with the stop in the tubes, in combination

with film-frame holding and adjusting mechanism supported from said carriages in front of the holdfast.

35. In a film-frame apparatus for utilizing film-frames, in combination with a suitable shiftable, elongated base, and suitable film-frame holding and micrometric-adjusting apparatus carried by standards rising from opposite ends of said base: intermediate supports comprising horizontal parallel boxes, separate collet bearings in the opposite ends of said boxes, tubes slidable in said collet bearings, and means carried by the boxes intermediate said collet bearings for locking the tubes in position.

36. In a film-frame apparatus for utilizing film-frames, in combination with a suitable primary support, and suitable film-frame holding and micrometric adjusting apparatus: intermediate supports comprising horizontal parallel boxes having short remotely-spaced bearings, tubes slidably mounted therein, each box having an elongated bearing surface between said bearings contacting with one side of its tube, an opposed clamp block in each box contacting with a considerable length of the tube and distributing the pressure therealong, and a set screw for actuating said block.

37. In a film-frame apparatus for utilizing film-frames, in combination with a suitable primary support, and suitable film-frame holding and micrometric-adjusting apparatus: intermediate supports comprising horizontal parallel boxes having short remotely-spaced bearings, tubes slidably mounted therein, each box having an elongated bearing surface between said bearings contacting with one side of its tube, an opposed clamp block in each box having V-shaped bearing surfaces contacting with a considerable length of the tube and distributing the pressure therealong, and a set screw for actuating said block.

38. In a film-frame apparatus for utilizing film-frames, in combination with a suitable primary support, and suitable film-frame holding and micrometric-adjusting apparatus: intermediate supports comprising horizontal parallel boxes having short remotely-spaced bearings, shafts slidable therein, each box having a bearing surface between said bearings contacting with its shaft at one side, an opposed spring-released clamp block in each box, and a set screw for actuating the same.

39. A film frame apparatus, comprising a weighted base, a standard rising therefrom, a carriage carried by said standard and guided for rectilinear movement lengthwise of said base, said carriage being movable from end to end of said base and giving the film frame a movement over a wide extent without disturbing the micrometric adjustments of the frame, a horizontal rod cen-

trally mounted in said carriage and slidable endwise therein through a wide range beyond the end positions of said carriage, film frame holding devices mounted on said rod and means for micrometrically adjusting said film frame sidewise.

40. A film-frame apparatus for utilizing printing-films, comprising a base having a transverse way, a relatively narrow sliding carriage thereon movable in either direction from a central position on the way, a transverse member parallel to the way mounted for extended endwise movement on said carriage, and pivotal supports for a film-frame carried by said member.

41. A film-frame apparatus for utilizing printing-films, comprising a base having a transverse way, a relatively narrow sliding carriage thereon movable in either direction from a central position on the way, a transverse member parallel to the way mounted for extended endwise movement on said carriage, means for locking the carriage and the transverse member at any position and pivotal supports for a film-frame carried by said member.

42. A film-frame apparatus for utilizing printing-films, comprising a base, a film-frame, and means for securing extended lateral movement of the film-frame in opposite directions from a central position relative to the base, comprising a plurality of successively supported carriages adapted for extended lateral movement relative to each other.

43. A film-frame apparatus for utilizing printing-films, comprising a base, film-frame hinge supports, and means for securing extended lateral movement of the film-frame hinge supports in opposite directions relative to a central position, comprising a transverse way member carried by the base, a carriage movable and lockable along said way member, and a transverse support movable endwise and lockable at its several positions on said support.

44. In a film-frame apparatus for utilizing printing-films, a support, a carriage rectilinearly movable across the support, a transverse rod or the like parallel to the direction of movement of the carriage and movable endwise and lockable thereon, and film-frame hinge supports mounted on said rod and spaced materially from the sides of said supporting part.

45. In a film-frame apparatus for utilizing printing-films, an endwise sliding carriage, having a bearing, a transverse rod or the like movable endwise in said bearing and lockable thereto, film-frame hinge supports mounted movably on said rod, and stops on said rod distinct from said supports for contacting with said bearing.

46. In a film-frame apparatus for utilizing printing-films, the combination of a base

or support, a laterally movable carriage supported thereby, a transverse rod or the like movable endwise and lockable on said carriage, mechanism for pivotally holding and effecting micrometric-adjustment of a film-frame having portions thereof mounted on said rod at opposite sides of the carriage, and stops on said rod between said portions and cooperating abutment regions on said carriage, said stops being spaced apart at a distance materially greater than the distance between such abutment regions.

47. In a film-frame apparatus for utilizing printing-films, the combination of a base or support, a laterally movable carriage supported thereby, a transverse cylindrical longitudinally slotted rod slidable endwise but held against rotation in said carriage, means on the carriage for locking the rod at any position and means carried by said rod for tiltably supporting and micrometrically adjusting a film-frame.

48. In a film-frame apparatus for utilizing printing-films, the combination with a base or support, and film-frame pivoting and micrometrically-adjusting mechanism, of intermediate supporting and adjusting means including a way member disposed crosswise at the front of the machine and transversely inclined in a downward and forward direction, and a correspondingly inclined carriage mounted on said way member for movement from side to side of the machine.

49. In a film-frame apparatus for utilizing printing-films, the combination with a base or support, and film-frame pivoting and micrometrically-adjusting mechanism, of intermediate supporting and adjusting means including a way member disposed crosswise at the front of the machine and transversely inclined in a downward and forward direction, a correspondingly inclined carriage mounted on said way member for movement from side to side of the machine and an elongated support carried by the lower part of said carriage parallel to the longitudinal axis of said way member and movable and lockable longitudinally of the carriage.

50. In a film-frame apparatus for utilizing printing-films, the combination with a base or support, and film-frame pivoting and micrometrically-adjusting mechanism, of intermediate supporting and adjusting means including a way member disposed crosswise at the front of the machine, a downward extending carriage mounted slidably on said way member for movement from side to side of the machine, and an elongated support parallel to said way member carried by the lower part of said carriage and endwise adjustable thereon.

51. In a film-frame apparatus for utilizing printing-films, the combination with a

base or support, and film-frame pivoting and micrometrically-adjusting mechanism, of intermediate supporting and adjusting means including a way member disposed crosswise at the front of the machine, a carriage mounted on said way member for movement across the front of the machine and extending downward and forward from said way member, and a supporting rod or the like carried by the lower front part of said carriage.

52. In a film-frame apparatus for utilizing printing-films, the combination of a weighted base or holdfast, vertically movable carriages thereon, forwardly projectable members carried by said carriages, a transverse way member carried by said projectable members at the front of the machine, a carriage mounted on said way member for movement across the front of the machine, a rod or the like parallel to said way member and mounted for endwise movement but held against rotation in said carriage below and in front of said way member, and film-frame pivoting and micrometrically-adjusting mechanism supported from said rod.

53. In a film-frame apparatus for utilizing printing-films, the combination with a base or support, standards rising from opposite ends of said support, carriages guided in said standards, of a transverse guiding and supporting member connecting said carriages provided with oppositely directed edge ride-ways, a carriage slidable on said member, being provided with correspondingly grooved portions engaging said ride-ways, a rod slidable through said carriage parallel to the movement thereof, and a film-frame supported from said rod.

54. In a film-frame apparatus for utilizing printing-films, the combination with a weighted base having standards rising from opposite ends, carriages mounted in said standards, and film-frame pivoting and micrometrically-adjusting mechanism, of intermediate supporting parts comprising a transverse member connecting said carriages and having beveled edge ride-ways on opposite sides, a carriage provided with correspondingly formed portions embracing said edge ride-ways, one of said portions being movable, means for forcing said portion against its ride-way to bring the carriage into clamping engagement with both ride-ways, and a rod slidable endwise in said carriage parallel to the movement thereof.

55. In a film-frame apparatus for utilizing printing-films, the combination with a weighted base or holdfast, and a tiltable film-frame, of intermediate supporting and adjusting parts including a transverse way member, a carriage slidable thereon across the front of the machine and embracing the

way member, a clamp shoe carried by the carriage, resilient means tending to free said clamp shoe from the way member, and a set screw for locking the clamp shoe against the way member.

56. A film-frame apparatus for utilizing printing-films, comprising a weighted base or holdfast, a frame movable forward and backward relative thereto and being supported therefrom, said frame comprising slidable side members and a transverse way member connecting the forward ends of said side members, a carriage mounted on said way member for extended movement across the front of the machine, a rod slidable endwise on said carriage parallel to the movement thereof, and film-frame holding and micrometric-adjusting mechanism supported by said rod.

57. A film-frame apparatus for utilizing printing-films, comprising a weighted base or holdfast, a frame movable forward and backward relative thereto and being supported therefrom, said frame comprising slidable side members and a transverse way member connecting the forward ends of said side members, a carriage mounted on said way member for extended movement across the front of the machine, a rod or the like carried by said carriage parallel to said way member and capable of extended endwise movement in said carriage, and micrometric film-frame adjusting and holding devices supported by said rod.

58. A film-frame apparatus for utilizing printing-films, comprising a weighted base or holdfast, a structure forwardly projectable from said holdfast comprising telescopic side members and a transverse way member connecting the forward ends of the forward sections of said side members, a carriage mounted on said way member for extended movement across the front of the machine, a rod slidable endwise on said carriage parallel to the movement thereof, and film-frame holding and micrometric-adjusting mechanism supported by said rod.

59. A film-frame apparatus for utilizing printing-films, comprising a weighted base or holdfast, laterally-spaced standards thereon, carriages vertically movable on said standards, a frame movable forward and backward with relation to the base and comprising side members slidable in said carriages and a transverse way member connecting said side members, a carriage mounted on said way member for extended movement across the front of the machine, a rod slidable endwise on said carriage parallel to the movement thereof, and film-frame holding and micrometric-adjusting mechanism supported by said rod.

60. A film-frame apparatus for utilizing printing-films, comprising a weighted base or holdfast, a structure forwardly project-

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able from said holdfast comprising telescopic side members and a transverse way member connecting the forward ends of the forward sections of said side members, a carriage 5 mounted on said way member for extended movement across the front of the machine, a rod or the like carried by said carriage parallel to said way member and capable of extended endwise movement in said carriage, and micrometric film-frame adjusting 10 and holding mechanism supported by said rod.

61. A film-frame apparatus for utilizing printing-films, comprising a weighted base 15 or holdfast, laterally-spaced standards therein, carriages movable vertically on said standards, a forwardly projectable structure comprising telescopic side members the rear sections of which are slidably 20 mounted in said carriages and a transverse way member connecting the forward ends of the forward sections of said side members, a carriage mounted on said way member for extended movement across the front 25 of the machine, and film-frame holding and micrometric-adjusting mechanism supported from said carriage.

62. A film-frame apparatus for utilizing printing-films, comprising a weighted base 30 having standards, carriages mounted therein, a slidably guided carriage projectable forward from said carriages, a laterally movable carriage mounted on the forward projectable carriage and freely slidable thereon 35 at right angles to the movement thereof, and a second freely slidable laterally movable carriage mounted on the other laterally

movable carriage and carrying the film-frame, whereby a wide range of lateral adjustment is secured.

63. A film-frame apparatus for utilizing printing-films, comprising a weighted base or holdfast, vertically movable carriages thereon, a forward projectable carriage 40 mounted on said vertically movable carriages, and two laterally movable carriages one mounted on the forward projectable carriage and the other supported by the first, and film-frame hinge supports carried by 45 the last carriage.

64. In a film-frame apparatus, the combination with a film-frame and micrometric-adjusting mechanism therefor, of supporting means including a weighted base or 50 holdfast, and a vertical pivot member passing therethrough and having a wood screw for securing to a table or the like.

65. In a film-frame apparatus, the combination with a film-frame and micrometric-adjusting mechanism therefor, of supporting means including a weighted base or 55 holdfast, a vertical pivot member passing therethrough and having means for securing to a table or the like, an angle scale on the base, and a pointer secured to and rotatably 60 adjustable on said pivot.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

BENJAMIN DAY.

Witnesses:

EDWARD C. HOLMES,
H. DONALD HOLMES.