Oct. 16, 1934. J. A. SLOBEY 1,977,213

PRINTER'S LINE-UP TABLE

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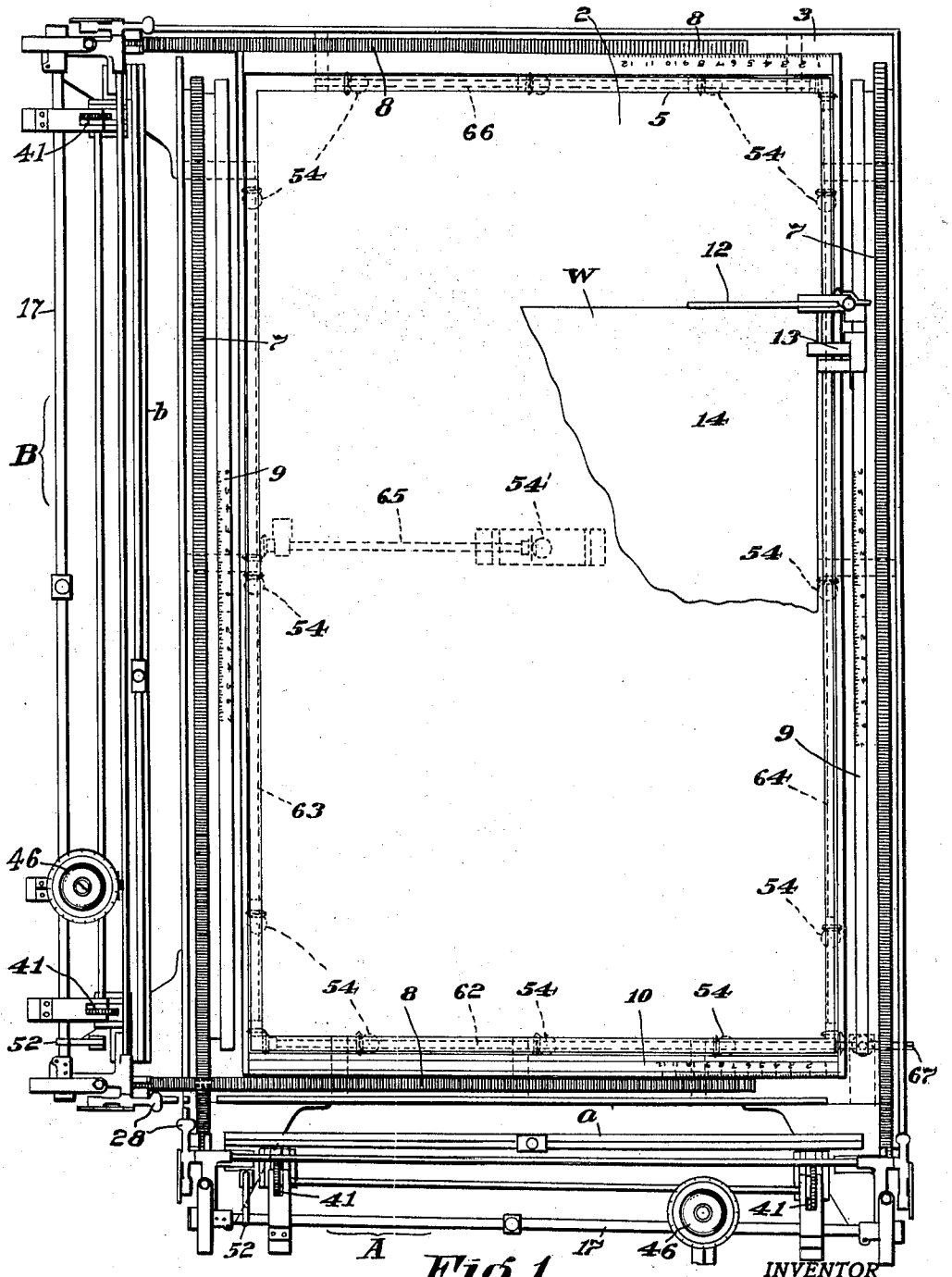


Fig. 1

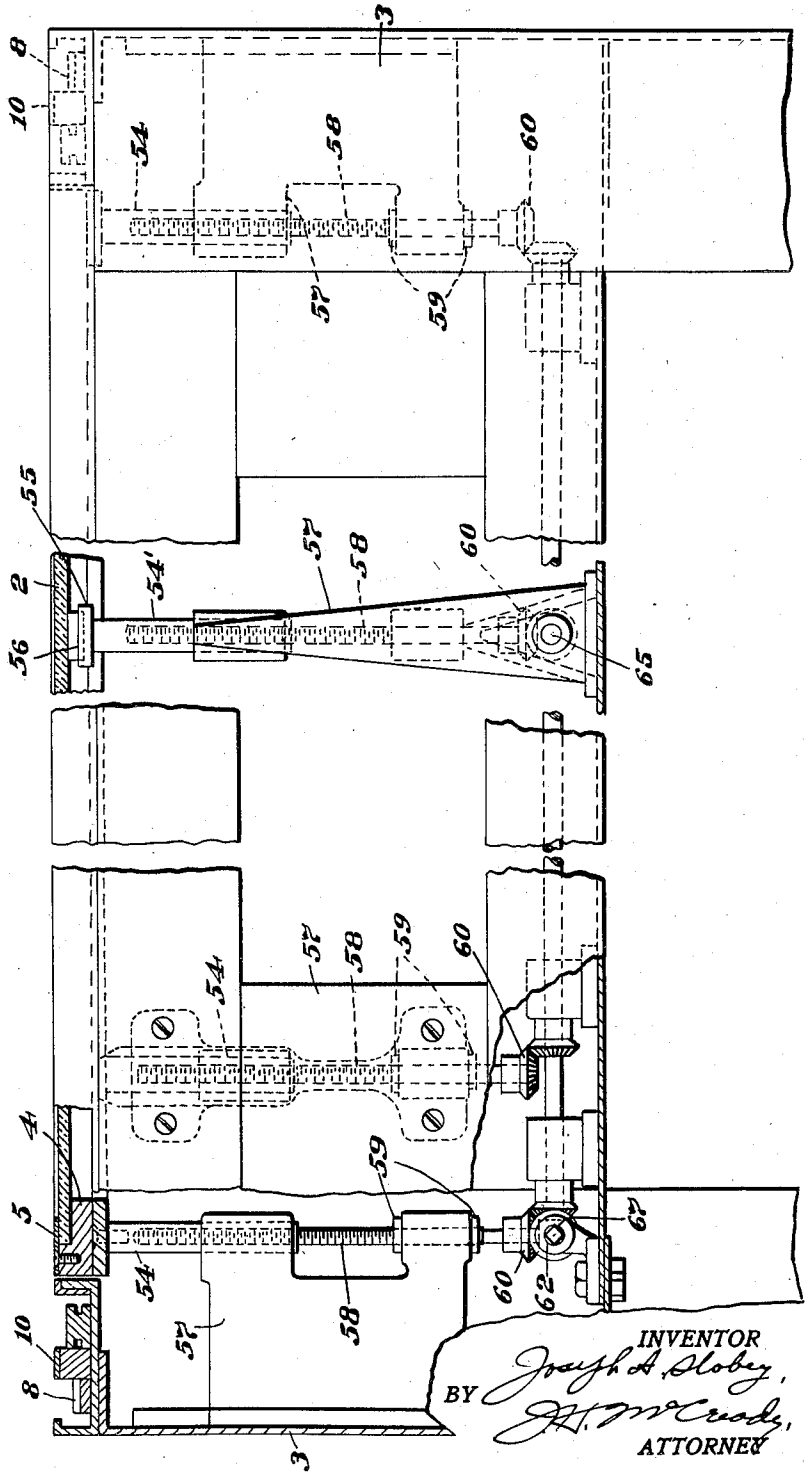
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PRINTER'S LINE-UP TABLE

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Fig. 2



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Fig. 3

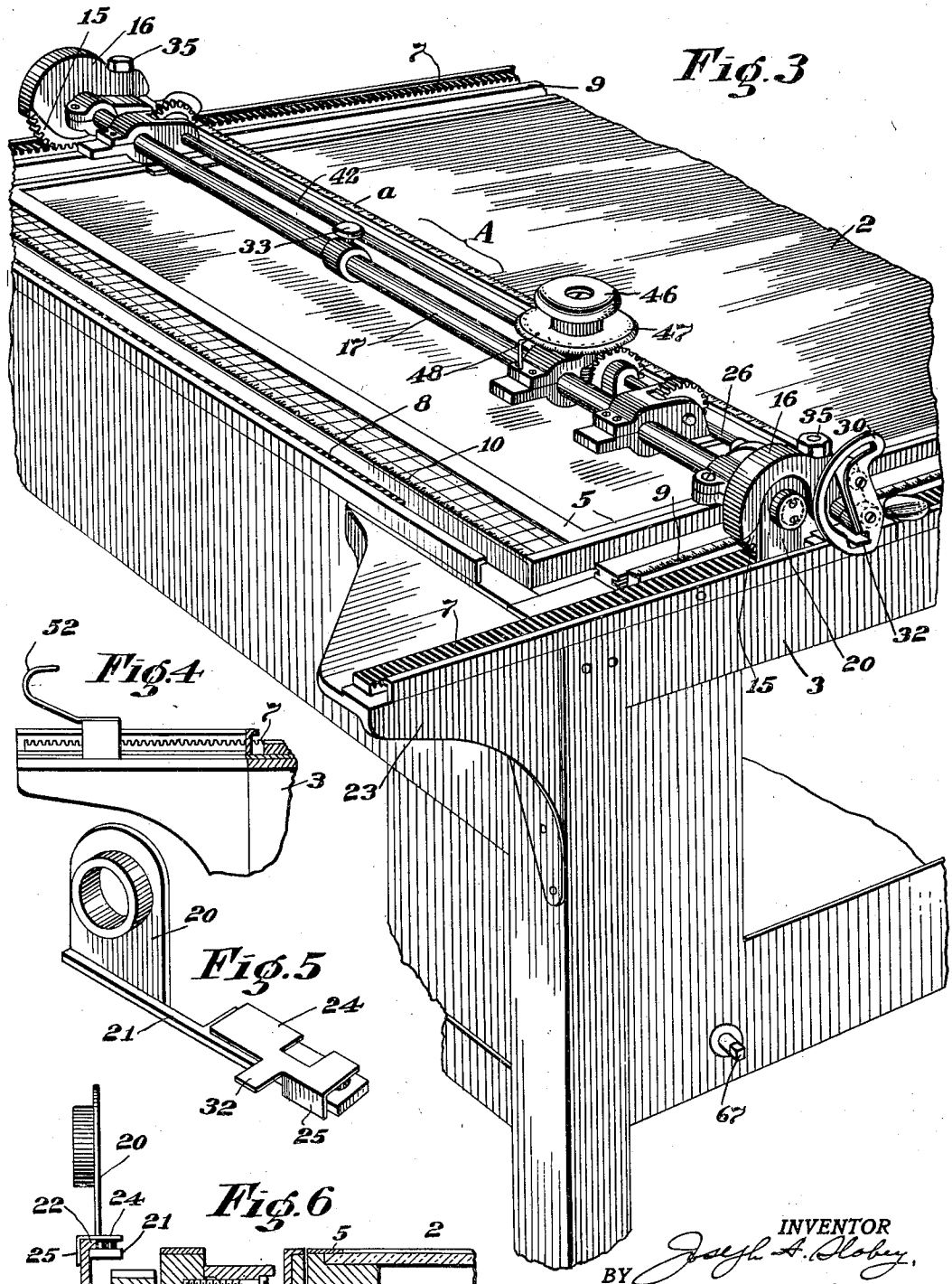


Fig. 4

Fig. 5

Fig. 6

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PRINTER'S LINE-UP TABLE

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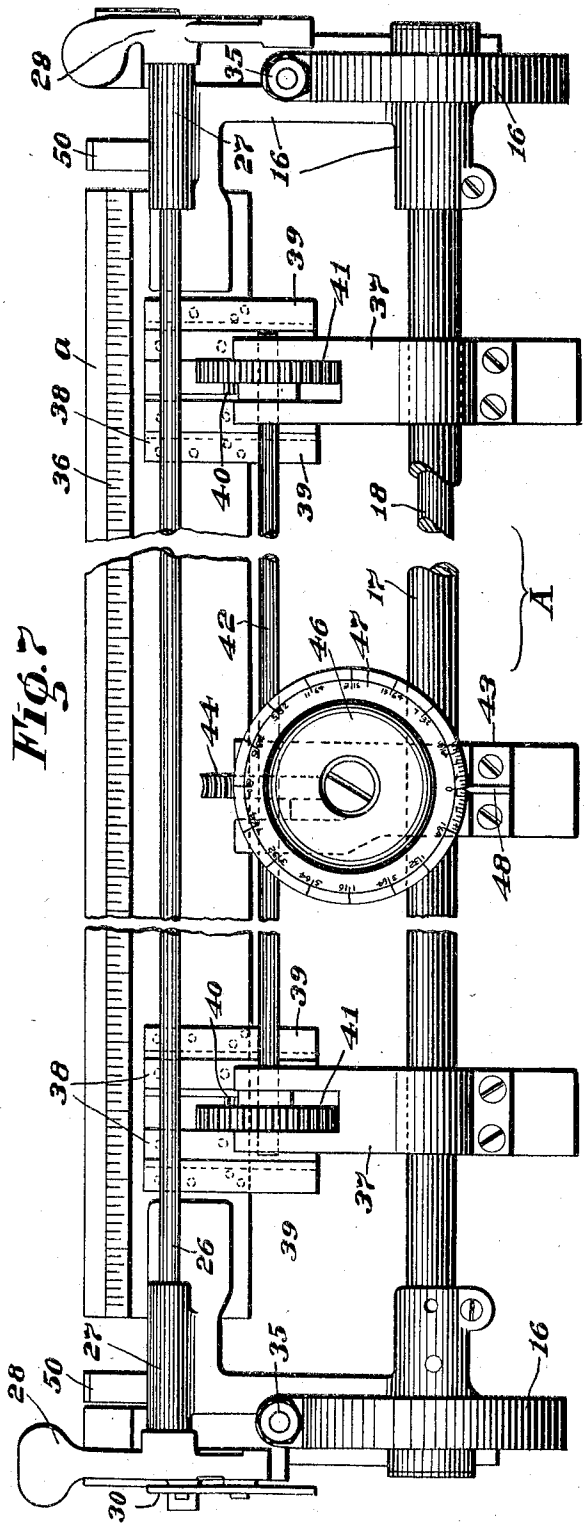


Fig. 7

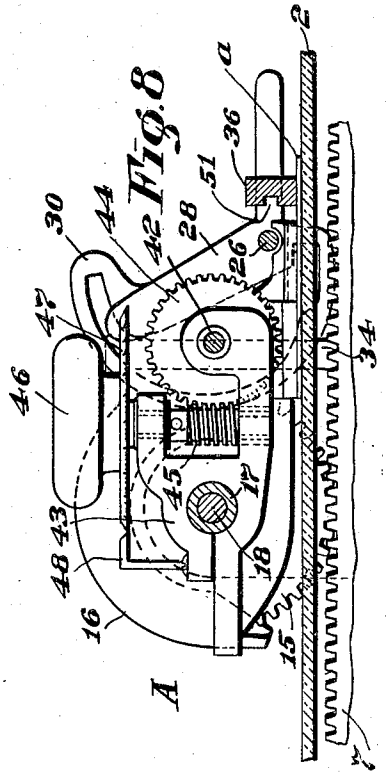


Fig. 8

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Fig. 9

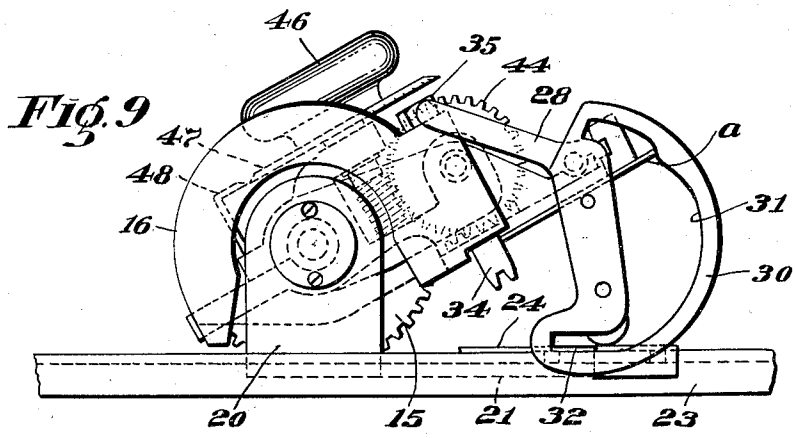
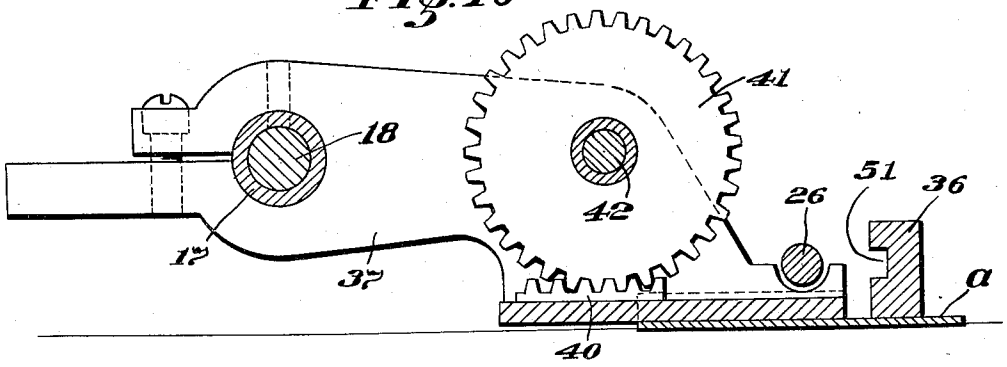


Fig. 10



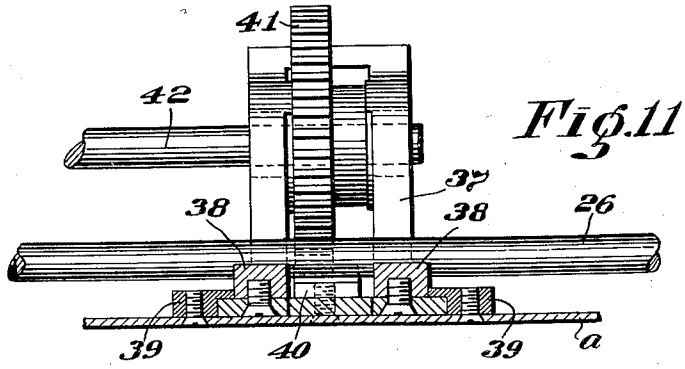


Fig. 11

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Patented Oct. 16, 1934

1,977,213

UNITED STATES PATENT OFFICE

1,977,213

PRINTER'S LINE-UP TABLE

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Application October 5, 1929, Serial No. 397,679

9 Claims. (Cl. 33—80)

This invention relates to apparatus of the character usually referred to as "printer's line-up tables". These tables usually include a table top with two straight edges mounted to move across said top at right angles to each other.

Such tables are used in connection with a great variety of printing work. For example, in multicolor printing it is necessary to make a series of plates, each designed to apply color to a given portion of the printed surface, and an exceedingly accurate registration of the plates must be obtained in order to produce satisfactory results. This requires both an accurate initial positioning of the plates and a checking up of the results after the proof sheets have been made in order to determine whether the registration has been disturbed by expansion or contraction of the paper or its distortion during the printing process. This work is customarily done on a line-up table. Such tables are also used extensively in preparing the printing plates and negatives, laying out the work, checking it up at various stages in the process, and for a great variety of other purposes.

In using line-up tables as heretofore constructed, it has been found that the degree of accuracy obtainable depends to a very substantial extent upon the skill and eye of the workman, and that this fact is responsible for a large percentage of the errors made. The present invention therefore aims to improve apparatus of this character with a view to making it useful in a wider range of work and more especially with the object of minimizing the liability of making mistakes or errors. In other words, the invention aims to devise a line-up table in which much of the necessity for a sharp eye and great skill on the part of the workman will be avoided, the machine itself contributing to the production of accurate results to a degree which has not been obtained heretofore.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the drawings,

Figure 1 is a plan view of a table embodying features of this invention;

Fig. 2 is a partial vertical sectional view of the table shown in Fig. 1;

Fig. 3 is a perspective view of parts of the table shown in Figs. 1 and 2 and illustrates also one of the straight edges and its carriage;

Fig. 4 is a fragmentary sectional view showing a stop for one of the straight edges;

Fig. 5 is a perspective view of a guiding device attached to a carriage which carries the straight edge;

Fig. 6 is a sectional view showing the guiding device illustrated in Fig. 5 in its relationship to adjacent parts of the table;

Fig. 7 is a plan view of the straight edge and the carriage associated with it;

Fig. 8 is a vertical transverse sectional view of the straight edge and carriage shown in Fig. 7;

Fig. 9 is a side view of the straight edge and carriage in an elevated or tipped position;

Fig. 10 is a sectional view of a portion of the carriage showing parts of the mechanism for adjusting the straight edge; and

Fig. 11 is a vertical sectional view at right angles to Fig. 10.

The table shown in the drawings comprises a top 2 and a frame 3 in which said top is mounted. Usually the top is made of plate glass and it is supported at its margin on bars 4, Fig. 2, grooved to let the edge of the glass into them, finish strips 5 overlying the margin of the glass and being screwed to the bars 4 to hold them in place.

The table frame 3 carries tracks, preferably consisting of toothed racks, on which the two straight edges are mounted. Referring to Fig. 1 it will be seen that two of these racks 7—7 run lengthwise of the table at opposite sides of the top 2 and two other racks 8—8 are similarly located at opposite ends of the table. The first pair of racks support a carriage, indicated in general at A, and carrying a straight edge *a*, while the second pair support a carriage B which carries a straight edge *b*. The tracks extend considerably beyond the edges of the table so that each straight edge can be moved far enough away from the edge of the table top to be out of the way of the other straight edge. Scales 9—9 extend longitudinally of the table beside the racks 7—7 while corresponding scales 10—10 extend across the ends of the table, and these scales cooperate with the respective straight edges to indicate their positions on the table.

The construction of the carriages and the mounting of the straight edges on them form important features of this invention. Since the two carriages are of substantially identical construction a description of one of them only is necessary. Preliminary to such a description, however, it may be pointed out that a common use of this table requires the placing of a printing plate, negative, printed sheet or other piece of work in a fixed position on the table top, this position being determined, for example, by suit-

able gages such as that shown in Fig. 1 at 12 and work clamps, one of which is shown at 13, these gages and clamps being of the type commonly used in apparatus of this kind. The straight edges are then moved over the work and a registration mark, usually in the form of a cross, is made on the work W. The nature of the work may be such, as for example in multi-color printing, that the same mark must be made at the same point on another negative, plate, or the like, or the position of the mark made on one plate must be compared with that on another so that the exact positions of the straight edges on the scales at the time the registration marks are made becomes an important factor.

This invention provides a construction with which such positions can be determined with a higher degree of accuracy than has been obtainable heretofore. Referring more particularly to Figs. 3, 7 and 8, it will be seen that the carriage A includes two gears or pinions 15—15 which mesh with and run on the respective racks 7—7 and support the main body of the carriage. These gears are partly housed in end castings 16—16 which are rigidly connected by a tube or sleeve 17, the castings having split clamps to bind them to the ends of the tube. These castings also are provided with bearings for supporting a shaft 18 which extends through the tube 17 and is rigidly secured to the two gears 15—15. Each gear is held on the rack by a guide piece 20, Figs. 3, 5 and 6, which is secured to the bearing for its respective end of the shaft 18 and is provided with an extension or shoe 21 which lies under the turned over edge 22, Fig. 6, of the stationary frame piece 23. A plate 24 which is secured to the shoe 21 by spacing studs overlies the part 22, as clearly shown in Fig. 6, and this plate has a down-turned lug 25 to engage the outer side of the guide piece 23.

These devices hold the two gears in mesh with the racks or, in other words, prevent them from being moved upwardly away from the racks. As the carriage is moved forward or backward the guiding pieces 20, 21, 24 slide along the stationary member 23, remaining constantly in engagement with the horizontal flange 22 of this member.

In moving the straight edge into or out of operative relationship to the work, it is often desirable to hold it in an elevated position. For this purpose a rod 26 is mounted to rock in bearings 27—27, Fig. 7, provided in the end castings 16—16, and cams 28—28 are secured on the ends of this rod. When these cams are down, as shown in Fig. 3, the straight edge is in its lowermost position. If the handle of one of the cams is lifted slightly so that a short "rise" of the cam engages the plate 24, the straight edge *a* then will be held slightly above its lowermost position. By turning the cam into the position shown in Fig. 9 the straight edge is elevated a very considerable distance, as illustrated in said figure. A guard 30 is riveted to each cam 28 and has a cam slot 31 therein through which a horizontal lug 32, integral with the plate 24, projects. This lug cooperates with the cam slot in holding the straight edge in any position to which it is moved and prevents over-swinging of the carriage away from the table top.

The carriage may be locked against movement along the rails by turning a thumb screw 33, Fig. 3, which is threaded through the sleeve or tube 17 so that the lower end of this thumb screw will bear against the shaft 18. It is often desirable, however, to lock the carriage in certain definite relationships to the racks 7—7, and for this purpose a dog 34, Fig. 9, is secured rigidly to each of the end castings 16. The lower end of this dog is provided with two or more teeth to fit accurately into the teeth of the rack while the shank of the dog projects through a part of the casting 16 and is secured thereto by a nut 35. When the straight edge is in its lowermost position, as shown in Fig. 3, the dogs 34—34 of the carriage engage the teeth of their respective racks 7—7 and lock the carriage against any movement longitudinally of the racks. In the particular machine shown each of the racks 7—7 has a quarter inch pitch and the dogs 34 have the same pitch so that the carriage can be locked to the rack at quarter inch intervals.

In order to make very fine adjustments it is desirable to be able to move the straight edge *a* more gradually than can be done through the movement of the carriage itself. That is, a rough adjustment of the straight edge can be made by moving the carriage; and in prior machines the entire adjustment of the straight edge relatively to the work has been produced in this manner. The present machine, however, includes provision for making a micrometer adjustment of the straight edge relatively to the carriage and the work. It will be seen from an inspection of Figs. 7, 8 and 10 that the straight edge *a* consists of a relatively wide flat plate with a graduated bar 36 secured to it. Two brackets 37—37 are clamped securely upon the tube 17 and carry forked extensions or guide bars 38—38 which project forward and lie just above the straight edge *a*. Gibs 39 secured rigidly to the straight edge overlap the opposite edges of these guide pieces, as best shown in Fig. 11, and thus hold the straight edge to the parts 38 while permitting it to slide backward or forward relatively to said parts. Between each adjacent pair of guides 38 is a short rack 40 which also is secured rigidly to the straight edge. Pinions 41—41 mesh, respectively, with these racks, both of these pinions being secured fast on the opposite ends of a horizontal shaft 42 which is supported partly by the brackets 37—37 and partly by a third bracket 43 secured to the tube 17 at a point between the first two brackets. A worm wheel 44, Figs. 7 and 8, is secured on the shaft 42 and is arranged to be revolved by a worm 45 fast on a vertical shaft which is supported in the bracket 43 and which has a knob or handle 46 secured to its upper end. A graduated disk 47 is secured to the knob 46 to rotate with it and cooperates with a stationary pointer 48 to indicate the degree of rotation of the knob and its shaft.

It will be clear that when the knob or handle 46 is turned, the connections above described serve to move the straight edge *a* backward or forward relatively to the carriage. Preferably the dial 47 is graduated both in thousandths and also fractions of an inch so that this arrangement permits an operator to make a micrometer adjustment of the straight edge relatively to the carriage and to the scales cooperating therewith, and to read the extent of the degree of this adjustment.

As above stated, in this particular machine the racks 7—7 have a quarter inch pitch so that the carriage may be locked at quarter inch intervals in its movement across the table. The micrometer adjustment, which is made by turning the handle 46, is designed to move the straight edge through a range of one-quarter or two hundred fifty thousandths of an inch, or, in other words,

from one locked position of the straight edge to the next adjacent position in which it can be locked. In using this apparatus, therefore, the workman can make a rough adjustment of the straight edge by moving the carriage across the work, then lock the carriage in its adjusted position and thereafter make a micrometer adjustment of the straight edge relatively to the work. The exact position of the straight edge when the adjustment has been completed can also be determined to thousandths of an inch by noting on the scale the position in which the carriage has been locked and reading on the dial the degree of the micrometer adjustment. Measuring points or plates 50—50, Fig. 7, are fixed on the carriage at opposite ends of the straight edge *a* where they will overlie the respective scales cooperating with this carriage, and they thus facilitate the reading of the position of the carriage on the scales. These measuring points and the straight edge are so adjusted relatively to each other that the forward edge of the straight edge is in alinement with the forward edges of the measuring plates 50 when the dial 47 is in its zero position with the straight edge in approximately the middle of its range of movement. From this point the straight edge may be adjusted two hundred fifty thusandths of an inch in either direction by turning the knob 46.

The graduated bar 36 carried by the straight edge *a* is designed to support a marking device which will occupy a definite and constant relationship to the straight edge and for this purpose it is grooved, as shown at 51, Figs. 8 and 10. A marking device such as that shown in the West Patent No. 1,623,291, granted April 5, 1927, is suitable for use in the machine, although other forms of marking devices also can be used.

As above stated, the carriage B and its straight edge *b* are substantially identical in construction and arrangement with the carriage A and straight edge *a*, and they cooperate with their tracks 8—8 and with adjacent parts of the table in the same manner as do the carriage A and its straight edge.

When the carriage A is moved away from the table top far enough to permit the other carriage to be moved across the table, the tube 17 engages a stop 52, Fig. 4, which is secured to the frame and serves to prevent the movement of the carriage off its racks. A similar stop cooperates with the carriage B.

In using this table it is desirable to position the straight edge in contact with, or closely adjacent to the work, and in order to enable the apparatus to accommodate plates, negatives and other articles of work varying substantially in thickness, provision has been made for adjusting the table top vertically toward or from the paths of travel of the straight edges. The mechanism provided for this purpose is best shown in Figs. 1 and 2. It comprises a series of upright posts or sleeves 54 arranged immediately under and supporting the bars 4 on which the glass top 2 is mounted. A similar post or sleeve 54′ is located under approximately the center of the table top and supports this part of the table through a head 55 and a pad 56 of leather, felt or other yielding material. The sleeves 54 and 54′ are mounted to slide vertically in brackets 57, Fig. 2, rigid with the frame 3. Mounted in vertical alinement with the sleeves 54—54′ are a series of upright screws 58, each threaded into its respective sleeve. Each of these screws forms a part of an upright shaft guided in one of the brackets 57 and held by thrust collars 59 against axial movement. At its lower end each of these screws or screw threaded shafts carries a bevel gear 60 meshing with additional bevel gears secured on horizontal shafts which are all driven from a single shaft 62. From an inspection of Figs. 1 and 2 it will be seen that the shaft 62 extends horizontally across one end of the frame 3 and is geared to the two side shafts 63 and 64, the former of these shafts being also geared to a cross shaft 65 which drives the screw 58 for the center sleeve 54′, while the other shaft 64 is geared to the end shaft 66. The main or driving shaft 62 has a squared end 67 projecting through the frame of the machine at one side thereof and adapted to receive a crank by means of which all of the screws 58 can be revolved in unison to raise or lower the table top.

It will be observed that this construction compels all of the supporting sleeves 54 and 54′ to move up or down at the same time and to the same extent, and that it definitely holds the table in any adjusted position. Consequently, the top of the table is always maintained level in any position to which it is moved, and any possibility of the top slipping is avoided.

It will be clear to those skilled in this art that the line-up table provided by this invention enables an operator to work to an exceptionally high degree of accuracy. The fact that he can bring either straight edge to a definite position with reference to the scales and the work by locking either carriage at a definite point on the scales and then adjusting the straight edge through the micrometer mechanism is an extremely important advantage in a great variety of work, as for example, in duplicating or reproducing. The fact, also, that in making such adjustments the operator is not depending simply on his eye but can rely largely on the manipulation of the machine is also an important advantage. That is, the locking of the carriage in a definite relationship to the scale is not dependent for its accuracy on the eye of the operator, but it is determined by the engagement of the locking dogs with the rack, the operator simply being called upon to determine at which quarter inch point on the scale he will lock the carriage. If his work calls for the adjustment of the straight edge to one hundred twenty thousandths of an inch, plus or minus, with reference to the particular quarter inch mark at which the carriage is locked, he can then make that adjustment through the micrometer mechanism, and such adjustment obviously does not require any substantial degree of skill.

The table therefore will handle the entire range of work which has customarily been performed on tables of this general character, and in addition it will afford a degree of accuracy which has not been obtainable heretofore. It will also accommodate an exceptionally wide variety of work because of such increased accuracy and the adjustability of the table top.

While I have herein shown and described a preferred embodiment of my invention, it will be understood that the invention may be embodied in other forms without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. A table of the character described comprising, in combination, a table top, a carriage mounted for movement across the top of said table, a straight edge carried by said carriage, a handle, worm and gear mechanism on said carriage ar-

ranged to be operated by said handle for adjusting said straight edge relatively to said carriage in a direction transversely to itself, and a dial cooperating with said adjusting mechanism to indicate the degree of adjustment.

2. A table of the character described comprising, in combination, a table top, a frame in which said table top is supported, racks mounted on said frame at opposite sides of said table top, a carriage having gears meshing with said racks and supporting the main body of the carriage for movement across the top of the table, dogs on the carriage for engaging the teeth of said racks and locking the carriage against movement on the racks, a straight edge supported on said carriage for movement therewith, and micrometer mechanism for adjusting said straight edge relatively to said carriage to any point between adjacent positions of adjustment of said carriage on said racks.

3. A table of the character described comprising, in combination, a table top, a frame in which said table top is supported, racks mounted on said frame at opposite sides of said table top, a carriage having gears meshing with said racks and supporting the main body of the carriage for movement across the top of the table, a straight edge supported by said carriage for movement therewith, a scale cooperating with said straight edge to indicate its position, adjusting mechanism arranged to act on said straight edge at widely separated points to adjust it relatively to said carriage, and means independent of said scale for indicating the degree of said adjustment.

4. A table of the character described comprising, in combination, a table top, a frame in which said table top is supported, racks mounted on said frame at opposite sides of said table top, a carriage having gears meshing with said racks and supporting the main body of the carriage for movement across the top of the table, a straight edge mounted on said carriage to slide forward and backward relatively thereto and for movement therewith, a shaft extending longitudinally of said carriage, means operable to turn said shaft, mechanism for utilizing the rotary movement of said shaft to act on said straight edge at widely separated points to move it forward or backward relatively to said carriage, and means for indicating the degree of said forward or backward movement.

5. A table of the character described comprising, in combination, a table top, a frame in which said table top is supported, racks mounted on said frame at opposite sides of said table top, a carriage having gears meshing with said racks and supporting the main body of the carriage for movement across the top of the table, a straight edge mounted on said carriage to slide forward and backward relatively thereto and for movement therewith, a shaft extending longitudinally of said carriage, pinions carried by said shaft, racks rigid with said straight edge and meshing with said pinions, a worm wheel on said shaft, a worm meshing with said worm wheel, a handle for revolving said worm, and a dial for indicating the degree of rotation of said worm.

6. A table of the character described comprising, in combination, a table top, a carriage mounted to roll backward and forward across the top of said table, a straight edge carried by said carriage, and mechanism for acting on said straight edge at widely separated points to adjust said straight edge bodily relatively to said carriage into different positions all parallel to each other and to hold said straight edge positively in its adjusted positions.

7. A table of the character described comprising, in combination, a table top, a carriage mounted for movement across the top of said table, a straight edge carried by said carriage, and micrometer adjusting means mounted on said carriage and arranged to act on said straight edge at widely separated points to adjust said straight edge relatively to said carriage in a direction transversely of said straight edge and into different positions all parallel to each other.

8. A table of the character described comprising, in combination, a table top, a carriage mounted for movement across the top of said table, a straight edge carried by said carriage, a scale mounted on the table and cooperating with said straight edge to indicate the position of said straight edge on the table, means for locking said carriage in various positions of adjustment longitudinally of said scale, and micrometer adjusting means operable while the carriage is held so locked for acting on said straight edge at widely separated points to adjust said straight edge longitudinally of said scale.

9. A table of the character described comprising, in combination, a table top, a carriage mounted to roll forward and backward across the top of said table, a straight edge mounted on said carriage for movement therewith, a stationary scale for indicating the position of said straight edge, means for locking said carriage in various positions of adjustment longitudinally of the scale, and micrometer adjusting mechanism mounted on said carriage and operable while the carriage is held so locked for acting on said straight edge at widely separated points to adjust said straight edge positively in a direction longitudinally of said scale and for holding said straight edge positively in its various positions of adjustment.

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