

April 22, 1924.

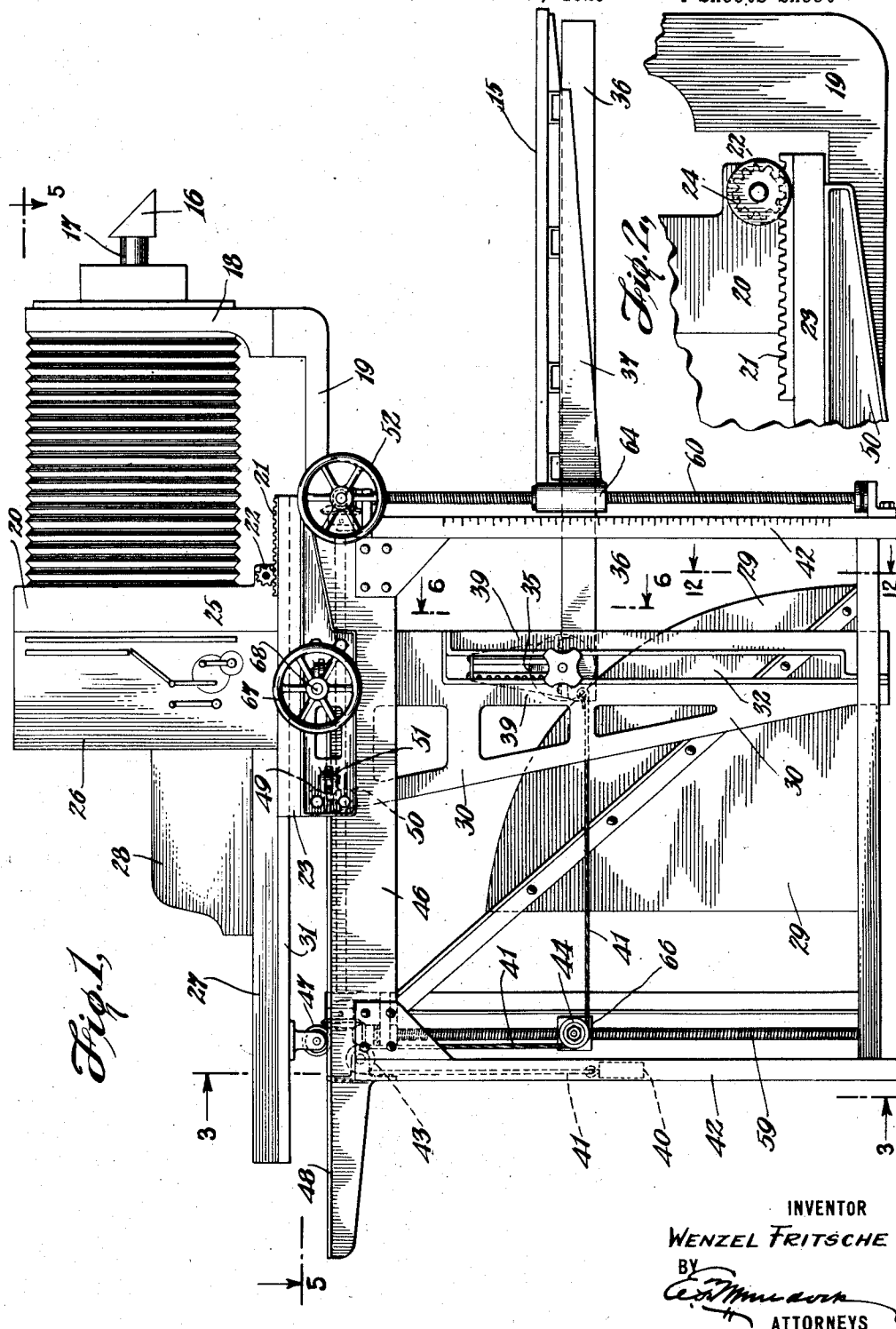
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W. FRITSCHÉ

PHOTOGRAPHIC COPYING MACHINE

Filed March 25, 1921

4 Sheets-Sheet 1



April 22, 1924.

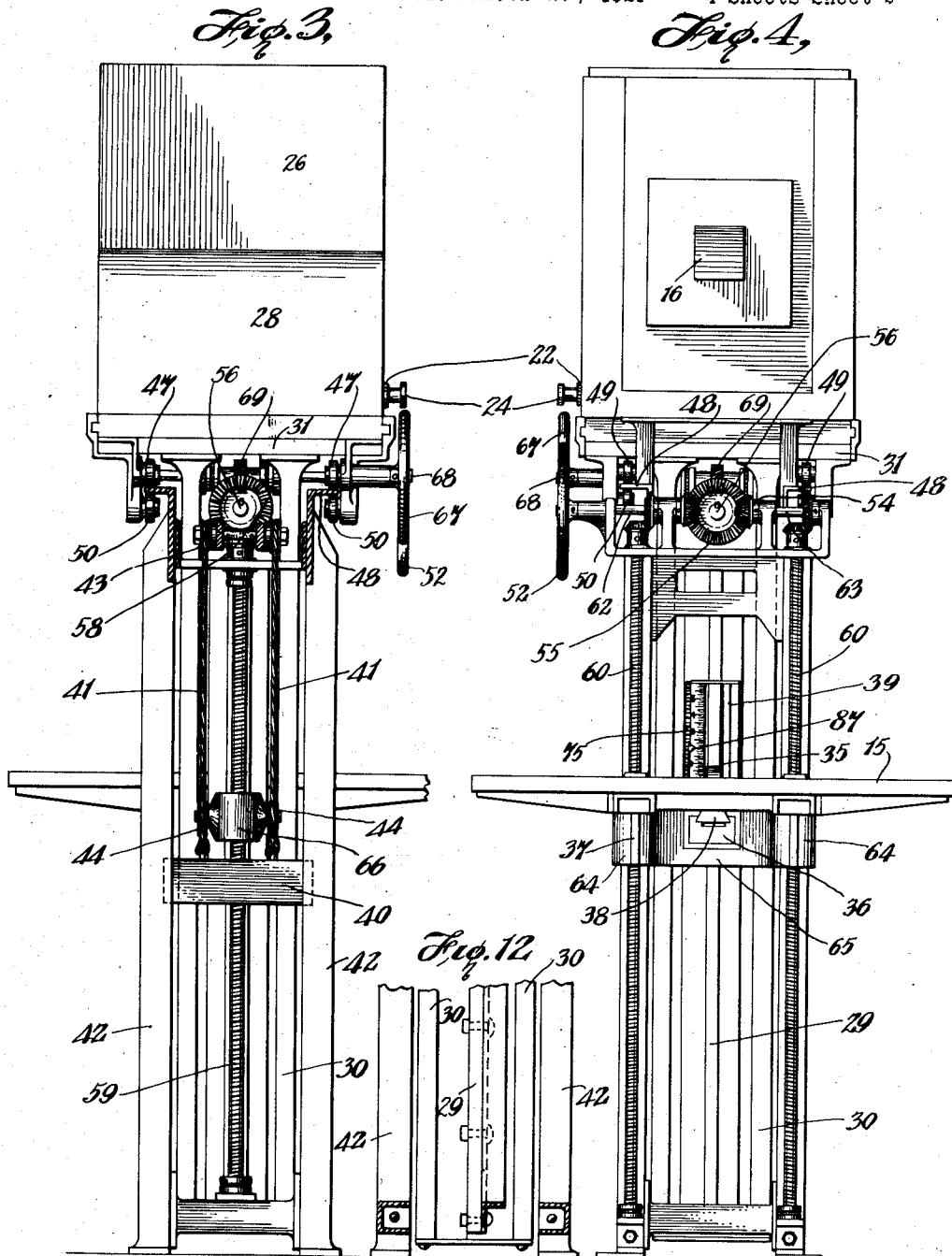
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PHOTOGRAPHIC COPYING MACHINE.

Filed March 25, 1921

4 Sheets-Sheet 2



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April 22 , 1924.

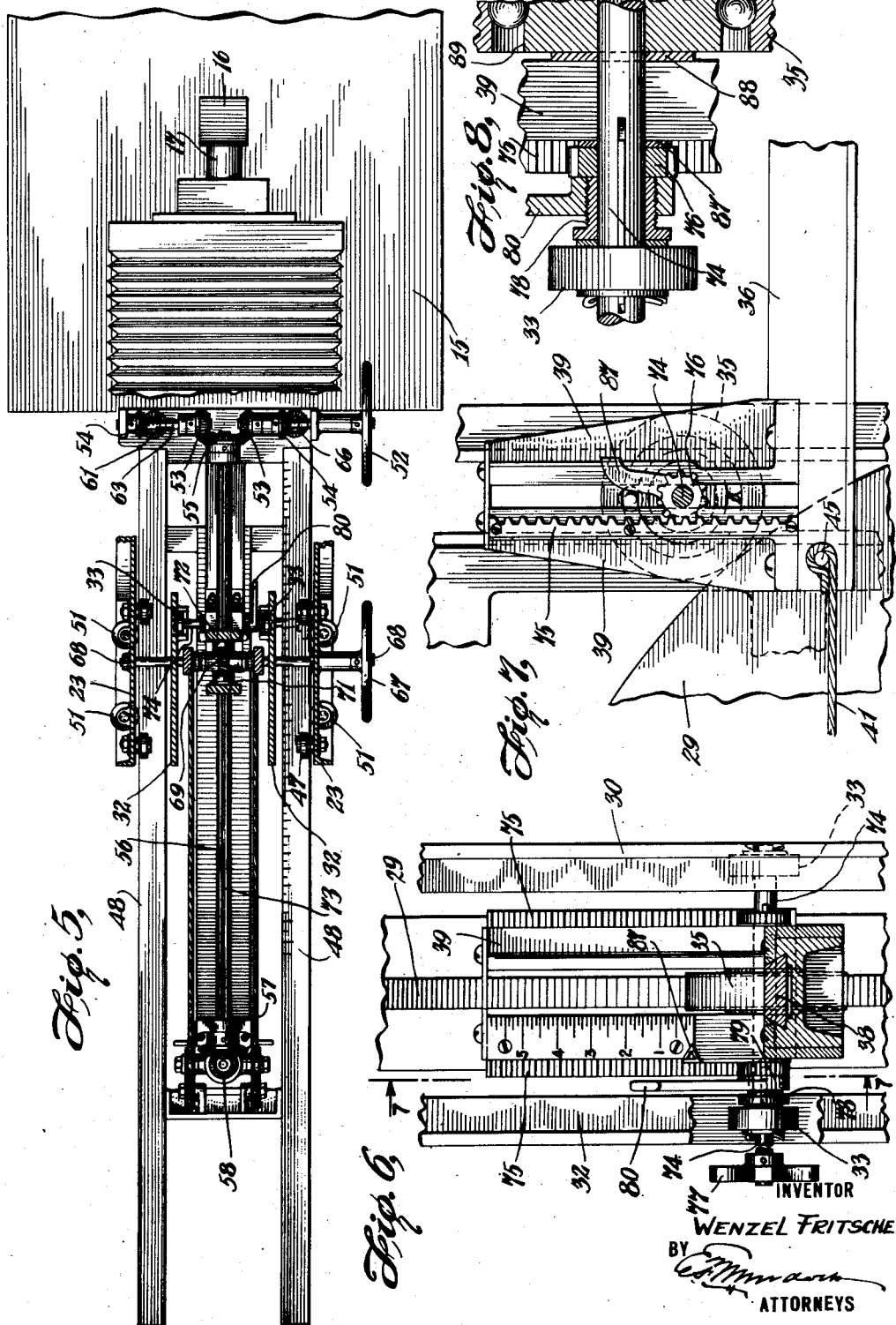
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PHOTOGRAPHIC COPYING MACHINE

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April 22, 1924.

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PHOTOGRAPHIC COPYING MACHINE

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4 Sheets-Sheet 4

Fig. 9,

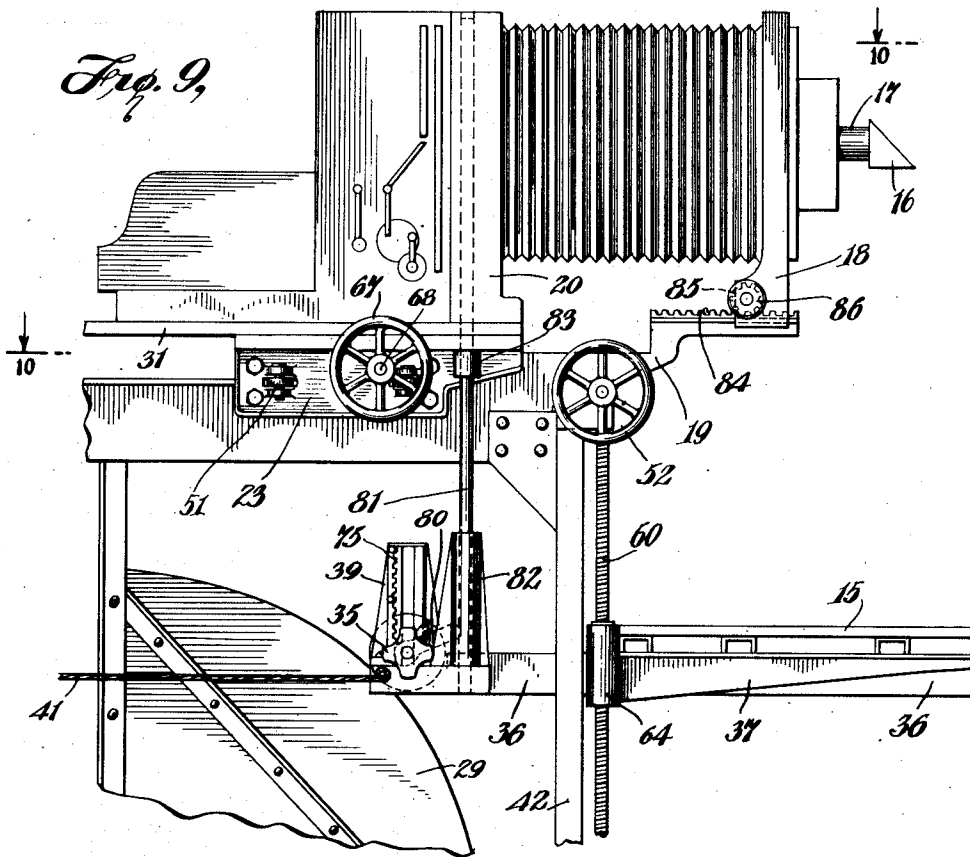


Fig. 10,

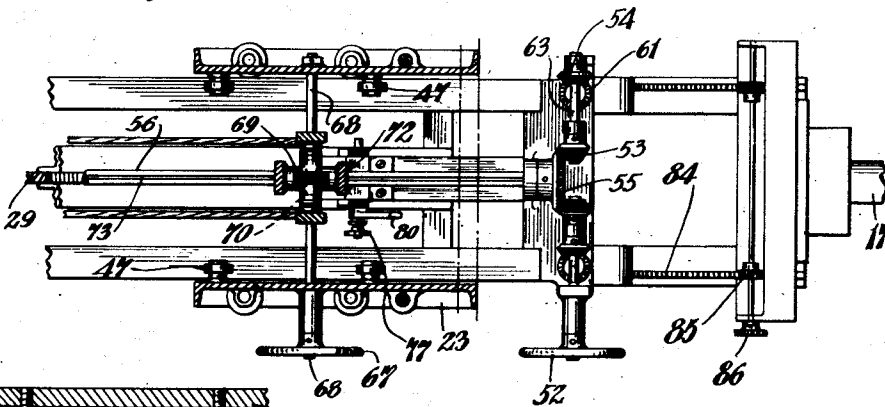
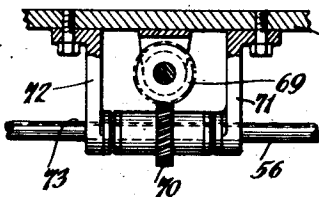


Fig. 11,

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UNITED STATES PATENT OFFICE.

WENZEL FRITSCHÉ, OF NEW YORK, N. Y.

PHOTOGRAPHIC COPYING MACHINE.

Application filed March 25, 1921. Serial No. 455,595.

To all whom it may concern:

Be it known that I, WENZEL FRITSCHÉ, a citizen of Germany, and a resident of New York city, in the county and State of New York, have invented certain new and useful Improvements in Photographic Copying Machines, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to automatically focus the camera employed in machines of the character mentioned in correspondence with the disposition of the copy table of said machine; to vary the operation of the automatic mechanism in correspondence with the requirements of the camera and work to be performed; to vary the working condition of the machine to suit various conditions of the copy board and of the object to be photographed when disposed thereon; to provide a record for duplication of operating conditions of the said machine; and to simplify the construction of the machine.

Drawings.

Figure 1 is a side elevation of a machine of the character mentioned, constructed and arranged in accordance with the present invention.

Figure 2 is a detail view on enlarged scale showing the means for adjusting the camera for varying the working condition thereof.

Figure 3 is a vertical section looking forward from the rear of the machine, the section being taken as on the line 3—3 in Figure 1.

Figure 4 is a front elevation of the machine.

Figure 5 is a horizontal section on enlarged scale the section being taken as on the line 5—5 in Figure 1.

Figure 6 is a detail view on enlarged scale showing in section a mechanism for varying the working position of the copy board, the section being taken as on the line 6—6 in Figure 1.

Figure 7 is a section taken on the line 7—7 in Figure 6.

Figure 8 is a detailed view on enlarged scale showing the construction of the mechanism for adjusting the copy board.

Figure 9 is a side elevation showing a

machine as characterized, constructed and arranged in accordance with the modified form of the invention.

Figure 10 is a horizontal section of the same, the section being taken as on the line 10—10 in Figure 9.

Figure 11 is a detail view showing method of transmitting the operating movement for adjusting the camera to the copy board.

Figure 12 is a detail view showing the method of mounting the cam plate or shifting the rear frame of the camera.

Description.

The class of machines to which the present invention more particularly relates is that employed in commercial photography, and usually for making photographic copies of drawings, prints or other objects which are supported on a copy table or board 15.

The table 15 in the usual form of machine is mounted to move vertically for varying the distance between the said table and the reflector 16 of the photographic camera. The reflector 16 shown in the drawings is the usual prismatic lens which diverts rays of light from lines perpendicular to those parallel with the axis of the lens tube 17 mounted on the camera front board 18.

In the preferred form of the machine the board 18 is permanently mounted on the machine of the frame by the brackets 19. By this arrangement the center of the reflector 16 approximates the center of the board 15.

The focusing of the camera is effected by shifting the plate holder 20, wherein the focusing member such as ground glass, plate, or other substitute is mounted. A preliminary focusing is accomplished by means of the rack 21 and pinion 22 on the frame 23. The pinion 22 is manipulated by the hand wheel 24 fixedly mounted on the shaft 25. It will be understood that subsequent to the camera being focused by manipulating the pinion 22, the pinion is not changed for subsequent exposures, though the focusing of the camera with reference to the copy board 15 may vary.

After the preliminary focusing has been effected the box 26 carrying the sensitive element such as plates, film pack, or film rolls, is adjusted and locked to the plate

holder 20 upon the frame 27. The box 26 and developing case 28 may be of any known and approved construction.

The movement of the plate holder 20 and parts connected therewith is controlled by a cam plate 29 and the dropped frames 30 which are permanently mounted on the base board 31 of the camera. The frames 30 have each a vertical slot 32 to form runways for the guide rollers 33 at the opposite ends of the shaft 34, whereon is mounted the roller 35, as shown best in Fig. 6 of the drawings.

The position of the roller 35 on the cam plate 29 controls the disposition of the plate holder 20 and parts connected therewith, and the position of the roller 35 on the cam plate 29 is regulated by the elevation and depression of the table 15, the said roller being connected with the said table by the beam 36, which as shown best in Fig. 1 of the drawings extends forward under the table 15, and between the supporting brackets 37 thereof.

As seen best in Fig. 4 of the drawings the beam 37 is a rectangular tube having on the upper side thereof a longitudinal slot, the edges whereof are chamfered to fit the dove-tail cleat 38 pendant from the under side of the supporting structure of the table 15, which cleat is extended rearward to the frame 39 in which the roller 35 is mounted. This construction secures to the moving parts the desired smoothness and accuracy of operation.

The roller 35 is held firmly engaged with the edge of the cam plate 29 by the dead-weight, which as shown best in Figure 3 of the drawings is suspended at the end of cables 41 in guide frames 42. The cables 41 are roved over the sheaves 43 and 44 and are anchored to the pins 45 in the sides of the beam 36 adjacent the inner end thereof, (see Figure 7 of the drawings).

From the foregoing it is obvious that at all times the weight 40 exerts through the cables 41, a sufficient pull on the beam 36 and parts connected therewith, to draw the same backward as the curvature of the cam plate 29 permits the retraction of the roller 35. The dropped frame 30, base board 31, and frame 23, and parts connected therewith move lengthwise of the supporting frame 46 in correspondence with the movement of the roller 35. To this end the base board 31 is mounted on rollers 47 which track on the flanges 48 of the angle bars forming the frame 46. The base board is also supported on rollers 49 mounted on the frame 23 which frame is also supplied with rollers 50 that extend below the flanges 48, as seen best in Figures 3 and 4 of the drawings to steady the operation of the said base board and the plate holder 20 mounted thereon. The action is further steadied by

the guide rollers 51 which are horizontally disposed to bear against the side edge of the flanges 48. The machine is usually operated by means of the hand wheel 52. This wheel as is best shown in Fig. 5 of the drawings is mounted on a shaft carrying beveled gears 53 and 54, the former being meshed with the bevel gear wheel 55 disposed at the end of a transmission shaft 56, which shaft is provided at the opposite end with a bevel gear 57, the teeth whereof mesh with a corresponding bevel gear 58 on the upper end of the screw 59. Operating in correspondence with the screw 59 are the screws 60 which are provided at their upper ends with the bevel gears 61 that mesh with the gears 54 on the shafts 62 and 63.

It will be noted that the wheel 54 on the shaft 63 engages the bevel gears 61 with which it is associated on the same side of the said gears as the gear wheel 54 engages the gear wheel 61 on the shaft 62. This arrangement insures the same direction of rotation to the two screws 60. The threads of the screws 60 engage tapped perforations in the bosses 64 of the supporting brackets 37. The bosses 64 as seen best in Fig. 4 of the drawings are integrally connected by a bridge 65 in which a squared perforation is formed to carry and guide the beam 36.

The arrangement of the screws 59, and 60 with the connecting shaft 56 and transmission gears all operatively engaged as described insures a correspondence in the elevation and depression of the bracket 37, beam 36 and the nut 66 on which the sheaves 44 are mounted. The arrangement takes care of the direct pull of the cable 41 on the frame 39 on which the roller 35 is mounted at all times and in all positions of the table 15.

During the operation of focusing the camera on the object placed on the table 15 it is found more convenient to use the hand wheel 67 which is mounted on the frame 23. The hand wheel 67 is rigidly mounted on the shaft 68 at the center of which a spiral gear, wheel 69 is mounted. The spiral gear wheel 69 is meshed with a mated spiral gear wheel 70 as seen best in Fig. 11 of the drawings. The wheel 70 is rigid on the nut 71. The nut 71 is mounted between brackets 72 which are pendant from the base board 31. The nut 71 is provided with a key that fits the slot 73 in the shaft 56. This arrangement makes it possible to slide the nut 71 and parts connected therewith lengthwise of the shaft 56 when rotating the same. Also it provides that when the hand wheel 67 and shaft 68 are rotated, the shaft 56 is rotated with the same result as accomplished when the hand wheel 52 is rotated.

During the operation of focusing, the ma-

chine is provided with a focusing plate of ground glass usually provided in photographic cameras. Before the copying occurs it becomes necessary to properly adjust the camera and the copy board. To this end the focusing is accomplished by means of the hand wheel 67 and the mechanism connected therewith as just above described. It will, however, be understood that the copy matter may sometimes vary in thickness, or objects of various thickness may be successively photographed. It is to accommodate this variation and to avoid the necessity of continually focusing the camera that the hand wheel 24, rack 21 and pinion 22 are provided. It will be understood that when the rack 21 and pinion 22 are operated, the plate holder 20, box 26 and case 28 slide on the base board 31, and that the manipulation of the said rack and pinion does not affect the operating conditions of the shifting mechanism connected with the hand wheel 67.

It will be understood that after the preliminary adjustment of the camera to the copy table has been effected the focusing mechanism is not again touched for the reason that the plate holder 20 and parts connected therewith are shifted automatically by the weight 40 and regulated by the curvature of the cam plate 29, the said curvature being platted to permit longitudinal movements of the said copy holder corresponding with the variation in the focal distance and the focal requirement of the lens being used during the subsequent elevation and depression of the table 15.

In service it often becomes necessary to vary the relation of the plate holder 20 to the lens in the tube 17 without disturbing the relation of the table and the lens. When this is desired, the relation between the roller 35 and the beam 36 is changed. To this end the roller is mounted on the shaft 74 and the shaft 74 is supported by racks 75 with the teeth of which pinions 76 engage. The shaft 74 as best seen in Fig. 6 has a hand wheel 77. The shaft 74 has a screw-threaded section 78 with the threads of which a nut engage. The nut 79 has a lever 80 by means of which the nut may be turned. When it is turned to jam the pinion 76 to which it is adjacent, the said pinion becomes locked, making it impossible thereafter to raise or lower the shaft 74.

With the mechanism installed it is obvious that by turning the hand wheel 77, the position of the roller 35 on the rack 75 and between the sides of the frame 39, is varied, thereby permitting the beam 36, roller 35, frame 30 and camera parts connected with the base board to retract in proportion to the lift of the roller 35 without disturbing the fixed position of the table 15. It is obvious that as the plate

holder of the camera is retracted or advanced toward the lens frame, an enlargement or diminution of the photographed image is accomplished.

In Figures 9 and 10, I have shown a machine constructed and arranged in correspondence with certain modifications of structure embodying the invention.

The principal modification consists in substituting for the frames 30 upright standards 81, which as seen best in Figure 9 of the drawings are permanently attached by means of socketed bosses 82 to the beam 36. The standards have sliding engagement with the frames 23, the perforated brackets 83 being extended from the sides of the said frames and in line with perforations extended through the frame-work of the plate holder 20. This modification simplifies the construction and permits closer adjustment of the plate holder 20 with the front board 18.

A further modification consists in providing the brackets 19 with the racks 84, the teeth whereof are meshed with the pinions 85 which are manipulated by the hand wheel 86 for the focusing of the camera by the movement of the front board.

Claims.

1. A photographic copying machine comprising a copy table, a camera having a permanently positioned head and lens therefor; means for varying the approximation of said table and said head; and means operatively connecting said table and the rear frame of the camera for adjusting said rear frame relative to said head in correspondence with the approximation of said table to said head, said means embodying a free moving support for said rear frame, and transmission mechanism for moving said frame in a direction perpendicular to the movement of said table.

2. A photographic copying machine comprising a copy table, a camera having a permanently positioned head and lens therefor; means for varying the approximation of said table and said head; and means operatively connecting said table and the rear frame of the camera for adjusting said rear frame relative to said head in correspondence with the approximation of said table to said head, said means embodying, a cam plate, a supporting structure for said frame pendent therefrom in juxtaposed relation to said cam plate, and a beam slidably connected with said table for retractively engaging the curved edge of said cam plate, said beam being operatively connected with said supporting structure.

3. A photographic copying machine comprising a table, a camera having a permanently positioned head and lens therefor; means for varying the approximation of said table and said head; and means oper-

actively connecting said table and the rear frame of the camera for adjusting said rear frame relative to said head in correspondence with the approximation of said table to said head, said means embodying, a cam plate, a supporting structure for said frame pendent therefrom in juxtaposed relation to said cam plate, a beam slidably connected with said table for retractively engaging the curved edge of said cam plate, said beam being operatively connected with said supporting structure, and a friction reducing member mounted in said supporting structure for engaging the curved edge of said cam plate.

4. A photographic copying machine comprising a camera having a fixed head and a movable rear frame; a cam plate having a fixed relation to said head and operatively engaging said rear frame for governing its working position in relation to the focal distance between the lens in said head and the object being copied; means for retractively holding said rear frame in engagement with said cam plate, said means embodying a weighted member, and flexible connection thereof with said rear frame, and guide members for maintaining the pull on said rear frame in horizontal directions; a copy board operatively disposed in relation to said head and flexibly connected with said rear frame, said cam plate, and said weighted member; and means operating in unison for elevating and lowering said table, and a guide for said weighted member.

5. A photographic copying machine comprising a camera having a fixed head and a movable rear frame; a cam plate having a fixed relation to said head and operatively engaging said rear frame for governing its working position in relation to the focal distance between the lens in said head and the object being copied; means for retractively holding said rear frame in engagement with said cam plate, said means embodying a weighted member, and flexible connection thereof with said rear frame, and guide members for maintaining the pull on said rear frame in horizontal directions; a copy board operatively disposed in relation to said head and flexibly connected with said rear frame, said cam plate, and said weighted member; means operating in unison for elevating and lowering said table, and a guide for said weighted member; a movable contact member interposed between said cam plate, rear frame, and table for moving over the edge of said cam plate to vary the position of said frame and table in relation to said cam plate without varying the relation of said table to said head; and vertical guides for said contact member.

6. A photographic copying machine com-

prising a camera having a fixed head and a movable rear frame; a cam plate having a fixed relation to said head and operatively engaging said rear frame for governing its working position in relation to the focal distance between the lens in said head and the object being copied; means for retractively holding said rear frame in engagement with said cam plate, said means embodying a weighted member, and flexible connection thereof with said rear frame, and guide members for maintaining the pull on said rear frame in horizontal directions; a copy board operatively disposed in relation to said head and flexibly connected with said rear frame, said cam plate, and said weighted member; means operating in unison for elevating and lowering said table, and a guide for said weighted member; a movable contact member interposed between said cam plate, rear frame, and table for moving over the edge of said cam plate to vary the position of said frame and table in relation to said cam plate without varying the relation of said table to said head; vertical guides for said contact member; and manipulative means for shifting said contact member independently.

7. A photographic copying machine comprising a camera having a fixed head and a movable rear frame; a cam plate having a fixed relation to said head and operatively engaging said rear frame for governing its working position in relation to the focal distance between the lens in said head and the object being copied; means for retractively holding said rear frame in engagement with said cam plate, said means embodying a weighted member, and flexible connection thereof with said rear frame, and guide members for maintaining the pull on said rear frame in horizontal directions; a copy board operatively disposed in relation to said head and flexibly connected with said rear frame, said cam plate, and said weighted member; means operating in unison for elevating and lowering said table, and a guide for said weighted member; a movable contact member interposed between said cam plate, rear frame, and table for moving over the edge of said cam plate to vary the position of said frame and table in relation to said cam plate without varying the relation of said table to said head; vertical guides for said contact member; manipulative means for shifting said contact member independently; a calibrated member disposed on said guides; and an indicating member connected with said contact member for recording the position of said contact member on said guides.

WENZEL FRITSCHÉ.