

July 24, 1934.

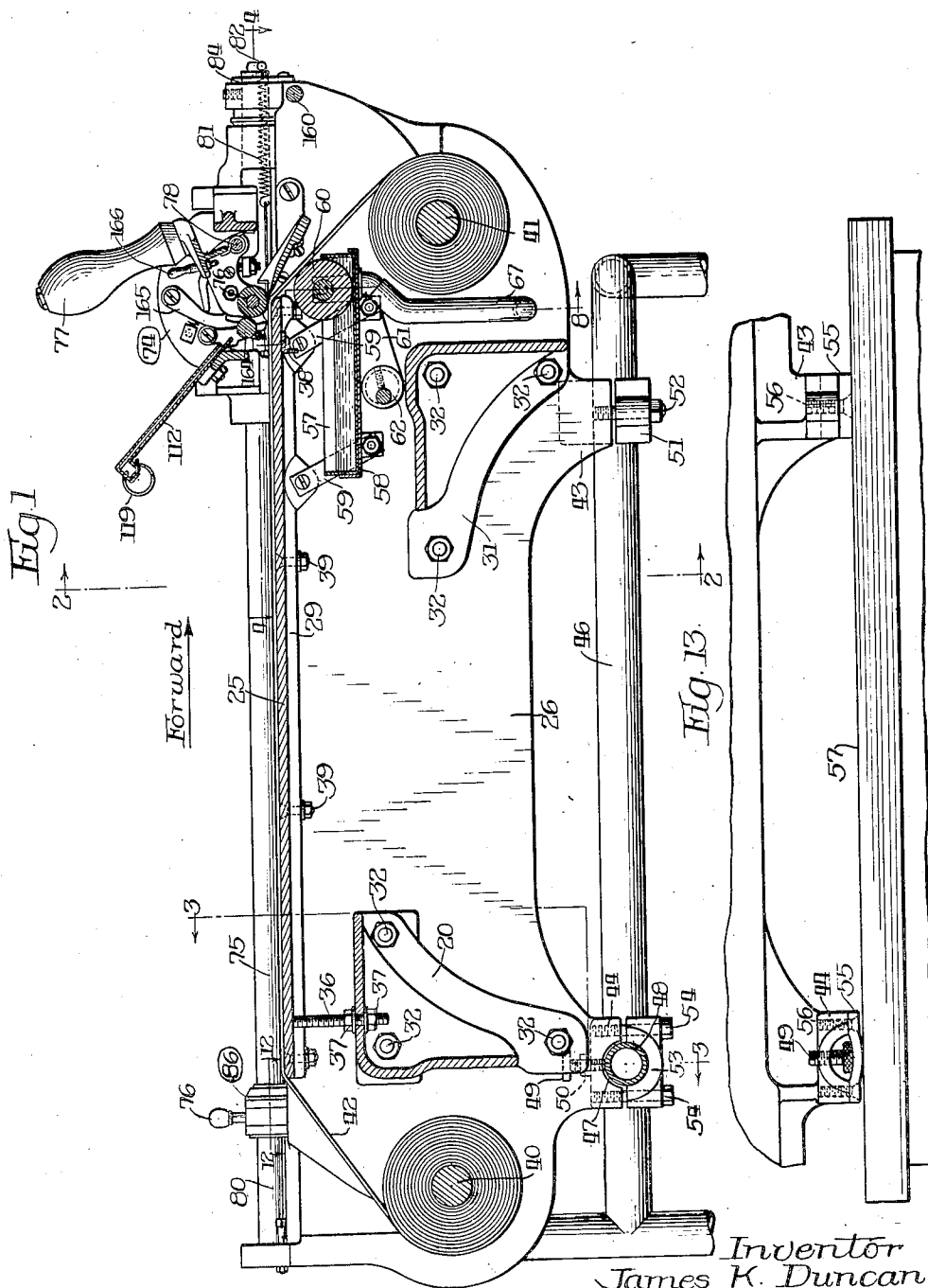
J. K. DUNCAN

1,967,873

HECTOGRAPH MACHINE

Filed Oct. 8, 1930

8 Sheets-Sheet 1



Inventor
James K. Duncan.

By *William H. Hupley, Bryan + Knight*
attys

July 24, 1934.

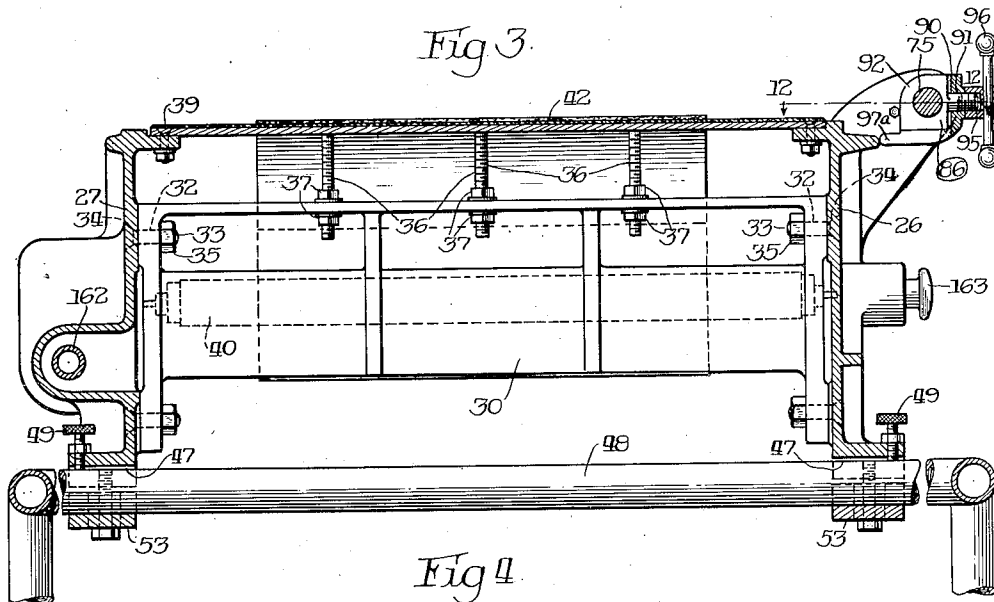
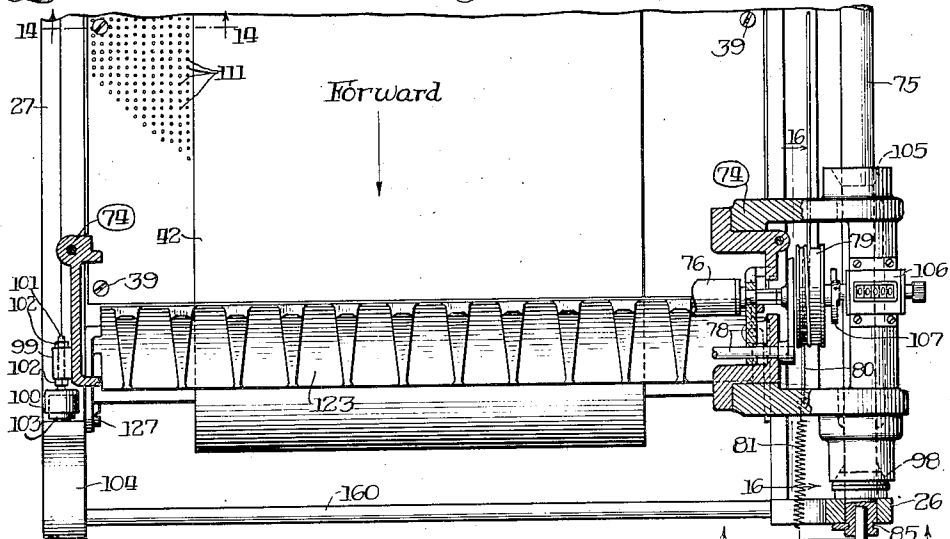
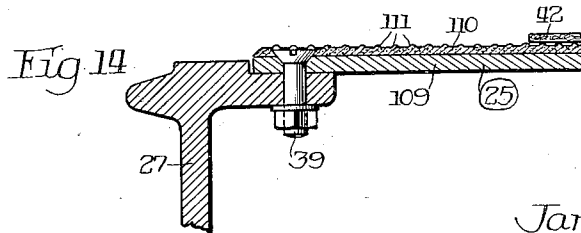
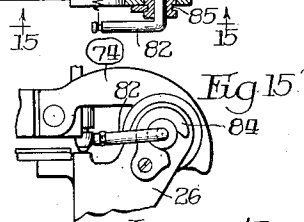
J. K. DUNCAN

1,967,873

HECTOGRAPH MACHINE

Filed Oct. 8, 1930

8 Sheets-Sheet 3



Inventor:
James K. Duncan

By Wilkinson, Huxley, Byrum & Knight
Attys

July 24, 1934.

J. K. DUNCAN

1,967,873

HECTOGRAPH MACHINE

Filed Oct. 8, 1930

8 Sheets-Sheet 4

Fig. 5.

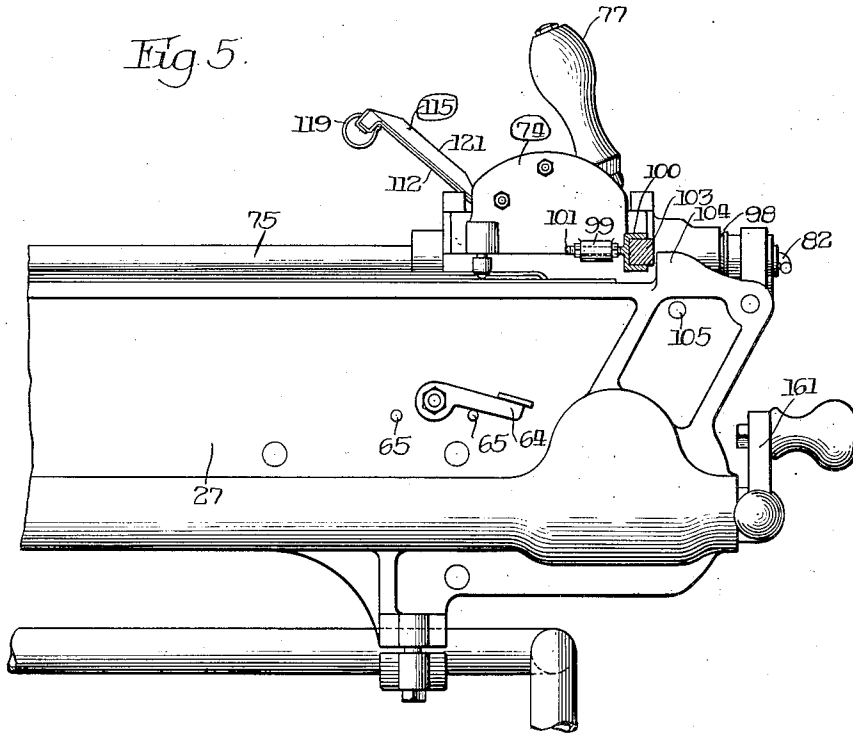


Fig. 6.

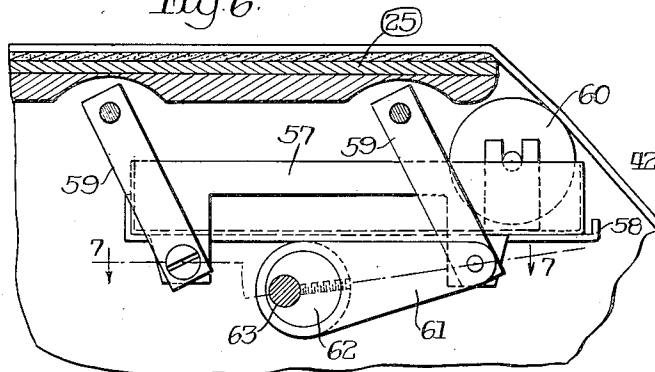
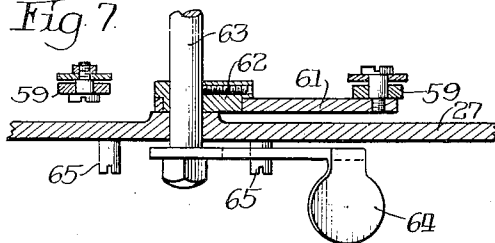


Fig. 7.



Inventor:
James K. Duncan

By *Wilkinson, Huxley, Byrum & Knight*
Attys.

July 24, 1934.

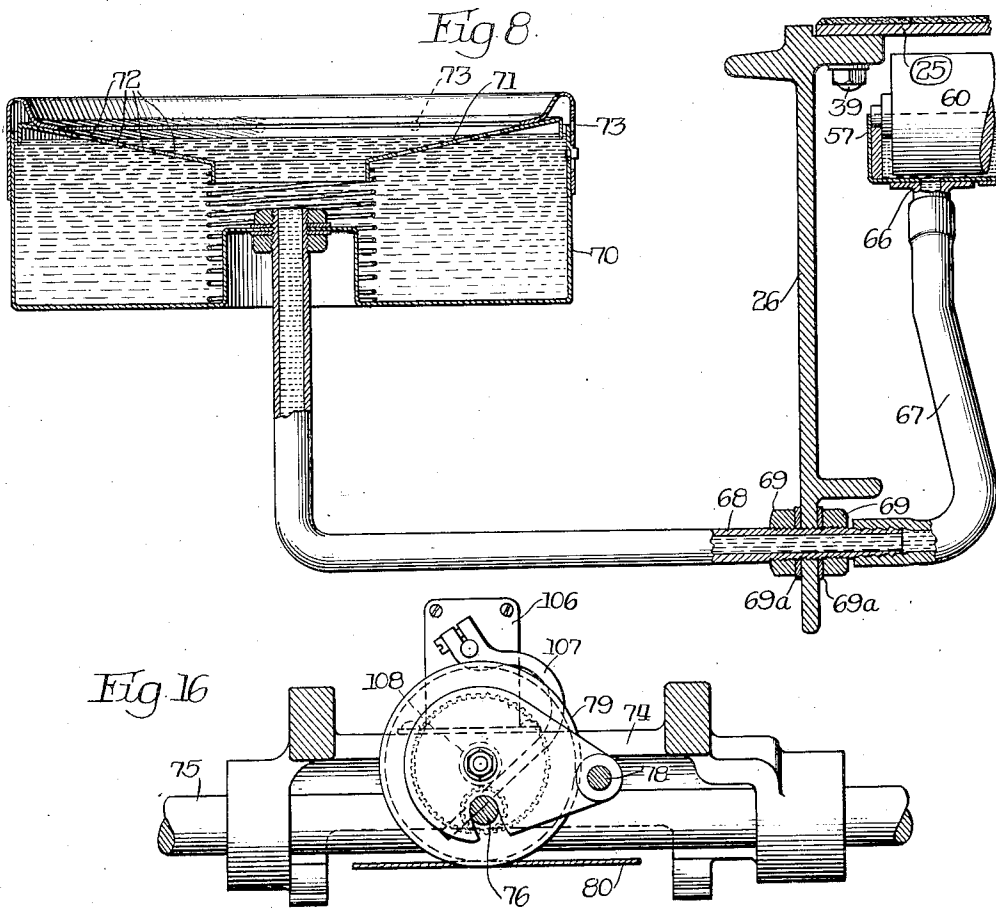
J. K. DUNCAN

1,967,873

HECTOGRAPH MACHINE

Filed Oct. 8, 1930

8 Sheets-Sheet 5



Inventor:
James K. Duncan.

By *William H. Hays, Byron & Knight*
Attys

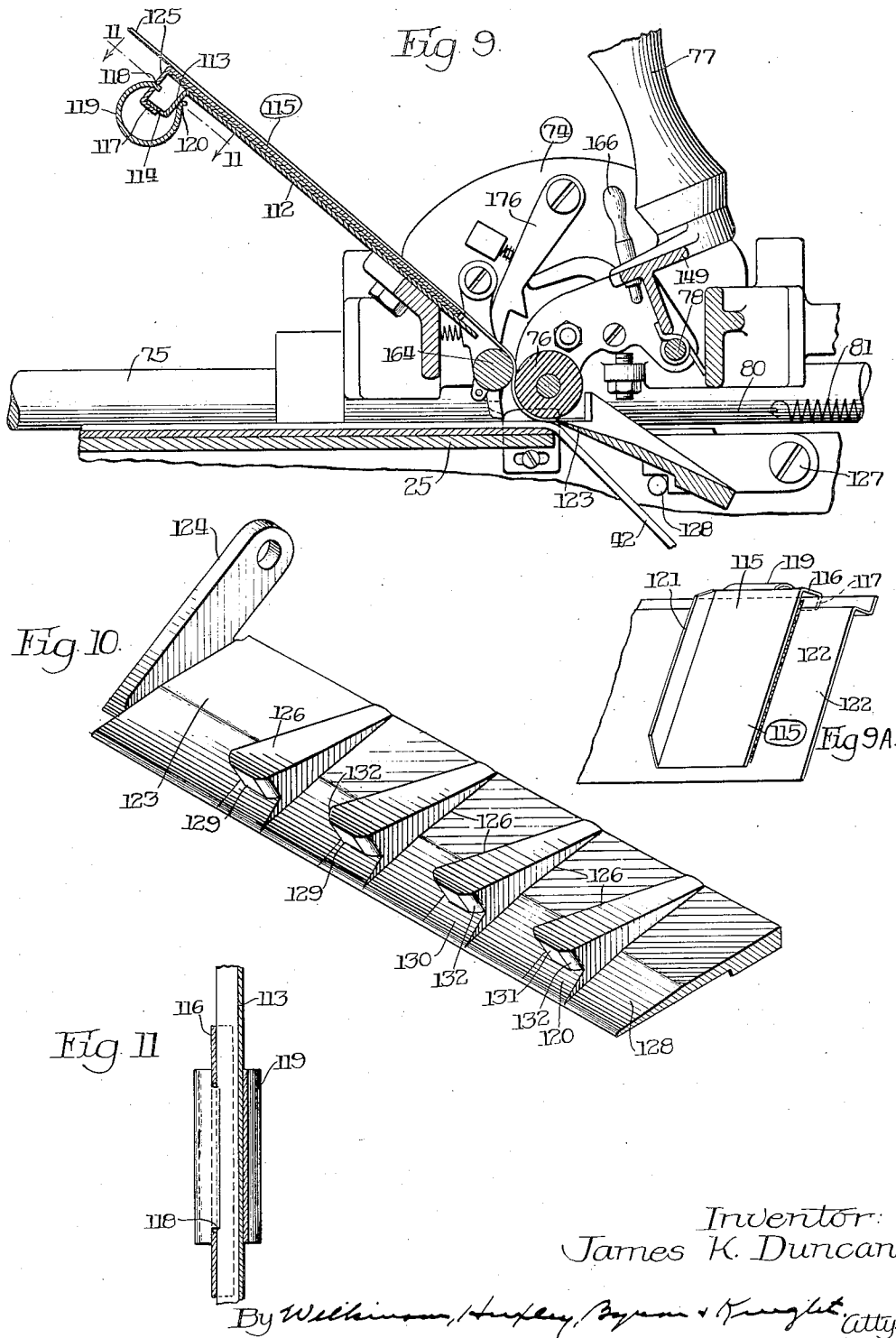
July 24, 1934.

J. K. DUNCAN
HECTOGRAPH MACHINE

1,967,873

Filed Oct. 8, 1930

8 Sheets-Sheet 6



Inventor:
James K. Duncan.

By *Wilkinson, Huxley, Byrum & Knight* Attys

July 24, 1934.

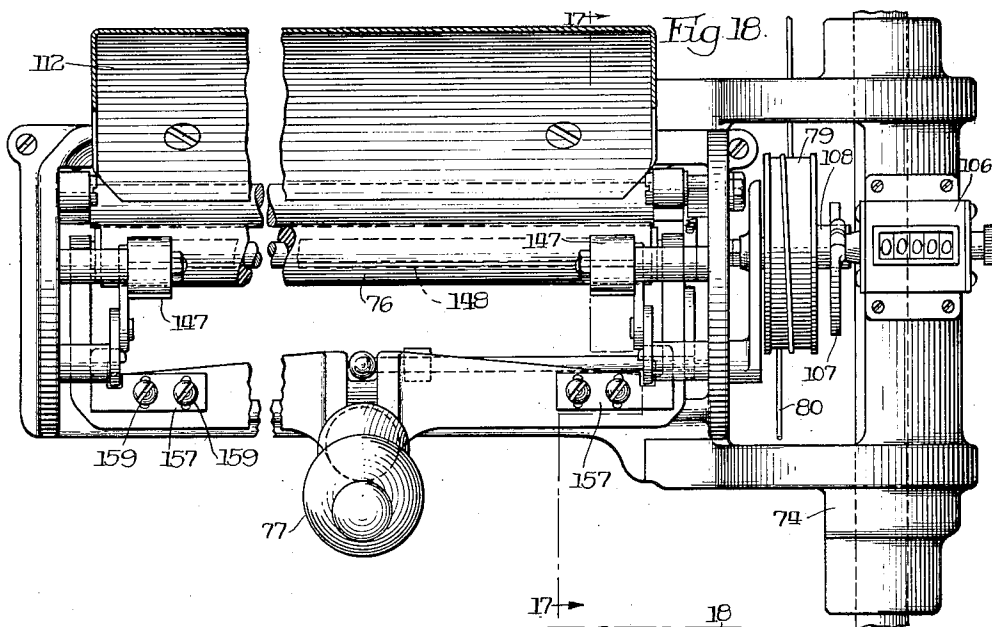
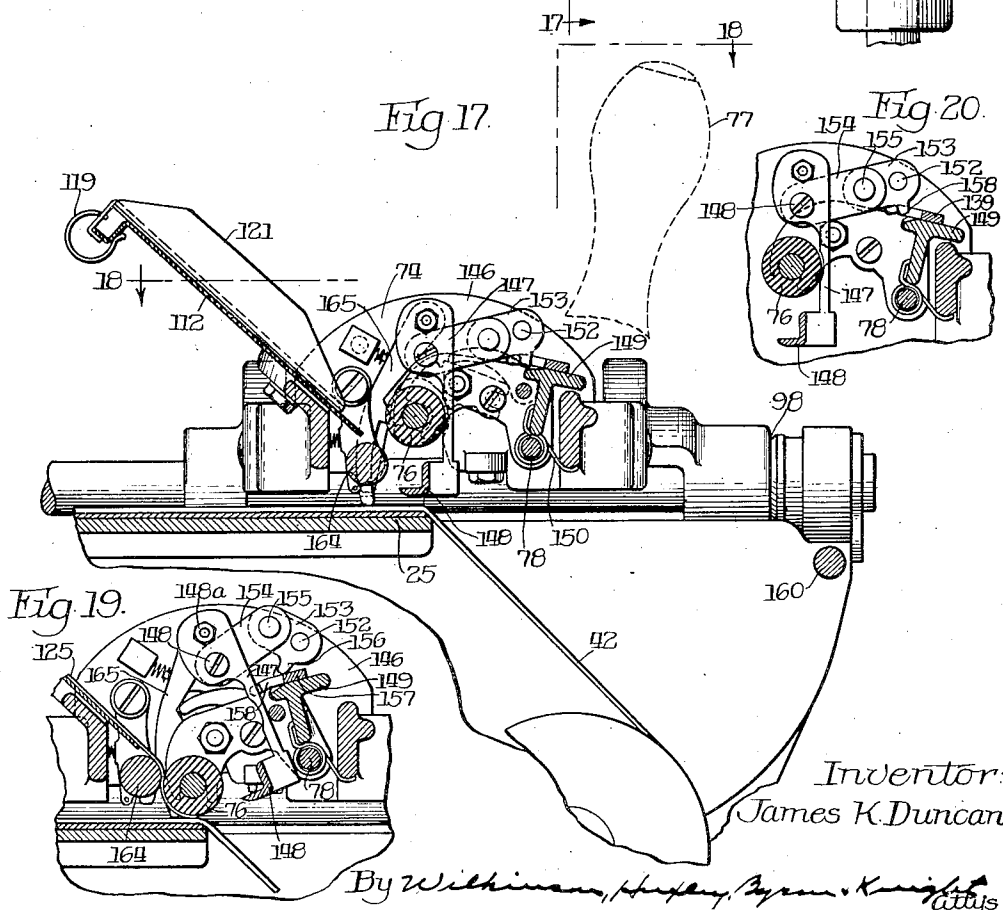
J. K. DUNCAN

1,967,873

HECTOGRAPH MACHINE

Filed Oct. 8, 1930

8 Sheets-Sheet 7



Inventor:
James K. Duncan

By *William H. Hays, Byron A. Knight*
Attys.

July 24, 1934.

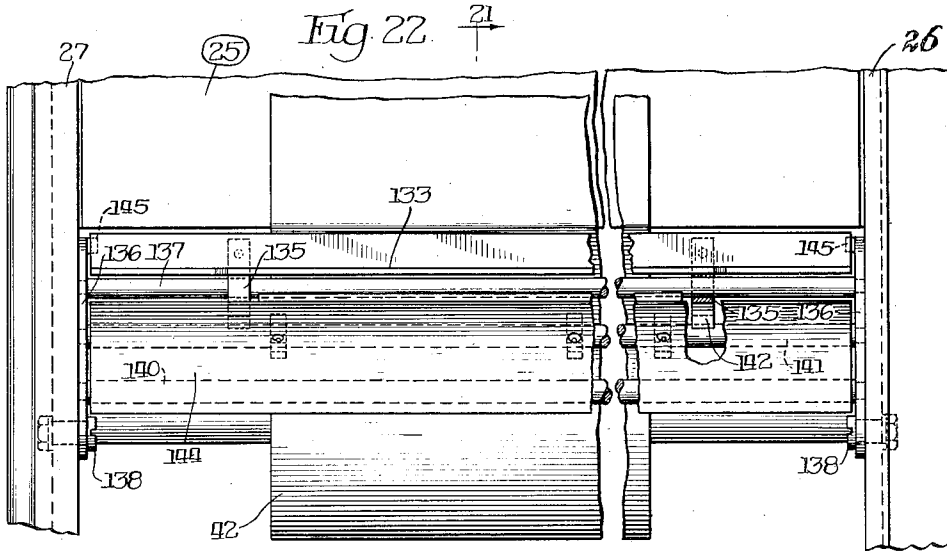
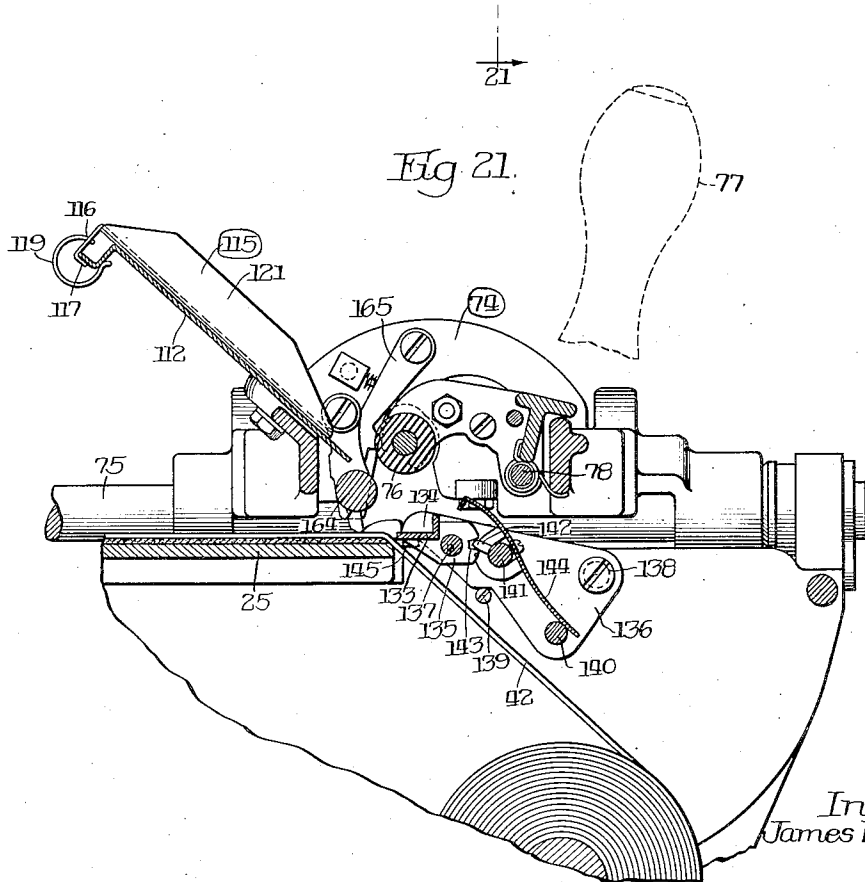
J. K. DUNCAN

1,967,873

HECTOGRAPH MACHINE

Filed Oct. 8, 1930

8 Sheets-Sheet 8



Inventor
James K. Duncan

By Wilkinson, Huxley, Byrom & Knight *Attys.*

UNITED STATES PATENT OFFICE

1,967,873

HECTOGRAPH MACHINE

James K. Duncan, Chicago, Ill., assignor to Ditto,
Incorporated, Chicago, Ill., a corporation of
West Virginia

Application October 8, 1930, Serial No. 487,227

30 Claims. (Cl. 101—133)

The present invention relates to hectograph machines.

An object of the present invention is to provide a construction which will maintain a flat duplicating surface.

A further object is to provide a hectograph machine which, without excess weight, will be rigid and which will maintain its rigidity and provide necessary alignment of the parts throughout any and all service.

A further object is to provide a hectograph machine provided with adjustments by means of which it may be readily supported upon an uneven base.

A further object is to provide in a hectograph machine adjustable feet, whereby proper adjustment can be made in the installation of the machine even though the foundation may be uneven.

A further object is to provide a hectograph machine in which the body is absolutely rigid and well balanced.

A further object is to provide a hectograph machine which may with small adjustments be accommodated to a support which is uneven or distorted or may be located upon a crooked table.

A further object is to provide a hectograph machine in which the tendency is avoided to place stresses upon the machine frame when said frame is secured to a stand.

A further object is to provide a hectograph machine made up of parts which require a minimum of skill in their assembly.

A further object is to provide a hectograph machine having the advantage that the parts will automatically locate themselves in proper position relative to one another and which adapts itself readily to interchangeability of parts.

A further object is to provide a hectograph machine having moistening means for the gelatine band thereof, which moistening means comprises simple mechanical devices of substantially foolproof construction.

A further object is to provide a moistening device of improved efficiency and durability over what has been known and used heretofore.

A further object is to provide actuating means for a moistener of a hectograph machine in which the parts are of simple and rugged construction whereby the disintegrating effect of the water with which it comes in contact will not appreciably affect the operation of said moistener.

A further object is to provide moisture actuating means which lend themselves with a minimum of manual effort to a positive and stable operation.

A further object is to provide actuating means for a moistening device on a hectograph machine

in which the use of springs and other relatively troublesome members is eliminated.

A further object is to provide actuating means for a moistener on a hectograph machine in which the parts are of such a balanced nature that the whole mechanism is entirely foolproof and practically indestructible in the ordinary use of the machine.

A further object is to provide an improved moistener adapted for use in a hectograph machine in which the gelatine band is rolled upon a spindle, which moistener will apply moisture to the rear or back side of the gelatine band, whereby the said moisture will be applied to the gelatine surface of said band in the convolutions of the roll.

A further object is to provide a moistening means having a readily removable moistening roller.

A further object is to provide a moistening means in which the filling of the reservoir is simplified and which will avoid overflow of water in parts not readily observable.

A further object is to provide improved means for supporting the driving cable of the platen roller of the hectograph machine.

A further object is to provide a swivel connection for the driving cable for the platen roller of a hectograph machine, which swivel connection will permit the cable to accommodate itself to movements of the driving spool or drum for said platen roller and will eliminate the danger that said cable may leave said drum or roller.

A further object is to provide a cable swivel connection which will permit the carriage of a hectograph machine to swing on the slide rod upon which it is mounted, so as to enable the cable to retain its position on the spool without disturbing its tension.

A further object is to provide a cable swivel connection which will lend itself to a positive and speedy attachment to the machine.

A further object is to provide a cable connection which will swing to proper position upon the application of a minimum of swinging force being applied thereto.

A further object is to provide a hectograph machine having means for insuring proper positioning of the carriage with the margin bar when said carriage is at the paper feeding end of its stroke.

A further object is to provide a hectograph machine having an auxiliary bumper on the side opposite to the slide rod of the hectograph machine to assist in absorbing shocks.

A further object is to provide a hectograph machine having a bumper or stop on the side thereof opposite to the slide rod, which bumper or stop can be adjusted to compensate for wear.

A further object is to provide a hectograph machine having a carriage which has a swinging movement along an axis disposed at one side of the machine in which the wear and tear upon the pivots and other wearing surfaces will be reduced to a minimum.

A further object is to provide a hectograph machine having a carriage adapted to swing about an axis located at one side of the machine, which machine is provided with means for preventing the destructive effects of whipping action of the carriage during shipment and in service.

A further object is to provide a hectograph machine having an improved bearing surface for the hectograph band or sheet.

A further object is to provide an improved bed for a hectograph machine in which the tendency of the gelatine band to stick to the surface of the bed is reduced to a minimum.

A further object is to provide a hectograph bed which will have the surface provided with a multiplicity of point contacts for the gelatine band.

A further object is to provide a hectograph machine having a bed in which a circulation of air is possible beneath the gelatine band, whereby the matter of winding and rewinding the band is made easier than in structures as heretofore known and used.

A further object is to provide a bed plate for a hectograph machine so formed that the gelatine band will, when the pull thereon is relieved, tend to separate itself from said bed plate.

A further object is to provide a bed plate for a hectograph machine so constructed that the band will be induced to travel in a straight line.

A further object is to provide a bed plate which will in cooperation with the gelatine band have improved cushioning action over prior constructions.

A further object is to provide a margin bar having improved rigidity over prior practice.

A further object is to provide a margin bar which presents a minimum of interference when the paper is being stripped from the gelatine, and which at the same time will protect the gelatine band against injury from the fingers of the operator.

A further object is to provide a margin bar which combines the advantage that the paper may be readily stripped from the gelatine band with the advantage that said margin bar will properly locate pieces of paper of relatively small dimensions crosswise of the machine upon which the margin bar is used.

A further object is to provide an improved margin bar which combines the advantage of ready stripping of the paper with the advantage that the minimum of attention is necessary on the part of the operator properly to position the paper upon said margin bar.

A further object is to provide a margin bar having means for piloting the hand of the operator into proper position for stripping the paper from the gelatine band.

A further object is to provide a margin bar comprising a casting whereby the piloting means above referred to may be formed to provide a maximum of efficiency.

A further object is to provide a hectograph machine having an improved paper guide.

A further object is to provide an improved paper guide in which the proper alignment is preserved in service.

A further object is to provide a paper guide involving a slidable member mounted upon a base which will preserve its contact with said face without interference with the sliding functions of said guide relative to said base.

A further object is to provide a paper guide mounted upon a base and having sliding contact with said base which will be free from marring effects upon said base in the sliding movements of said guide.

A further object is to provide a slidable paper guide which is readily slidable upon its base, but which will maintain its proper position under conditions of service.

A further object is to provide a paper guide and slide having the advantages above set forth which may be assembled readily without the use of any screws or other holding means.

A further object is to provide an improved paper guide and slide having improved simplicity of operation over prior devices.

A further object is to provide an improved carriage stop which will avoid marring of the rod upon which it is mounted and which may be stocked and shipped as a unitary device without danger of losing parts thereof.

A further object is to provide an adjustable carriage stop for a hectograph machine embodying resilient means for absorbing the impacts of the carriage.

A further object is to provide a carriage stop for a hectograph machine, which stop is adapted to be adjustably carried by a carriage guide rod and which may be firmly secured in any adjusted position on the rod without damaging or marring the surface of said rod.

A further object is to provide a carriage stop which will be simple and durable in construction, cheap to manufacture and reliable in operation.

A further object is to provide a hectograph machine having improved means for counting the number of operations of said machine. In this connection a more specific object is to provide a counting mechanism cooperating with the movements of the platen roller, whereby said counting mechanism in the normal operation of the machine will register the number of times a piece of paper is impressed upon the gelatine band.

A further object is to provide a counting mechanism adapted to register, in normal operation, the number of times the platen roller is moved to operative position with relation to the gelatine band.

A further object is to provide an improved margin bar for a hectograph machine which provides improved means for stripping the paper while preserving an uninterrupted guiding edge for the margin of said paper.

A further object is to provide an improved margin bar having manual means for rotating said margin bar to facilitate the removal of sheets of paper from said margin bar.

A further object is to provide an improved margin bar with means for flipping up the marginal edge of the paper and making it possible to grasp the paper at any point along said edge.

A further object is to provide an improved margin bar having means positioned in the normal path of the operator in removing the paper, which means when operated by the hand of the operator will flip the margin of the paper to a position where said paper may be readily grasped.

A further object is to provide a margin bar having improved means for flipping the marginal

edge of the paper disposed upon said margin bar, which margin bar may be readily swung to a position to permit access to the gelatine band spool.

5 A further object is to provide an improved margin bar which will permit the use of the paper to the extreme edge of the sheet.

10 A further object is to provide an improved margin bar of the automatic or marginless type which is adjustable, whereby the factor of safety as to accurate operation may be modified as conditions require.

15 A further object is to provide a margin bar of the automatic or marginless type which is positioned in its operation and which does not require the use of any springs.

20 A further object is to provide a margin bar of the automatic or marginless type which is so constructed that it will present an effective resistance to pressure from a heavy piece of paper or card.

25 A further object is to provide a carriage for a hectograph machine having a margin bar of the automatic or marginless type which is easy to operate.

30 A further object is to provide a margin bar of the automatic or marginless type which is so constructed that it will remain in operative control of the marginal edge of the paper during a maximum downward travel of the platen roller.

35 A further object is to provide a margin bar of the automatic or marginless type which will retain control of the paper until practically the instant when the platen roller has a grip upon said paper in cooperation with the gelatine band.

Referring to the drawings—

Figure 1 is a vertical sectional view of a hectograph machine, said view being taken along the planes indicated by the arrows 1—1 of Figure 2.

40 Figure 2 is a vertical section of a hectograph machine as shown in Figure 1, the view in Figure 2 being taken along the plane indicated by the arrows 2—2 of Figure 1.

45 Figure 3 is a transverse sectional view taken along the planes indicated by the arrows 3—3 of Figure 1.

50 Figure 4 is a sectional plan view, parts being broken away, taken along the plane indicated by the arrows 4—4 of Figure 1.

55 Figure 5 is a view in side elevation of a portion of the hectograph machine illustrated in the preceding figures, parts being broken away.

Figure 6 is a view on an enlarged scale showing part of the structure illustrated in Figure 1, Figure 2 being taken along the plane indicated by the arrows 6—6 of Figure 2.

Figure 7 is a detail view in section taken along the planes indicated by the arrows 7—7 of Figure 6.

60 Figure 8 is a sectional view illustrating on an enlarged scale parts of the structure shown in Figure 2, Figure 8 being taken along the planes indicated by the arrows 8—8 of Figure 1.

65 Figure 9 is a sectional view illustrating on an enlarged scale part of the structure shown in Figure 1, Figure 9 being a section along the plane indicated by the arrows 9—9 of Figure 1.

70 Figure 9—A is a view in perspective, parts being broken away, showing an improved paper guide and slide.

Figure 10 is a view in perspective of the improved margin bar which may be used in the practice of the present invention.

75 Figure 11 is a sectional view taken along the

plane indicated by the arrows 11—11 of Figure 9.

Figure 12 is a view partly in section illustrating an improved carriage stop, the section being taken along the planes indicated by the arrows 12—12 in Figures 1 and 3.

Figure 13 is a view in side elevation of part of the machine illustrating certain adjustable feet which may be used in the practice of the present invention.

Figure 14 is a sectional view taken along the plane indicated by the arrows 14—14 in Figure 4.

Figure 15 is a sectional view taken along the plane indicated by the arrows 15—15 of Figure 4.

Figure 16 is a sectional view taken along the plane indicated by the arrows 16—16 of Figure 4.

Figure 17 is a sectional view taken longitudinally of the machine illustrating a margin bar of the automatic or marginless type and the operating mechanism therefor, said view being taken along the planes indicated by the arrows 17—17 in Figure 18. Figure 17 shows the carriage with the platen roller out of operative position and with the margin bar in position to receive a sheet prior to being impressed upon the gelatine band.

Figure 18 is a top plan view, partly in section, of the structure shown in Fig. 17.

Figure 19 is a view similar to Figure 17 but showing the platen roller in operative position and with the margin bar removed from cooperative relationship with the sheet of paper to be impressed upon the gelatin band.

Figure 20 is a view showing part of the structure shown in Figure 17, parts being removed for purposes of clarity.

Figure 21 is a sectional view taken longitudinally of the machine, showing a modified type of margin bar, said view being taken along the plane indicated by the arrows 21—21 of Figure 22, and Figure 22 is a top plan view, the parts being broken away, of the structure shown in Figure 21.

Referring first to Figures 1 and 2, the numeral 25 indicates a bed plate which may be composite in its nature and which will be described in detail presently. Said bed plate is supported by the two side members 26 and 27, which members have inturned flanges 28 and 29, respectively, for supporting said bed plate 25. Said side frames 26 and 27 are held in rigid spaced relationship with each other by means of the cross-braces 30 and 31. Said cross-braces may be identical in size and shape and provide holes (Figure 3) indicated by the numerals 32—32 for the reception of bolts 33—33. The side frames 26 and 27 are provided with conical holes 34—34 for receiving the heads of said bolts 33—33, said heads being tapered to conform to said conical holes. Bolts 33—33 are provided for securely holding the side frames 26 and 27 upon the cross-braces 30 and 31. Three bolts 33 are used in connection with each cross-brace 30 or 31, which provides a rigid construction. It is a simple matter in the manufacture of the cross-braces 30 and 31 and the side frames 26 and 27 accurately to machine the parts so that the action of the tapered heads of the bolts 33 in cooperation with the tapered holes in the side frames 26 and 27 will result in accurate positioning of the cross-braces with respect to the side frames without the exercise of care on the part of those making the assembly.

Inasmuch as the bed of a hectograph machine is subjected to considerable pressure when the gelatine band is made taut, the present invention contemplates a structure for reinforcing the

bed plate 25 against such stresses. By reference to Figures 1 and 3 it will be noted that the rear cross-brace 30 has cooperatively associated therewith a plurality of screw threaded supporting members 36—36. Said screw threaded members 36—36 are disposed within holes in said cross-brace 30 and may be accurately positioned relative to said cross-brace 30 by means of the nuts 37—37. The upper extremities of said screw threaded members 36 bear against the under side of the bed plate 25 near the rear extremity thereof. The supporting means 36—36 at the rear of the machine will be found sufficient to support the bed plate 25. At the front of the machine an angle member 38 is provided which is secured to the under side of the bed plate 25, effectively stiffening the front edge of said bed plate. If preferred the bed plate 25 may be secured to the flanges 28 and 29 by means of bolts 39—39 (Figure 1).

Journalled in means supported by the side frames 26 and 27 are spindles 40 and 41 (Figure 1). The means for supporting said spindles and for communicating rotary movement thereto form no part of the present invention and need not be described herein. It may be stated briefly that said spindles 40 and 41 are connected to the two extremities of a gelatine band 42, which, according to well recognized practice, comprises a sheet of gelatine or other hectograph material mounted upon a relatively sturdy backing member, such as fabric. Means will be provided for holding the gelatine band 42 taut along the bed plate 25. Inasmuch as such means form no part of the present invention and inasmuch as means suitable for the purpose are available commercially, such means need not be illustrated or described herein in detail.

The side frames 26 and 27 are formed adjacent to their front and rear extremities to form feet. In the illustrated embodiment of the present invention the front feet on the two side frames are identical and are indicated by the numeral 43. The rear feet of the two side frames may be identical with one another and are indicated by the numeral 44. The feet 43—43 of the side frames 26 and 27 are provided with grooves whose axes extend longitudinally of the machine, said grooves being indicated by the numerals 45—45 in Figure 2, which grooves are adapted loosely to receive the longitudinally extending bars 46—46 (Figures 1 and 2). The radius of each groove 45 will preferably be chosen of greater value than the radius of the corresponding bar 46. The rear feet 44—44 of the two side frames 26 and 27 are provided with grooves 47 (Figures 1 and 3) adapted to receive the cross-bar 48. The grooves 47—47 conform rather accurately to the contour of the cross-bar 48. Each of the feet 44—44 upon the two side frames 26 and 27 is provided with a screw 49 adapted to bear upon the upper surface of the cross-bar 48. A lock nut 50 is provided for locking the screw 49 in position. Each of the feet 43—43 is provided with a bottom piece 51 secured to said feet 43—43 by bolts 52—52, said bottom pieces 51—51 serving as clamps to hold the side frames and their associated members in rigid, adjusted position longitudinally of the bars 46—46. Each of the feet 44—44 has associated therewith a bottom piece 53 which may be held in clamped relationship with the cross-bar 48 by means of the bolts 54—54. Said bottom piece 53 will engage the under side of the cross-bar 48 and its contour

should conform fairly closely to the contour of the under side of said cross-bar 48.

The screws 49—49 above described have very useful functions when the side frames 26 and 27 and their associated parts are mounted upon a flat surface such as a table. Figure 13 illustrates the function of said screws under such conditions. It will be noted from an inspection of Figure 13 that each of the feet 43 and 44 is provided with a rubber pad 55, which pads may be identical with one another. Said rubber pads are secured in place by means of screws 56—56. In connection with the rear feet 44—44 on the two side frames of the machine the screws 49—49 are used as adjusting means, said screws being disposed in reverse position relative to their positions in Figure 1. As shown in Figure 13, the heads of the screws 49—49 in the feet 44—44 are utilized to contact with the rubber pads upon said feet 44—44. By turning said screws 49—49 the heads may be positioned to adjust the bottom bearing surfaces of the pads 55—55 upon said feet 44—44, whereby inequalities in the level of the supporting table (such as indicated by the numeral 57) may be compensated for.

The framework comprising the bars 46—46 and the cross-bar 48 forms no part of the present invention. It may be of a form usual in the supports for hectograph machines and may be cheaply and conveniently made of tubular material.

The means for moistening the gelatine band 42 will now be described.

By reference to Figures 1 and 6 it will be noted that the present invention contemplates means for applying moisture to the rear side of the gelatine band 42 and provides efficient mechanism for operating such moistening means. The present invention contemplates manually operable means whereby the operator may apply moisture to the rear side of the gelatine band as said gelatine band is being wound up. As illustrated, the moistening device is located adjacent to the front of the machine and accordingly the operator will ordinarily prefer to apply the moisture to the band as the band is being wound upon the forward spindle 41. Said moisture applied to the rear of the band 42 will by an offset process be communicated to the gelatine side of the gelatine band 42 to accomplish the desired moistening.

The moistening means includes a pan indicated by the numeral 57, which pan is carried in a cradle 58 supported by the rocking arms 59—59. Said rocking arms are supported by the side frames 26 and 27. Trunnioned upon the pan 57 is a roller 60 which may have its periphery covered with fabric or rubber or other preferred material. In order to offset the corrosive effects of water it is at present preferred to use rubber upon the periphery of said roller 60, the remainder of said roller being composed of rust-proof material. Said roller is adapted to have its lower portion immersed in water within the pan 57.

Referring now to Figures 5, 6 and 7 it will be noted that the cradle 58, which carries the pan 57, has secured thereto a link 61 adapted to be controlled by an eccentric 62 mounted upon a shaft 63. Said shaft 63 is journalled in the side frames 26 and 27 and is provided with a manually operable trip 64 located upon the outside of the side frame 27. It will be clear without detailed explanation that the operator may control the position of the cradle 58 by a simple manipulation of the trip 64. With the trip 64

in the position shown in Figures 5 and 7 the roller 60 will be in cooperative relationship with the rear side of the gelatine band 42. With the trip 64 moved to the left as the parts are found in Figure 5 the cradle 58 will be moved to the left as the parts are viewed in Figure 6, removing the roller 60 from cooperative relationship with the band 42. Stops 65—65 may be provided for limiting the right and left hand movements of the trip 64 as the parts are viewed in Figure 5. It should be noted that the axis of the connection between the link 61 and the cradle 58 is in line with the axis of the shaft 63 and the major diameter of the eccentric 62 when the roller 60 is in operative position. By reason of this construction the pressure of the gelatine band 42 cannot result in pushing the roller 60 out of operative position. Moreover, when the link 61 is thrown to the left as the parts are viewed in Figure 6 the connection between said link 61 and the cradle 58 will be substantially in line with the axis of the shaft 63 and the major diameter of the eccentric 62, whereby the cradle will be positively held out of engaging relationship with the gelatine band 42. Expressed in other language, the link 61 is over-centered so that it will stay in either operative or inoperative position, depending upon how the operator manipulates the member 64. By reason of the construction illustrated the operator may move the pan 57 as slowly as he desires, thereby avoiding the liability that the water in said pan may splash over.

The present invention contemplates a construction in which the filling of the pan 57 is simplified. Reference may be had particularly to Figures 2 and 8, from which it will be noted that the under side of the pan 57 is provided with a fitting 66 for the reception of flexible tubing 67. Extending through the side frame 26 is a pipe 68, which pipe has its extremity threaded for the reception of nuts 69—69. Said nuts 69—69, in cooperation with washers 69^a—69^a, hold the pipe 68 in rigid though adjustable relationship with the side frame 26. The extremity of said pipe 68 adjacent to the pan 57 has the flexible tubing 67 secured thereto. The pipe 68 is upwardly bent at its outer extremity and provides a mounting means for a sponge cup 70. The details of the sponge cup form no part of the present invention and need not be described in detail. It may be stated, however, that the sponge cup 70 should be at such a height that the level of a normal supply of water therein will be at the level of water desired in the pan 57. The sponge cup 70 may be provided with a false bottom 71 for supporting a sponge (not shown). Said false bottom will be provided with holes 72. The height of said false bottom 72 will be chosen such that when water appears above the level of said false bottom it will be at the proper level of the water in the pan 57. The sponge cup 70 may be provided with overflow holes 73 so that if, through carelessness, an operator should pour more water into said sponge cup than is necessary the overflow will occur around the sponge cup rather than around the pan 57, whereby the overflow will be immediately visible. Moreover, if the operator happens to be sitting with his knees under the machine the overflow will not fall upon his knees.

The utility of the sponge cup 70, in addition to the automatic moistener, including the roller 60, may be explained as follows: Primarily the cup 70 is a reservoir for water for supplying the

pan 57 in which the roller 60 rotates. A moist sponge is, however, a very valuable accessory around a hectograph machine for various reasons. First of all, it provides a soft and harmless means for wiping the surface of the gelatine band in case, due to weather conditions, the surface of the band should be excessively moist. Further, the sponge provides a soft and harmless means for removing lint or other foreign matter which may fall upon the gelatine band. Further, if for any reason the operator should fail to operate the handle 64 to apply the moistening roller to the gelatine band when the gelatine band was last used, the operator may apply the necessary moisture with a wet sponge.

The flexible connection 67 has the advantage that no interference is set up to the reciprocating movements of the pan 57 between its operative and inoperative positions. Moreover, the flexible connection 67 may be readily detached from the fitting 66, whereby removal and replacement of the pan 57 is simplified.

In some instances for rapid work operators of hectograph machines prefer to tilt their machines, the rear end being located at a higher level than the front end. The present invention accommodates itself to this type of service, it being a simple matter to locate the sponge cut 70 in a level position by merely turning the pipe 68 in its bearing in the side frame 26. In order to maintain the pan 57 in a level position under the conditions referred to the rear rocker arms 59 may be replaced by slightly longer rocker arms or, if preferred, said rocker arms 59 may be provided with a plurality of spaced holes at their lower extremities, whereby the level of the pan 57 may be adjusted to suit conditions.

According to well known practice in the operation of hectograph machines, a carriage is provided for applying the master sheet and blank sheets of paper to the gelatine band, said carriage having a movement of reciprocation along the bed of the machine. The numeral 74 (Figures 1, 2 and 4) indicates as a whole a carriage for this purpose. Said carriage is guided in its movement longitudinally of the machine by a round rod 75 (Figures 1, 2, 3, 4 and 5) disposed lengthwise of the machine in parallel relationship with the side frame 26. The carriage 74 is adapted to be swung about the axis of the rod 75, whereby access may be had to the bed plate 25 for the removal and displacement of the gelatine band 42.

The carriage 74 is provided with a platen roller 76 adapted to be swung by means of a handle 77 about the axis of a shaft 78. Certain elements cooperating with the platen roller 76 will be described presently and need not be referred to in detail at this point. It may be stated, however, that according to preferred practice the platen roller 76 should be positively rotated as the carriage 74 is moved in its working strokes backward and forward of the machine. For accomplishing the driving movement of the platen 74 one extremity of said platen is provided with a spool 79 (Figures 2 and 4) having disposed thereon a cable 80. Said cable 80 is looped around said spool 79 and has its rear extremity secured to the side frame 26 near the rear extremity of said side frame 26. The front extremity of said cable 80 is attached to an extensible spring 81, the other extremity of said spring 81 being connected to a swiveled arm 82 (Figures 1, 4 and 15). The arm 82 is bent at right angles intermediate of its length and the extremity 83 of said arm is located within a hole dis-

posed in the forward extremity of the rod 75. Said extremity 83 is coaxially disposed relative to the rod 75, whereby swinging of the spring 81 as the carriage 74 is swung will occur in an orbit having the axis of the rod 75 as its axis. The bearing of the extremity 83 is small so that the said extremity will turn with practically no effort, whereby practically no resistance is presented to the swinging of the arm 82. Under these conditions, therefore, as the carriage 74 is swung about the axis of the rod 75 the forward end of the cable 80 and the spring 81 will follow, whereby no great increase in tension will be applied to the cable 80 or the spring 81 and whereby the proper positioning of the cable 80 upon the spool 79 will not be affected. It will be understood, of course, that the principal function of the spring 81 is to provide the necessary tension in the cable 80, whereby it will have the proper grip upon the spool 79.

Figure 15 shows a holding member 85 adapted to be located within an annular groove 85 near the forward extremity of the rod 75. Said holding member is provided for the purpose of holding the rod 75 in position and forms no part of the present invention.

As is well known in the operation of hectograph machines of commercial types, an adjustable stop is commonly provided for limiting movement of the carriage toward the rear of the machine. The guide rod 75 may be used as a support for a carriage stop. Such a stop is illustrated in Figures 1, 3 and 12 and is indicated as a whole by the numeral 86. Said carriage stop 86 is a unitary member which may be stocked and shipped without parts which are liable to become separated from one another.

Said stop includes the casing having the two spaced sidewalls 87 and 88, having coaxial holes indicated by the numerals 89—89 adapted to receive the rod 75. Said sidewalls are connected together by means of a connecting wall 90, which connecting wall 90 is provided with a hole 91 whose axis is disposed at right angles to the axis of the rod 75. Preferably the axis of said hole 91 should be symmetrically disposed relative to the opposed faces of the two sidewalls 87 and 88. Disposed between said sidewalls 87 and 88 is a member 92 having a hole 93 of a size loosely to receive the rod 75. Said member 92 has an outstanding screw-threaded stud 94 adapted to extend through the hole 91. Said screw-threaded stud 94 extends beyond the outline of the connecting wall 90 and is adapted to receive a nut 95, which nut 95 is provided with a finger grip 96. The finger grip 96 may take the form of a bar freely slidable through the nut 95, the extremities of said bar being enlarged so that escape of said finger grip from said nut is impossible. The advantages had in the construction referred to will be that the finger grip will have a minimum of interference with any other parts of the machine.

The stop 86 may be readily mounted upon the rod 75 by loosening up the nut 95 and inserting the rod 75 through the holes 89—89 in the sidewalls 87 and 88 and through the hole 93 in the member 92. In view of the looseness of the nut 95 no difficulty will be encountered in bringing the holes referred to into the necessary alignment. The stop 86 may be moved to the desired position and the nut 95 turned up upon the stud 94, the finger grip 96 being used for this purpose. The turning up of the nut 95 will have the effect of applying pressure to the left

hand side of the bar 75 as the parts are viewed in Figure 12 through the member 92, and applying pressure to the right hand side of the bar 75 through the sidewalls 87 and 88. Broad bearing surfaces are therefore provided for the stop upon the rod 75, whereby the marring of said rod is avoided. In practice it has been found that by means of a pressure easily applied by the hands of the ordinary operator, even though the operator be a girl or woman, the rod 75 will be gripped so tightly by the stop 86 that said stop, for all intents and purposes, forms an integral part of said rod 75.

The sidewall 88 is illustrated as being formed with an extension 88^a for receiving and holding a buffer 97. Said buffer will be chosen of resilient material and will preferably present a conical surface to that portion of the carriage which it is intended to abut. The details of this buffer form no part of the present invention but form the subject matter of another application.

The stop 86 is so constructed that the portion thereof which includes the nut 95 overbalances the opposite side thereof. The sidewalls 87 and 88 may be provided with feet 97^a—97^a adapted to engage the sideframe 26, the result being that the nut 95, with its finger grip 96, is always presented in a position convenient to the operator.

The present invention contemplates means for stopping movement of the carriage in its travel toward the forward end of the machine. Said means includes, not only stop mechanism for that side of the carriage adjacent to the rod 75, but to the other side as well. By reference to Figure 4 it will be noted that the sideframe 26 forms an abutment for a buffer 98, which buffer is disposed upon the rod 75. Said buffer is adapted to take the shocks of the carriage 74 at the right side of the machine as the parts are viewed in Figure 4, part of the carriage frame being formed to cooperate efficiently with said buffer 98. Said buffer therefore constitutes a stop limiting movement of the carriage 74 in the forward direction. Inasmuch as the operator may in rapid work use considerable force in moving the carriage forward, he is likely to set up severe stresses in the machine, and particularly when he brings the carriage into abutment with the buffer 98 on the right hand side of the machine as the parts are viewed in Figure 4.

The present invention contemplates a stop for the carriage upon the other or left hand side of the machine. For this purpose the swinging extremity of the carriage 74, as the parts are viewed in Figure 4, is provided with a lug 99, which lug is provided with a bore extending longitudinally of the machine. The numeral 100 indicates a cup shaped member provided with a screw-threaded stem 101. Nuts 102—102 are provided which cooperate with the stem 101 adjustably to position the cup shaped member 100. Said cup shaped member 100 houses the buffer 103 adapted to contact with the abutment 104 rigid with the sideframe 27 on the left hand side of the machine as the parts are viewed in Figure 4. The parts will be so designed that the buffer 103 will be operative simultaneously with or an instant later than the engagement between the carriage 74 and the buffer 98. By reason of the left hand stop provided by the buffer 103 stresses upon the carriage 74 in operation are minimized.

The buffer 103 and its adjustable supporting means have a further valuable function which is utilized in the shipment of the machine. By reference to Figure 5 it will be noted that a hole

105 is provided in the sideframe 27. When the machine is shipped the carriage will be brought forward to the extreme limit of its travel, in which position said carriage contacts with the 5 buffer 98 on the right side of the machine as the parts are viewed in Figure 4. The cup shaped member 100 will be moved up so that the buffer 103 is in close contact with the abutment 104, the nuts 102—102 being tightened up to hold the 10 buffer 103 in this position. A string or cord will then be passed through the hole 105 (Figure 5) and tied over the swinging end of the carriage 74. The stop 86 will be moved up in close engagement with the rear side of the carriage 74, the conical buffer 97 of said stop 86 being disposed within 15 the conical recess 105 on the rear side of said carriage 74 (Figure 4). The carriage will thus be securely held against shaking relative to the sideframes 26 and 27 during shipment.

20 As indicated above, the present invention contemplates novel means for counting the number of operations of the platen roller 76 in cooperation with the bed plate 75. By reference to Figures 2, 4 and 16 it will be noted that a counter 106 is provided, which is mounted upon the carriage 74. Said counter is provided with a swinging arm 107 adapted to be engaged by a stud 108 25 which extends coaxially with the spool 79. In the particular arrangement of spool illustrated in Figures 4 and 16 the spool is geared up with the platen roller 76, the axis of said spool being displaced a short distance from the axis of the platen roller 76. However, every time the platen roller 76 is moved downwardly toward its operative position with respect to the bed plate 25 30 the stud 108 has a similar movement. Each of said movements of the platen roller 76, therefore, results in an engagement of the stud 108 with the arm 107 of the counter 106. The counter 106 therefore performs the function of registering 35 the number of times that the platen 76 is moved to its operative position. Under normal conditions of operation said counter 106 registers the number of sheets which have been run through 40 the machine.

45 By reference to Figures 4 and 14 it will be noted that a novel type of bed plate is provided. The bed plate 25 which has been indicated as a whole by the numeral 25 is a composite structure including the relatively stiff metallic plate 109, having secured to the upper surface thereof the sheet of composition material 110. The composition material 110 may be a phenolic condensation particularly known in the trade as bakelite, 50 formica and other names. The composition material 110 will be flat on its under side to conform with the upper surface of the plate 109. The upper surface of the material 110 will be provided with a multiplicity of upstanding humps 111, which humps are symmetrically disposed relative to one another and should preferably be arranged along straight lines disposed longitudinally and transversely of the line of travel of the carriage 74, which is the same as the line of 55 travel of the gelatine band 42. The humps 111 should preferably present an area upon their uppermost points relatively small compared to the total area of the surface upon which said humps are provided. The spacing of said humps 111 will be chosen to suit conditions, depending upon the stiffness of the gelatine band 42 and the cushioning effect desired. Said spacing will be so chosen that the desired cushioning effect will be had without danger of undue sinking of the 60 gelatine band between said humps. Expressed

in other words, the spacing, though sufficient to provide the desired cushioning effect, should not be so great that there would be danger that a character to be copied will fail to impress itself upon the sheet in the machine. The depth of the valleys between the humps 111 will, of course, be chosen of a value correlated to the spacing of said humps. In a commercial machine which has given satisfactory results in service the humps 111 are spaced approximately one-eighth of an inch 80 apart, and the distance between the bottoms of the valleys and the tops of said humps is approximately one-sixty-fourth of an inch. In said machine the cross-sectional diameter of the humps at their largest portions is approximately one-sixteenth of an inch, whereby the distance between the largest portions of said humps is approximately one-sixteenth of an inch. These 85 figures will not be construed in a limiting sense, but they merely illustrate a construction which has proved practical with the particular type of gelatine band chosen for use. Said figures will, of course, vary if other types of band are to be used. 90 95

Preferably the humps 111 will be of rounded contour, being substantially hemispheres or less. 100

The construction of bed plate above described has very decided practical advantages. By reason of the arrangement of the humps 111 in lines lying along the direction of movement of the gelatine band 42 the resistance to sliding of said band 105 will be reduced to a minimum. Moreover, the spaces between the humps 111 provide recesses for air, whereby the surface tension between the back side of the gelatin band 42 and the upper side of the bed plate is minimized. Furthermore, by reason of the symmetrical arrangement of the humps 111 cleaning of the bed plate is decidedly simplified. In this connection it may be pointed out that whatever sticky material may be located 110 upon the rear side of the gelatine band 42 will be more inclined to lodge in the spaces between the humps 111 than upon the tops of said humps, thereby further decreasing the frictional resistance between the gelatine band and the bed plate. 115 120 Moreover, as the gelatine band is used repeatedly the humps 111 will tend to form longitudinal grooves in the back side of the gelatine band, which grooves will induce the band to be guided in a straight line. Moreover, as these lines are 125 being uniformly held to, the accumulation of foreign sticky material is minimized, thereby furnishing a relatively smooth set of trackways for the movement of the band.

Reference may now be had to Figures 2, 9 and 11 for the disclosure of improved means for guiding the paper into the carriage 74. Secured to the carriage 74 in an inclined position is the member 112 which presents a flat surface transversely of the machine. By reference to Figure 9 it will be noted that said member 112 is bent downwardly near its abutment extremity as indicated by the numeral 113, which downwardly bent portion is again bent as indicated by the numeral 114. 130 135

Disposed upon the member 112 is a member 140 115 which constitutes a slide. Said slide is bent at right angles at its upper extremity as indicated by the numeral 116, which bent-over portion is again bent as indicated by the numeral 117 into substantial parallelism with the face 140 portion of the member 115. The portions 113 and 114 of the member 112 and the portions 116 and 117 of the member 115 form a rectangular open-ended box or other closed geometrical figure. The portion 115 is provided with a slot 118 145

which receives one extremity of a C-clamp 119. The other extremity of said C-clamp 119 is turned outwardly to form a lip 120 adapted to bear against the under side of the portion 113 of the member 112. The member 115 has one of its side edges upturned as indicated by the numeral 121. Said upturned edge 121 lies in a substantially vertical plane parallel with the line of travel of the carriage 74. Said upturned edge 121 is illustrated in Figure 9—A as being located upon the left side of the member 115. It will be understood, of course, that said upturned edge may be located upon either side of said member 115.

When the member 115 is assembled upon the member 112 the C-clamp 119 may readily be applied without the use of any tools. The member 115 has a pivoting action upon the outer extremity of the portion 114 of the member 112. Inasmuch as the C-clamp 119 reacts against the portion 116 of the member 115, the net result will be to hold the member 115 flat against the member 112. Moreover, the C-clamp will hold the member 115 in position upon the member 112, which position may be readily altered by the operator by the exercise of a small amount of force in pushing against the upturned portion 121 in a direction transversely of the machine. It is preferred to provide a C-clamp 119 of a length such that it is effective adjacent to the sides of the member 115. By reason of this construction the member 115 will be held in proper alignment even though the operator should exert a pressure upon the upturned edge portion 121 adjacent to the lower extremity of the member 115. The rear side of the member 115 will preferably be provided with a backing 122, which may be of fabric, for the purpose of preventing scratching between the member 115 and the member 112.

Reference may now be had to the type of margin bar illustrated in detail in Figures 1, 4, 9 and 10.

As is well understood by those acquainted with hectograph machines, it is necessary to provide a means for locating the master sheet or the blank sheets to be impressed upon the gelatine band. The figures immediately above referred to illustrate a margin bar for this purpose. Said margin bar comprises a plate 123 having arms 124 at its two extremities, which arms are pivotally mounted upon the sideframes 26 and 27. Figure 9 shows a margin bar in operative position, said figure showing a sheet of paper indicated by the numeral 125 having its lower edge or margin located in the corner of the margin bar, which corner is provided by the front edge of the plate 123 and by a plurality of upstanding fingers indicated by the numerals 126—126. Figure 9 shows the parts with the platen roller 76 down in operative position to impress the sheet of paper 125 upon the gelatine band 42. The arms 124—124 are pivoted for movement about the axis of the pins 127. The plate 123 is located in its operative position by means of the stop 128, which may extend the entire width of the machine.

It is preferred to provide the plate 123 in the form of a cast or moulded member whereby the matter is simplified by providing smooth, rounded edges and corners for said plate 123 and the fingers 126. Said plate may, if preferred, be separate from the arms 124 and secured to said arms 124 by screws or other fastening means. The swinging edge of the plate 123 is preferably beveled as indicated by the numeral 128, whereby

the said swinging edge may come in close contact with the gelatine band 42 at the forward edge of the bed plate 25. The fingers 126 taper from practically zero value at the inner edge of the plate 123 to a maximum value at the region close to the swinging edge of said plate 123. Said fingers are wedge shaped in plan view, whereby the said edges of said fingers taper in a uniformly decreasing progression from the inner edge of said plate 123 to the swinging ends of said fingers 126. The swinging ends of said fingers 126 are notched as indicated by the numerals 129—129, said notches being provided by the walls 130 and 131. The walls 130 of the various fingers 126 should be in substantially the same plane, which plane should lie at an angle to the beveled surface 128 of the plate 123. It will be understood also that the bottoms of the notches 129—129 should be in a straight line extending at right angles to the line of movement of the carriage 74. It is needless to say also that the axis of swinging of the plate 123 should be at right angles to the line of movement of said carriage 74. The faces 131—131 of the fingers 126 should be beveled off toward the sides of the fingers 126. Said beveled off portions are indicated in Figure 10 by the numeral 132.

It will be understood without detailed description that the margin bar, including the plate 123, may be swung either to operative or inoperative position at the will of the operator. When moved to operative position it will be accurately located by means of the stop 128. When the operator inserts a sheet of paper into the carriage the sheet may be accurately positioned transversely of the machine by means of the upturned edge 121 of the slide 115 (Figure 9a). The sheet of paper 125 will be positioned accurately in the direction of movement of the carriage 74 by reason of the fact that the forward edge or margin of said sheet of paper will be located in the notches 129—129 of the fingers 126—126. By reason of the beveled portions 132—132 of the walls 131—131 defining said notches, the danger will be avoided of the paper catching against any sharp corner and therefore the danger will be minimized that the operator in speedy work will insert the sheet of paper 125 askew within the carriage 74. After the operator has operated the carriage toward the rear end of the machine he can, without exercise of care, run his finger nail or thumb nail along the surface of the plate 123 between the fingers 126—126. By reason of the tapered conformation of the sidewalls of said fingers 126—126, the finger nail of the operator will be piloted toward the edge of the paper 125 located within the notches 129—129. Even if the finger nail of the operator should strike the top of one of said fingers 126 his finger nail will be piloted down from the top of said finger 126 toward the edge of the paper 125. For this purpose the tops of the fingers 126 should be of rounded cross-sectional contour in planes transversely of the machine. Inasmuch as the walls 130—130 defining the notches 129—129 are at a steeper angle than the beveled portion 128 of the plate 123, the finger nail of the operator will readily locate itself underneath the lower edge or margin of the sheet of paper 125, whereby the gripping of said edge or margin is greatly simplified, resulting in expediting the speed of the operation. This point may be explained more specifically by stating that the construction described makes it unnecessary for the operator to swing the margin

bar back out of operative position to get a good grip upon the lower edge or margin of the sheet of paper 125. The construction illustrated and described protects the gelatine band from mutilation by the finger nail of the operator, a difficulty which is encountered in practice where the operator, either through carelessness or necessity for speedy work, runs his finger nail into the gelatine in gripping the lower edge or margin of the sheet of paper 125. The construction of margin bar employing the plate 123 adapts itself for rigidity, a consideration which is very important on wide machines. By reason of the piloting features above referred to of the fingers 126—126 the spacing between said fingers 126—126 may be reduced to a minimum to accommodate the finger nail of the operator. For this reason cards or sheets of paper of relatively small dimensions transversely of the machine may be accurately positioned.

Reference may now be had to Figures 21 and 22 for the disclosure of an improved type of margin bar having the advantage that the lower edge of the paper to be operated upon may be contacted at all points throughout the width of the machine and the advantage retained that the paper may be readily grasped for stripping from the gelatine band. This structure is particularly useful in the use of cards such as used in card indexes, which may be provided with one or more slits in the bottom edge thereof communicating with holes in a manner familiar to those having to do with card index systems.

The numeral 133 indicates a margin bar providing a corner 134. Said margin bar 133 may extend substantially the width of the carriage 74 and the corner 134 may be uninterrupted, whereby a sheet of paper mounted in said carriage 74 will be contacted throughout its entire lower edge or margin. Said margin bar 133 is supported at its two extremities by means of side plates 135, which side plates are pivoted to the side plates 136. The pivotal connection between the plate 135 and the plate 136 at each side of the margin is provided by a rod 137 which extends across the margin. The two plates 136 at the sides of the margin are pivoted for swinging movement to the side plates 26 and 27, coaxial pins 138 being illustrated to provide this pivotal movement. Stops 139 located in the side plates limit pivotal movement of the plates 136 in a counter-clockwise direction and locate the margin bar 133 in proper position relative to the gelatine band 42. The two side plates 136 at the two sides of the machine are connected together by means of the cross-rod 140, which cross-rod may have its ends riveted from outside of said plates 136—136. Also extending across the machine and having a rotary mounting in the plates 136—136 is the rotary rod 141, which rod 141 is provided with a pair of teeth 142, each adapted to engage in a corresponding recess 143 in a corresponding plate 135. Secured to the cross-rod 141 is a guide shield 144, which extends substantially the whole distance between the plates 136—136. Said guide shield 144 is so weighted that it is biased in a clockwise direction as the parts are viewed in Figure 21, and one extremity of said guide shield 144 is adapted to contact with the cross-rod 140, which therefore acts as a stop to limit clockwise rotation of said guide shield 144 and cross-rod 141. By reason of the toothed engagement between the cross-rod 141 and the plates 135—135 the biased positioning of the guide shield 144 is accompanied

by the normal operative positioning of the margin bar 133. Moreover, the margin bar 133 is so weighted that it is biased to its normal operative position, said position being located by stops 145 positioned upon the plates 136—136. The swinging movement of the guide shield 144 in a counter-clockwise direction is limited by engagement of said guide shield with the cross-bar 137.

It will be understood without detailed explanation that when it is desired to use the margin bar 133 said margin bar will be located against the stops 145—145, at which time also the plates 136—136 will rest upon the stops 139. The margin bar 133 will be in position properly to locate sheets of paper mounted in the carriage 74. In Figure 21 the platen roller 76 is shown in its raised position out of cooperative relationship with the bed plate 25. After the carriage 74 has been moved toward the rear end of the machine the operator may strip off the piece of paper from the gelatine band in a simple movement as follows: He will run his hand upwardly along the guide shield 144, thereby rotating the cross-rod 141 in a counter-clockwise direction. This movement, by reason of the toothed engagement between the rod 141 and the plate 135, will result in the clockwise rotation of the rod 137. Inasmuch as said rod 134 has mounted thereon the plates 135—135 which carry the cross-bar 133, this action will result in a movement of translation of the margin bar 133 about the axis of the rod 137. The rearward edge of said margin bar 133 will lift the margin of the paper, leaving said margin of the paper in the path of movement of the thumb of the operator as it moves along the guide shield 144. The operator may then strip the paper from the gelatine band 42 very readily.

The structure just described has the further advantage that the paper may be gripped at any point along its edge transversely of the machine.

Reference may now be had to Figures 17, 18, 19 and 20, which disclose a modified form of margin bar operating mechanism. The type of bar illustrated in these figures is known in the art as an automatic or marginless bar. In the structures shown in Figures 17 to 20, inclusive, the carriage is provided with a pair of side members 146 which provide pivotal mountings for the arms 147—147. Said arms 147 have mounted thereon at their lower extremities the margin bar 148. Said arms are secured to the cross-bar 148^a journaled in the side members 146—146. Said margin bar 148 should be fashioned on its under side so that said margin bar may swing throughout its range of swinging movement without danger of contacting with the gelatine band, regardless of the position of the carriage 74. For this purpose the under side of the margin bar 148 may be curved about the axis of swing of said arms 147—147. The handle 77 is rigid with respect to the handle arm casting 149. A spring 150 is provided coacting with a fixed part of the carriage 74 and with said casting 149 biasing said casting 149 in a clockwise direction as the parts are viewed in Figures 17, 19 and 20. Said casting 149 has swinging movement relative to the side members 146—146 of the carriage, the rotatable rod 78 being provided for supporting said casting 149. Said rod 78 is journaled within said side members 146. Also journaled in the sideframes 146 is the rotatable cross-bar 152 which carries the links 153, one of said links being located adjacent to each of said members 146—146. Cooperating with each of the links 153 is a link 154. Each link 153 is jointed to its

corresponding link 154 by means of a pivotal pin 155. Said links 153 and 154 on each side of the carriage comprise a toggle connection. The opposite end of each link 154 is pivotally connected to a corresponding arm 147 through the pivot pin 148.

The pivot pin 148 through which the links 154—154 cooperate with the arms 147—147 is located between the axis of the cross-bar 143^a and the margin bar 148, whereby when the pivotal connection 155 between links 153 and 154 on each side of the carriage is raised, the arms 147—147 will be positively moved in a counter-clockwise direction as the parts are viewed in Figures 17, 19 and 20.

The means for raising the pivotal connection 155 may be embodied in a structure now to be described. Each link 153 is provided with a tooth 156 adapted to be engaged by an adjustably mounted plate 157. There are two of said plates 157 illustrated, although one would be sufficient to perform the functions of operating the arms 147—147. Each of the plates 157—157 is provided with an aperture 158 for receiving the corresponding tooth 156. Said plates 157—157 are adjustably mounted upon the casting 149 by means of the screw and slot connections illustrated in Figure 18 and indicated by the numerals 159—159.

It will be clear without detailed explanation that as the casting 149 is swung, as for example by means of the handle 77, the plates 157—157 will communicate a rocking movement to the links 153—154 through the teeth 156—156. Clockwise movement of the casting 149 about the axis of the rod 151 will move the links 153—153 in a counter-clockwise direction until each link 153 is in substantial alignment with its corresponding link 154 in which position a toggle action will be established and the arms 147—147 with their margin bar 148 will be rigidly held in operative position. When the handle 77 with its casting 149 is moved in a counter-clockwise direction as the parts are viewed in Figures 17, 19 and 20, for the purpose of moving the platen roller 76 down into cooperative relationship with the bed plate 25 and gelatine band 42, this action will cause the movement of the links 153—153 in a clockwise direction, raising the pivotal connections 155—155 and swinging the arms 147—147 and margin bar 148 in a counter-clockwise direction. It will be understood, of course, that the dimensions of the parts will be so chosen that the platen roller 76 will have gripping relationship with the sheet of paper 125 in the carriage against said gelatine at practically the instant the margin bar 148 is withdrawn from operative position.

The margin bar and its operating mechanism disclosed in Figures 17 to 20, inclusive, has the advantage that it is very easy to operate, inasmuch as the effort required to break the toggle action of the links 153—154 is very small. Moreover, the action is so positive and the relation between the parts may be so precise that the interval of time elapsing between the withdrawal of the margin bar 148 and the complete establishment of a gripping relationship between the platen roller 76 and the paper 125 may be minimized.

In the foregoing description it has been considered unnecessary to refer specifically to all of the elements disclosed in the drawings. A certain few of said elements may be named in case the identity of said elements should not be clear from a mere disclosure in the drawings.

The member indicated by the numeral 160 is a cross-rod useful to form a back rest for the swing-

ing margin bar of the non-automatic type. The numeral 161 refers to a crank which may be used for winding and tightening the gelatine band 42. The numeral 162 refers to a drive shaft which may be turned by means of the crank 161. The numeral 163 represents a spring-pressed knob which may be manipulated for removal of a spindle carrying the gelatine band 42. The numeral 164 refers to a pressure roller forming part of the carriage 74, which pressure roller, according to the usual practice, has the function of gripping the paper with relation to the platen roller 76 before the platen roller is moved into pressing relationship with the bed plate 25 and the gelatine band and paper thereon. The numeral 165 represents a spring-pressed detent for locking the platen roller 76 in its depressed position, and the numeral 166 represents a handle which may be used for unlocking the detent 165.

Although certain preferred embodiments of the present invention have been described in detail, it will be clear that many modifications will occur to those skilled in the art. It is intended to cover all such modifications that fall within the scope of the appended claims.

What is claimed is:

1. In a hectograph machine, in combination, a pair of side frames and a plurality of cross-braces holding said side frames in rigid relationship with one another, said side frames and cross-braces being secured together by means of bolts having tapered heads fitting within tapered recesses in said side frames, said side frames being provided with means for supporting a bed plate, a bed plate upon said supporting means, and adjustable means carried by one of said cross-braces for supporting said bed plate between said side frames.

2. In a hectograph machine, in combination, a pair of side frames and a plurality of cross-braces holding said side frames in rigid relationship with one another, said side frames and cross-braces being secured together by means of bolts having tapered heads fitting within tapered recesses in said side frames, said side frames being provided with means for supporting a bed plate, a bed plate upon said supporting means, and adjustable means carried by one of said cross-braces for supporting said bed plate between said side frames, an end of said bed plate being provided with a stiffening member extending thereacross.

3. In a hectograph machine, in combination, a pair of side frames and a plurality of cross-braces holding said side frames in rigid relationship with one another, said side frames and cross-braces being secured together, said side frames being provided with means for supporting a bed plate, a bed plate upon said supporting means, and adjustable means carried by one of said cross-braces for supporting said bed plate between said side frames.

4. In a hectograph machine, in combination, a pair of side frames and a plurality of cross-braces holding said side frames in rigid relationship with one another, said side frames and cross-braces being secured together, said side frames being provided with means for supporting a bed plate, a bed plate upon said supporting means, and adjustable means carried by one of said cross-braces for supporting said bed plate between said side frames, an end of said bed plate being provided with a stiffening member extending thereacross.

5. In a hectograph machine, in combination, means for positioning a gelatin band, a moistening means adapted to deliver moisture to the back

side of said band, said moistening means including a moisture applying means located in a pan of liquid and supporting means for said pan comprising an eccentrically mounted link for positively holding said pan selectively in operative and inoperative positions.

6. In a hectograph machine, in combination, means for positioning a gelatin band, means for applying moisture to the rear side of said band, said moistening means comprising a moisture applying member and a pan for communicating moisture to said member, and over-centering means for holding said moisture applying means selectively in operative and inoperative positions.

7. In a hectograph machine, in combination, moistening means including a pan for a supply of liquid and a sponge cup connected with said pan, said sponge cup being at such a level relative to said pan that when said sponge cup is filled with water to a normal level said level will be identical with the proper level of water within said pan.

8. In a hectograph machine, in combination, side frames, a moistening mechanism between said side frames and adapted to apply moisture to the back side of a gelatin sheet, means for moving said moistening means into and out of operative positions, a reservoir for liquid outside of said side frames, said reservoir being connected to said moistening means through a flexible tubular connection.

9. In a hectograph machine, in combination, side frames, a moistening mechanism between said side frames and adapted to apply moisture to the back side of a gelatin sheet, means for moving said moistening means into and out of operative positions, a reservoir for liquid outside of said side frames, said reservoir being connected to said moistening means through a flexible tubular connection, said reservoir being at such a level that the normal level of the liquid within said reservoir will coincide with the normal level of liquid within said moistening means.

10. In a hectograph machine, in combination, side frames, a moistening mechanism between said side frames and adapted to apply moisture to the back side of a gelatin sheet, means for moving said moistening means into and out of operative position, a reservoir for liquid outside of said side frames, said reservoir being connected to said moistening means through a flexible tubular connection, said reservoir being at such a level that the normal level of the liquid within said reservoir will coincide with the normal level of liquid within said moistening means, said reservoir being so connected to one of said side frames that the proper vertical position of said reservoir may be maintained regardless of tipping of said hectograph machine in a plane parallel with the direction of carriage movement.

11. In a hectograph machine, in combination, side frames, a moistening pan between said side frames, rocking means for supporting said pan, an eccentric journaled in one of said side frames, and a link connecting said eccentric with said rocking means.

12. In a hectograph machine, in combination, side frame members, a gelatin sheet, moistening mechanism between said side frame members, said moistening means comprising a pan for the reception of liquid, means for moving said pan into and out of co-operative relationship with the gelatin sheet upon said hectograph machine, and means including flexible tubing extending through one of said side frames for supplying liquid to said pan.

13. In a hectograph machine, in combination, a frame, a bar disposed along said frame, a carriage slidable along said bar and swingable about said bar, said carriage including a platen roller and a spool for communicating driving motion to said platen roller, a cable looped around said spool, said cable having one of its extremities fixed relative to said frame, a swivel member having its swivel axis coincident with the axis of swing of said carriage, the other extremity of said cable being connected to said swivel member, said swivel member including a pin mounted within said rod axially thereof.

14. In a hectograph machine, in combination, a frame, a bar disposed along said frame, a carriage slidable along said bar and swingable about said bar, said carriage including a platen roller and a spool for communicating driving motion to said platen roller, a cable looped around said spool, said cable having one of its extremities fixed relative to said frame, a swivel member having its swivel axis coincident with the axis of swing of said carriage, the other extremity of said cable being connected to said swivel member, said swivel member including a pin mounted within said rod axially thereof, said cable including a spring member operative to hold said pin within said rod.

15. In a hectograph machine, in combination, side frames, a carriage movable longitudinally of said frames, said carriage being also swingable relative to said side frames about an axis parallel with the length of said side frames, a stop mounted upon the front end of one of said side frames co-operating with one side of said carriage, and a stop mounted upon the other of said side frames co-operating with the other side of said carriage, said other side of said carriage being provided with a buffer and means for adjusting the position of said buffer on said carriage longitudinally of said hectograph machine.

16. In a hectograph machine, in combination, side frames, a carriage movable along said side frames and swinging relative thereto about an axis parallel with the length of said side frames, stop mechanism disposed symmetrically with the axis of swing of said carriage, and stop mechanism for the other end of said carriage, said stop mechanism for said other end of said carriage being adjustable in the direction of the length of said hectograph machine, said stop mechanisms limiting forward movement of said carriage.

17. In a hectograph machine, in combination, a bed, a carriage reciprocable along said bed, said carriage including a platen roller adapted to be swung into and out of co-operative relationship with said bed, counting means carried by said carriage, and means co-operatively associated with said counting means and said platen roller for communicating motion to said counting means upon each swinging movement of said platen roller.

18. In a hectograph machine, in combination, a bed, a carriage reciprocable along said bed, said carriage including a platen roller, and means for swingingly mounting said platen roller, means for rotating said platen roller in response to reciprocations of said carriage, counting means and means co-operatively associated with said counting means adapted to be actuated by said driving means in each swinging movement of said platen roller.

19. In a hectograph machine, a bed, a margin

bar for positioning sheets of paper relative to said bed, said margin bar including a plate disposed transversely of said bed, said plate having upstanding fingers, the extremities of which
5 are notched to receive said sheets of paper, the lower surfaces defining the notches in said finger being in angular relationship with the adjacent surface of said plate.

20. In a hectograph machine, in combination, a bed and a margin bar co-operatively associated with said bed, said margin bar comprising a plate extending transversely of said bed, said margin bar having fingers upstanding from said plate, the extremities of said fingers being notched for
15 the reception of sheets of paper for locating said sheets of paper relative to said bed, the edge of said plate adjacent to said extremities of said fingers being beveled off in a plane angularly disposed relative to the bottom faces of the notched
20 portions of said fingers.

21. In a hectograph machine, in combination, a bed and a margin bar cooperatively associated with said bed, said margin bar comprising a plate extending transversely of said bed, said margin
25 bar having fingers upstanding from said plate, the extremities of said fingers being notched for the reception of sheets of paper for locating said sheets of paper relative to said bed, the edge of said plate adjacent to said extremities of said
30 fingers being beveled off in a plane angularly disposed relative to the bottom faces of the notched portions of said fingers, said notched portions of said fingers being beveled at the sides of said fingers to avoid presentation of any sharp
35 corners to the corners of such sheets of paper.

22. In a hectograph machine, in combination, a bed and a margin bar co-operatively associated with said bed, said margin bar comprising a plate extending transversely of said bed, said margin
40 bar having fingers upstanding from said plate, the extremities of said fingers being notched for the reception of sheets of paper for locating said sheets of paper relative to said bed, the edge of said plate adjacent to said extremities of said fin-
45 gers being beveled off in a plane angularly disposed relative to the bottom faces of the notched portions of said fingers, said fingers being tapered upwardly from said plate toward the notched extremities of said fingers.

23. In a hectograph machine, in combination, a bed and a margin bar co-operatively associated with said bed, said margin bar comprising a plate extending transversely of said bed, said margin
50 bar having fingers upstanding from said plate, the extremities of said fingers being notched for the reception of sheets of paper for locating said sheets of paper relative to said bed, the edge of said plate adjacent to said extremities of said fin-
55 gers being beveled off in a plane angularly disposed relative to the bottom faces of the notched portions of said fingers, said fingers being tapered upwardly from said plate toward the notched extremities of said fingers, said notched portions of said fingers being beveled off at the sides of
60 said fingers to avoid presentation of any sharp corners to the corners of such sheets of paper.

24. In a hectograph machine, in combination, a bed and a margin bar co-operatively associated with said bed, said margin bar comprising a plate
70 extending transversely of said bed, said margin bar having fingers upstanding from said plate, the extremities of said fingers being notched for the reception of sheets of paper for locating said sheets of paper relative to said bed, the edge of
75 said plate adjacent to said extremities of said

fingers being beveled off in a plane angularly disposed relative to the bottom faces of the notched portions of said fingers, said notched portions of said fingers being beveled off at the sides of said fingers to avoid presentation of any sharp corners
80 to the corners of such sheets of paper, said fingers being shaped to provide tapering spaces therebetween decreasing progressively toward the notched extremities of said fingers.

25. In a hectograph machine, in combination, a bed and a margin bar co-operatively associated with said bed, said margin bar comprising a plate extending transversely of said bed, said margin
85 bar having fingers upstanding from said plate, the extremities of said fingers being notched for the reception of sheets of paper for locating said sheets of paper relative to said bed, the edge of said plate adjacent to said extremities of said fingers being beveled off in a plane angularly disposed relative
90 to the bottom faces of the notched portions of said fingers, said fingers being shaped to provide tapering spaces therebetween decreasing progressively toward the notched extremities of said fingers.

26. In a hectograph machine, in combination, a bed and a margin bar co-operatively associated
100 with said bed, said margin bar comprising a plate extending transversely of said bed, said margin bar having fingers upstanding from said plate, the extremities of said fingers being notched for the reception of sheets of paper for locating said
105 sheets of paper relative to said bed, the edge of said plate adjacent to said extremities of said fingers being beveled off in a plane angularly disposed relative to the bottom faces of the notched portions of said fingers, said fingers being
110 tapered upwardly from said plate toward the notched extremities of said fingers, said fingers being shaped to provide tapering spaces therebetween decreasing progressively toward the notched extremities of said fingers.

27. In a hectograph machine, in combination, a bed plate, and means for advancing a duplicating band over said bed plate, said bed plate
115 having a multiplicity of spaced dot-like humps projecting upwardly therefrom to contact the bottom surface of said duplicating band whereby said band may be advanced with little effort over said bed plate.

28. In a hectograph machine, in combination, a bed plate, and means for advancing a duplicating band over said bed plate, said bed plate being
125 provided with dot-like projecting portions forming channels extending across said bed plate to prevent said duplicating band from adhering to said bed plate.

29. In a duplicating machine, a bed, and a margin bar for positioning sheets of paper relative to said bed, said margin bar comprising a plate extending transversely of said bed, said plate
130 having upstanding portions provided with angles, the corners of which angles receive the registered ends of said sheets of paper, said corners being above the adjacent upper surface of said plate whereby a channel is provided between adjacent upstanding portions.

30. In a hectograph machine, in combination, a bed plate and means for advancing a duplicating band over said plate, said bed plate being provided with dot-like humps projecting above the
140 upper surface of the plate for supporting said duplicating band, said dot-like humps being formed on most of that area of the bed plate covered by said duplicating band.