J. S. BANCROFT & M. C. INDAHL.

MATRIX MARKING MACHINE.

APPLICATION FILED APR. 16, 1910.

1,008,302.

Patented Nov. 14, 1911.

15 SHEETS—SHEET 1.

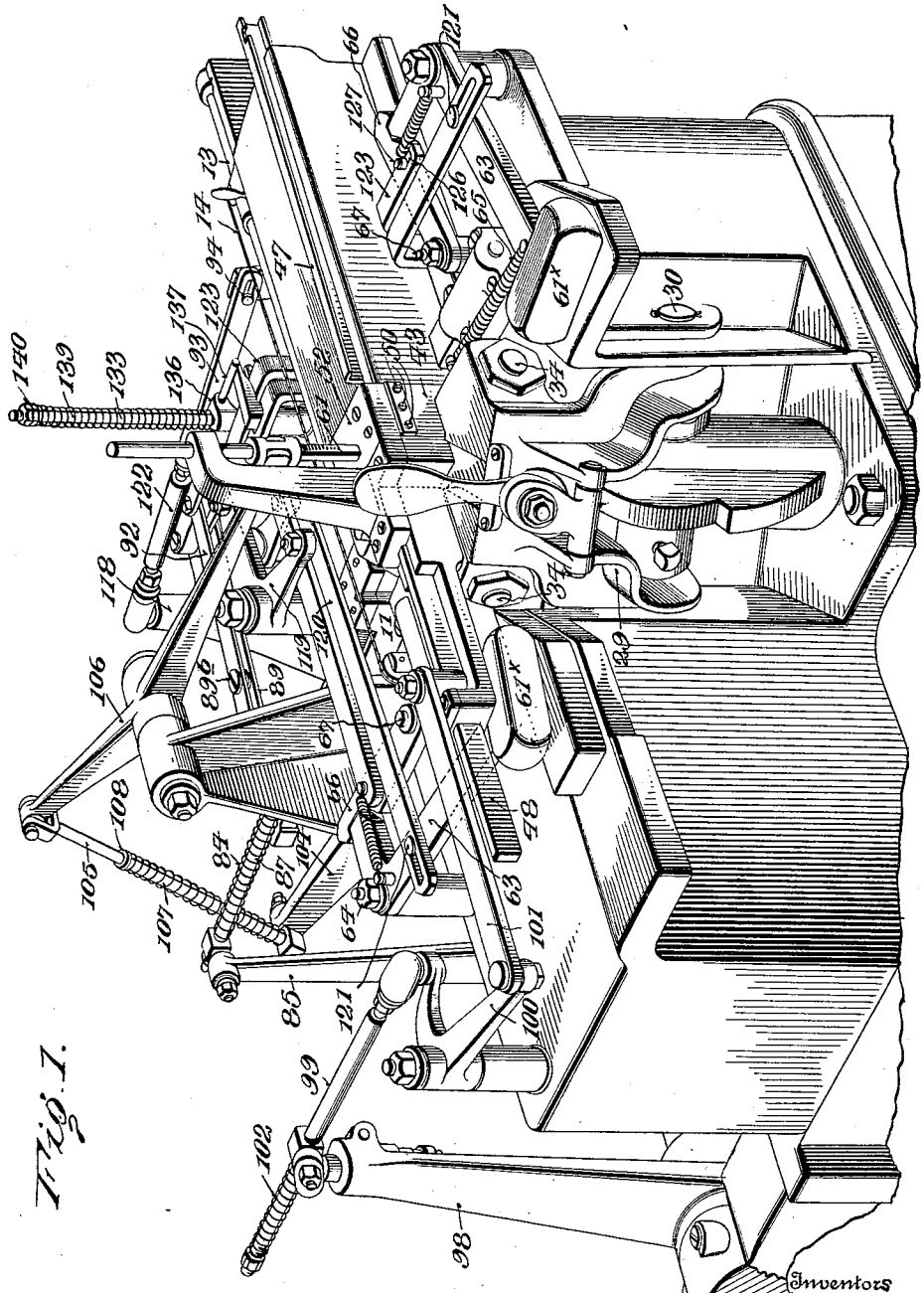


Fig. 1.

Witnesses

Helga O. H. Murray.

Robert P. Brown.

Inventors

J. S. Bancroft

M. C. Indahl

By Church & Church

their Attorneys

J. S. BANCROFT & M. C. INDAHL.

MATRIX MARKING MACHINE.

APPLICATION FILED APR. 16, 1910.

1,008,302.

Patented Nov. 14, 1911.

15 SHEETS—SHEET 2.

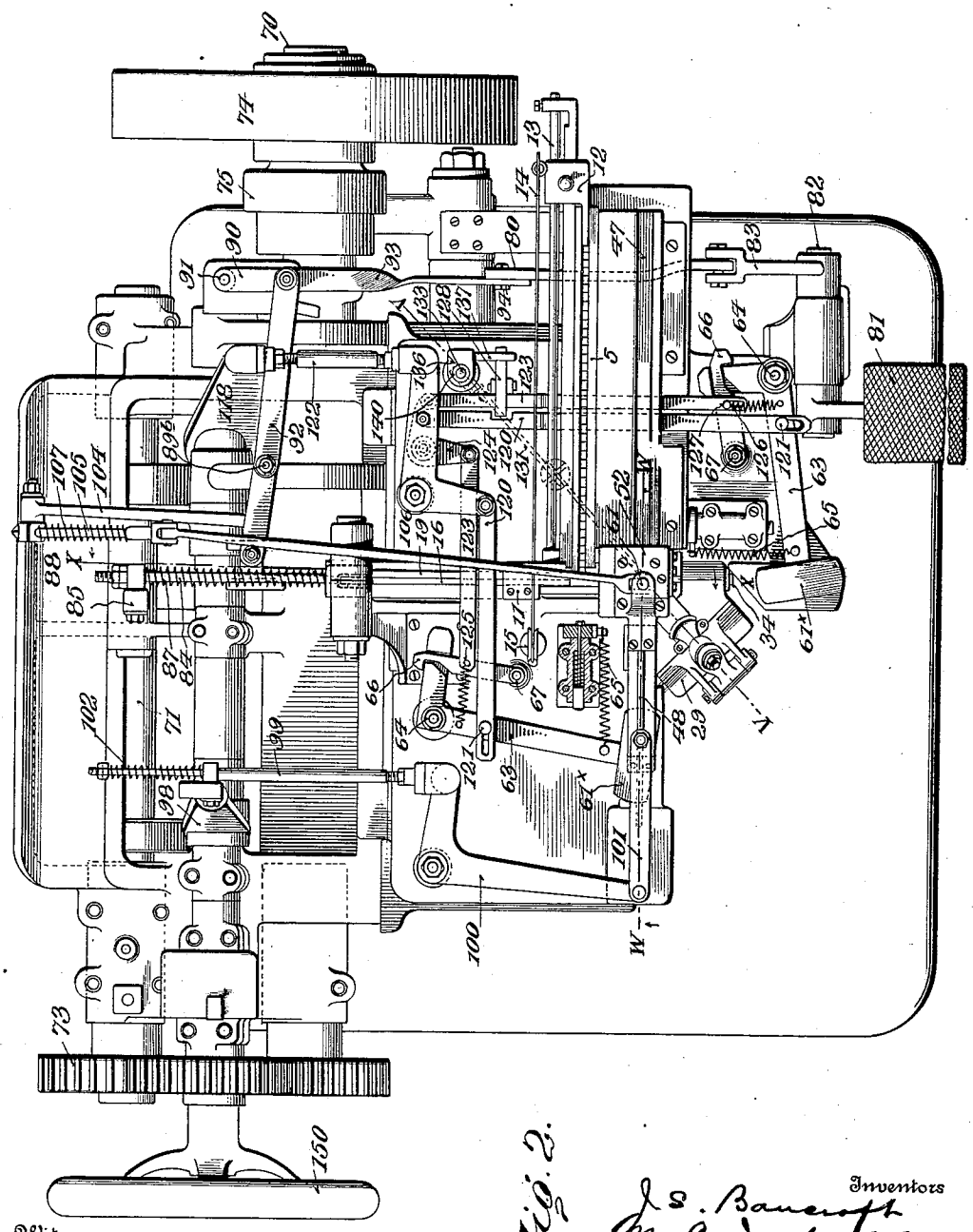


Fig. 2.

Witnesses

Helge A. Nyman.

Halbert P. Brown.

Inventors

J. S. Bancroft

M. C. Indahl

By Church & Church

their Attorneys

J. S. BANCROFT & M. C. INDAHL.

MATRIX MARKING MACHINE.

APPLICATION FILED APR. 16, 1910.

1,008,302.

Patented Nov. 14, 1911.

15 SHEETS—SHEET 3.

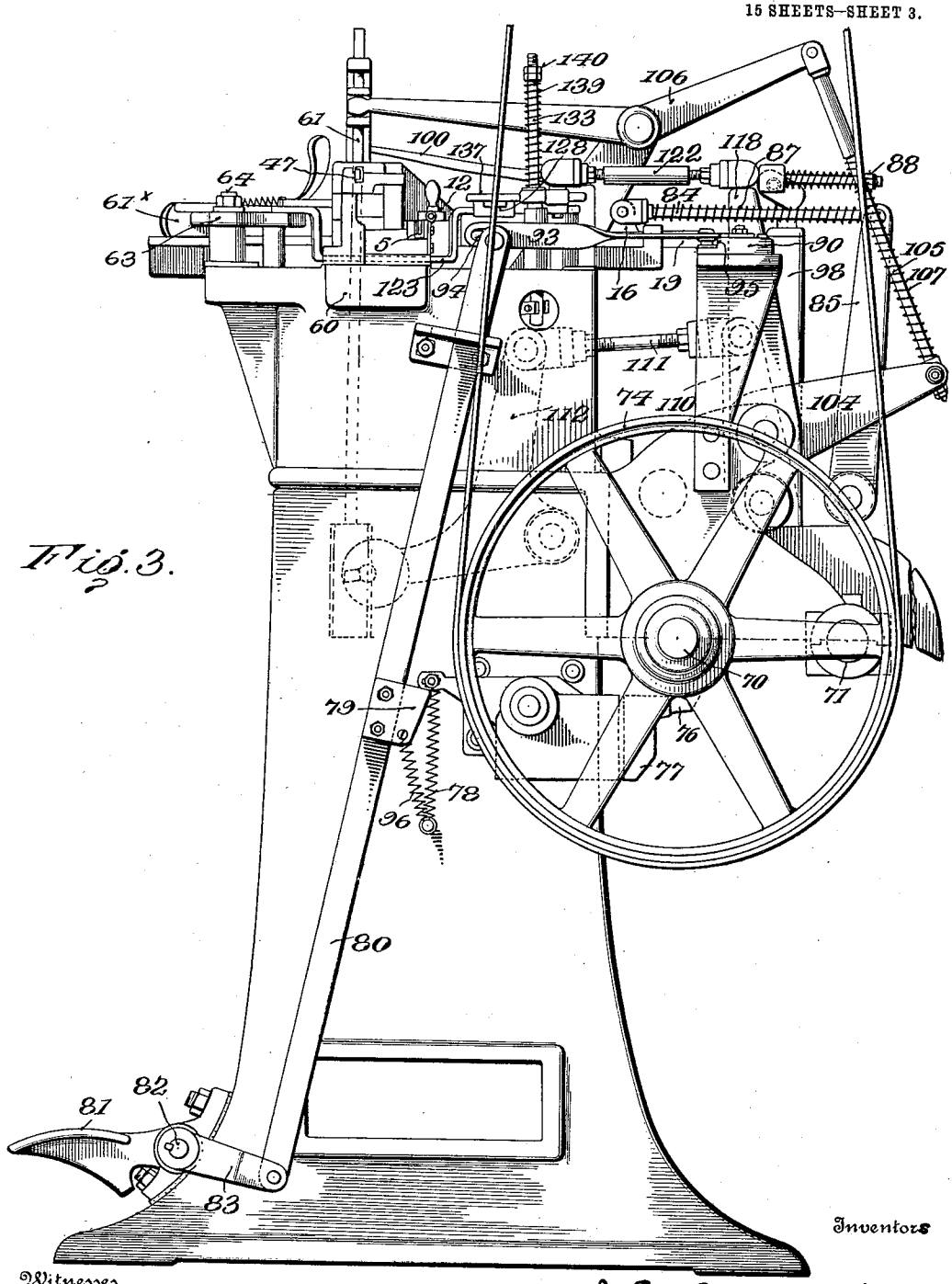


Fig. 3.

Witnesses

Helge H. Murray.

Herbert P. Brown.

Inventors

J. S. Bancroft

M. C. Indahl

By Church & Church

their Attorneys

J. S. BANCROFT & M. C. INDAHL.

MATRIX MARKING MACHINE.

APPLICATION FILED APR. 16, 1910.

1,008,302.

Patented Nov. 14, 1911.

15 SHEETS—SHEET 4.

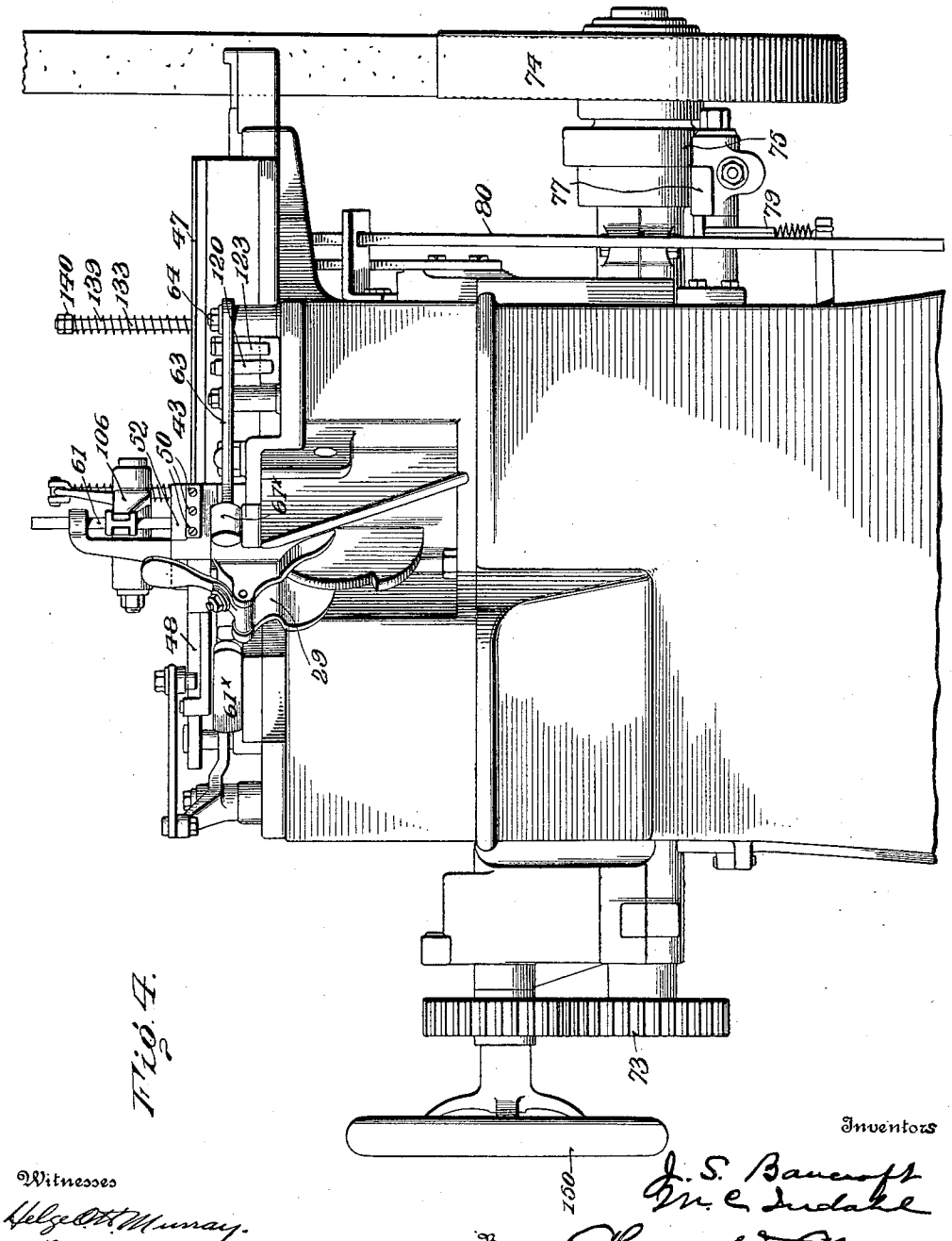


Fig. 4.

Witnesses

Helge O. H. Murray.

Kalbert P. Brown.

Inventors

J. S. Bancroft

M. C. Indahl

By Church & Church

their Attorneys

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

J. S. BANCROFT & M. C. INDAHL.

MATRIX MARKING MACHINE.

APPLICATION FILED APR. 16, 1910.

1,008,302.

Patented Nov. 14, 1911.

15 SHEETS—SHEET 5.

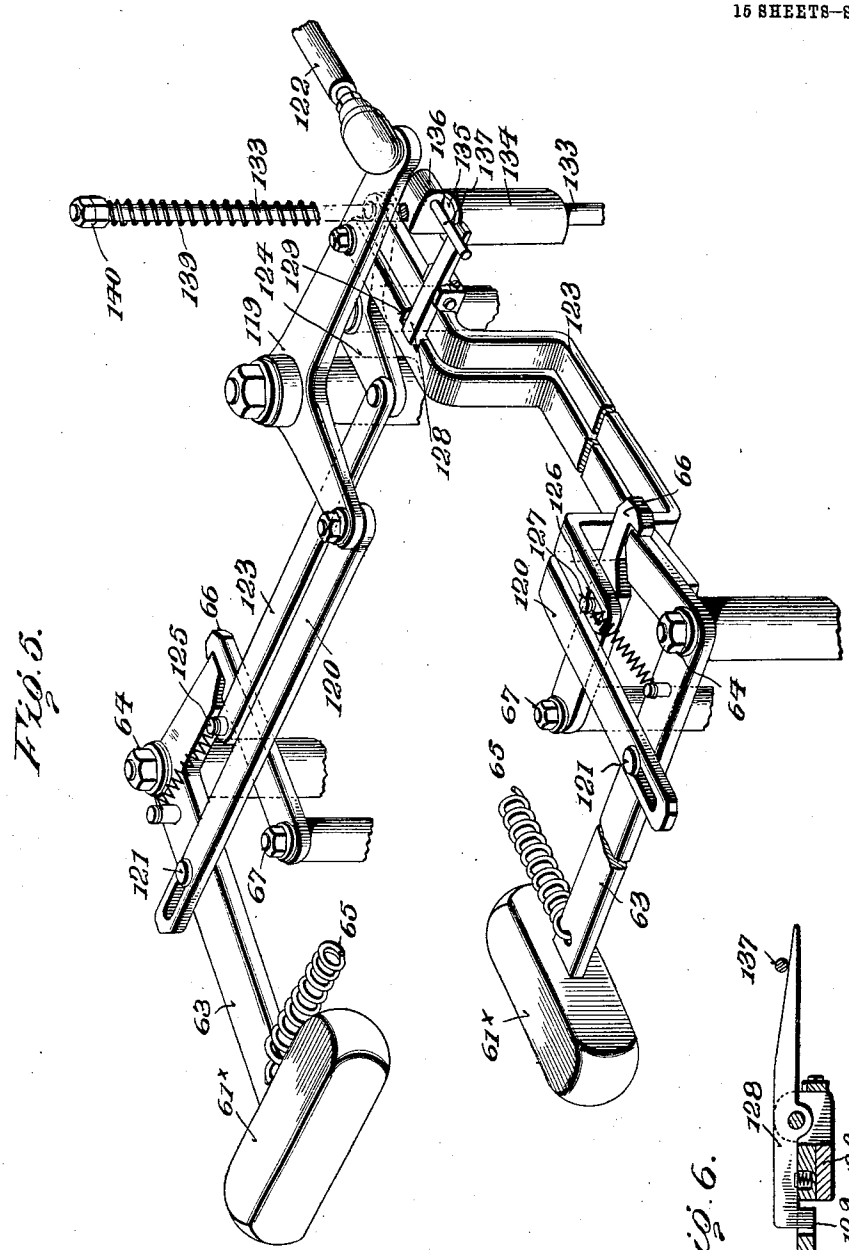


Fig. 5.

Fig. 6.

Inventors

J. S. Bancroft

M. C. Indahl

By Church & Church

their Attorneys

Witnesses

Helge A. Murray.

Calbert P. Brown.

J. S. BANCROFT & M. C. INDAHL.

MATRIX MARKING MACHINE.

APPLICATION FILED APR. 16, 1910.

1,008,302. **Patented Nov. 14, 1911.**

15 SHEETS—SHEET 6.

Fig. 7.

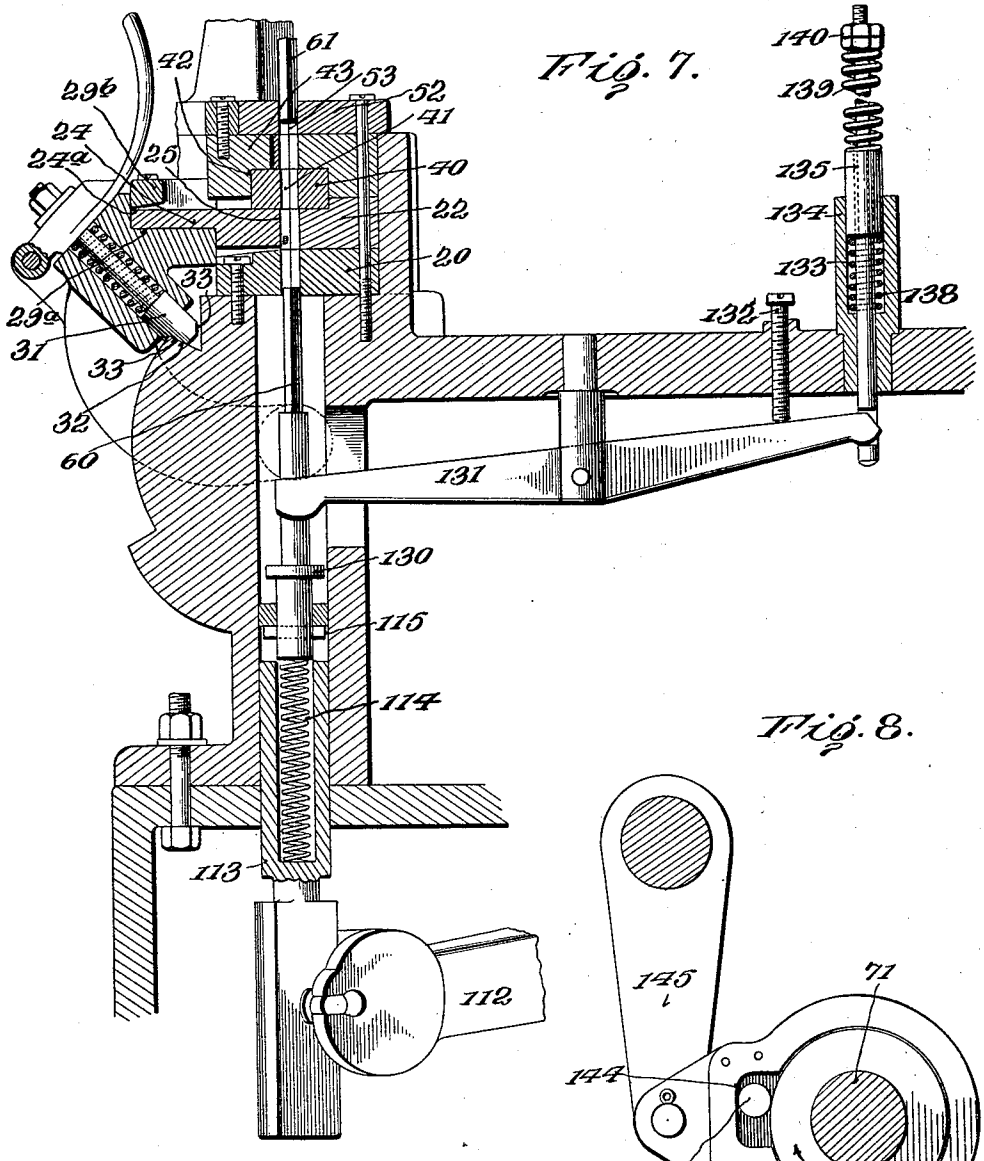


Fig. 8.

Witnesses

Inventors

J. S. Bancroft

M. C. Indahl

By Church & Church

their Attorneys

J. S. BANCROFT & M. C. INDAHL.

MATRIX MARKING MACHINE.

APPLICATION FILED APR. 16, 1910.

1,008,302.

Patented Nov. 14, 1911.

16 SHEETS—SHEET 7.

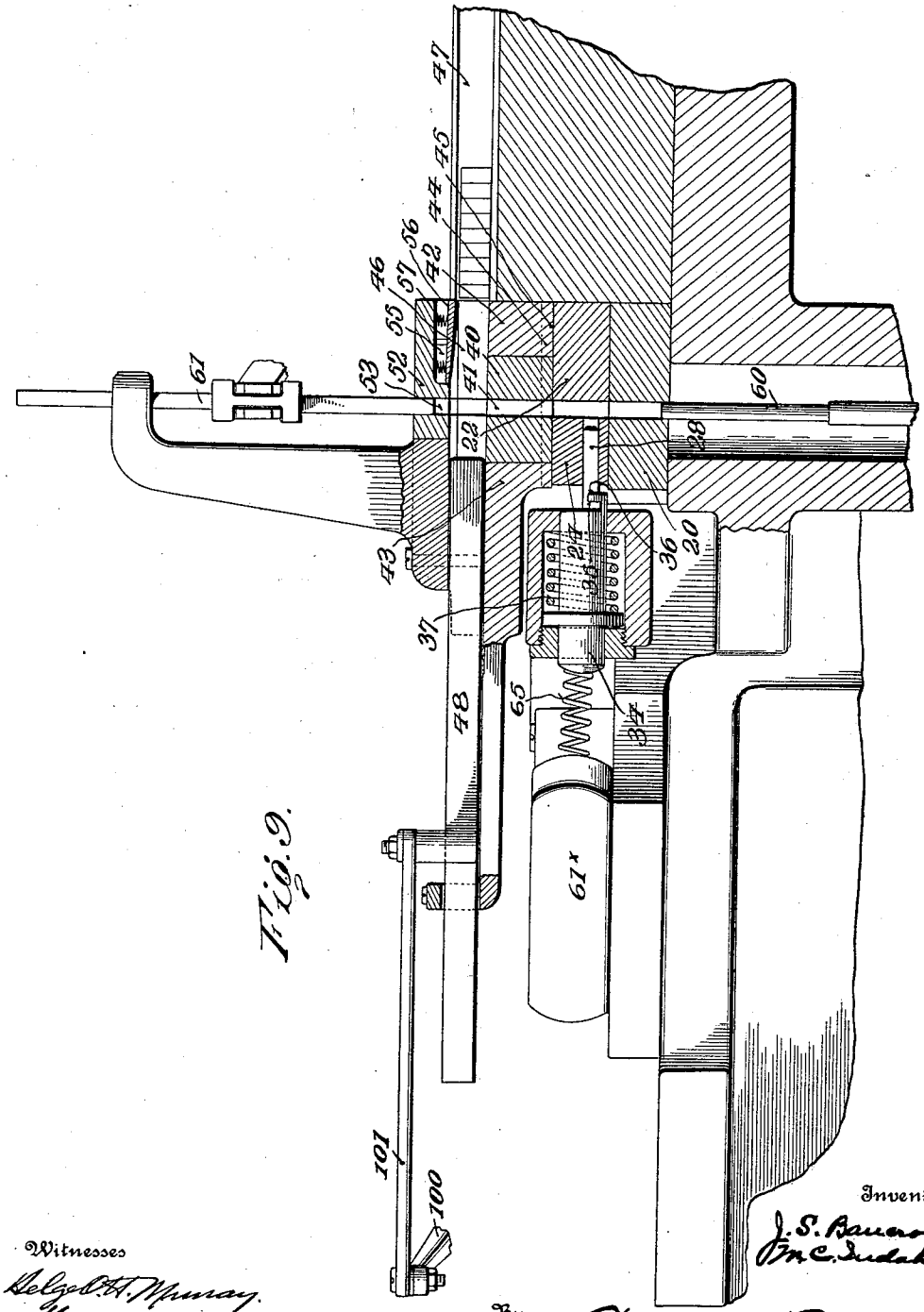


Fig. 9.

Witnesses

Helge A. Myrvang.

Kalbert P. Brown.

Inventors

J. S. Bancroft

M. C. Indahl

By Church & Church

their Attorneys

J. S. BANCROFT & M. C. INDAHL.

MATRIX MARKING MACHINE.

APPLICATION FILED APR. 16, 1910.

1,008,302.

Patented Nov. 14, 1911.

15 SHEETS—SHEET 8.

Fig. 10.

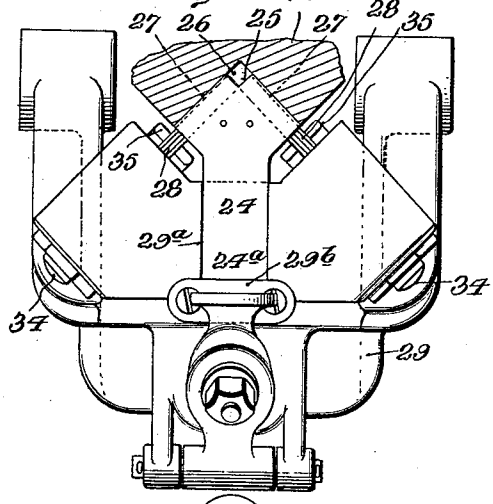


Fig. 12a

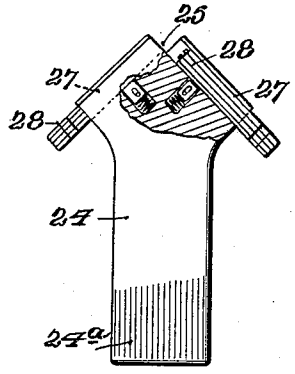


Fig. 11.

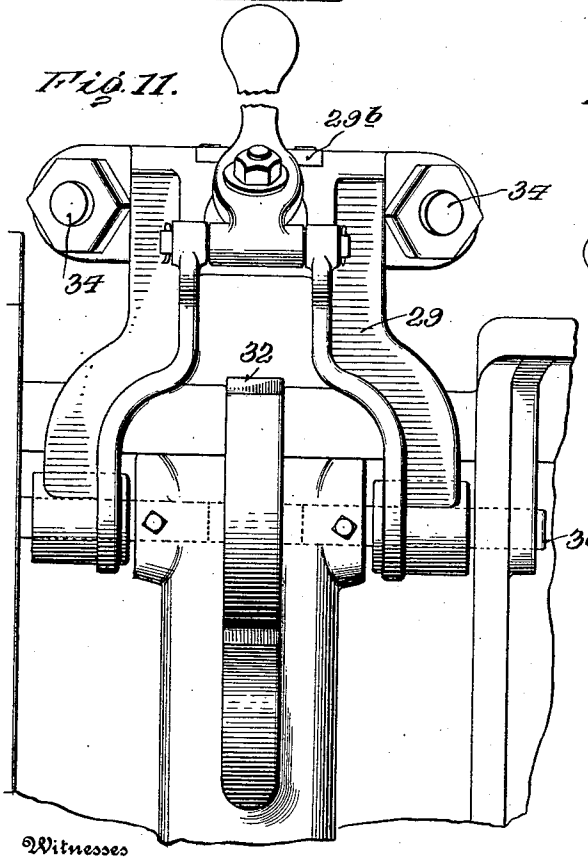
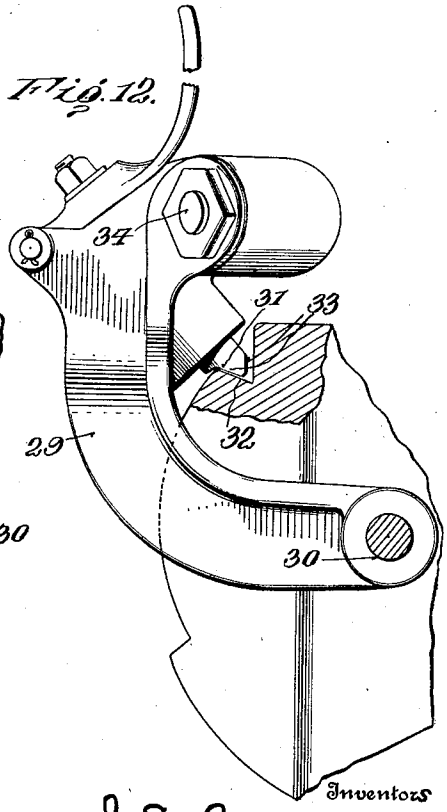


Fig. 12.



Witnesses

Helgel H. Murray.

Hubert P. Brown.

Inventors

J. S. Bancroft

M. C. Indahl

By Church & Church

their Attorneys

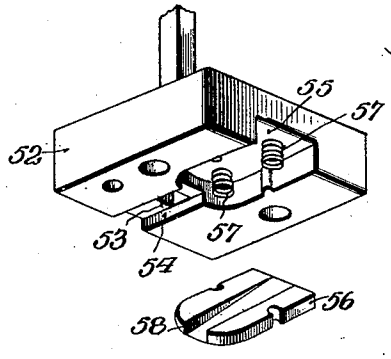
J. S. BANCROFT & M. C. INDAHL.

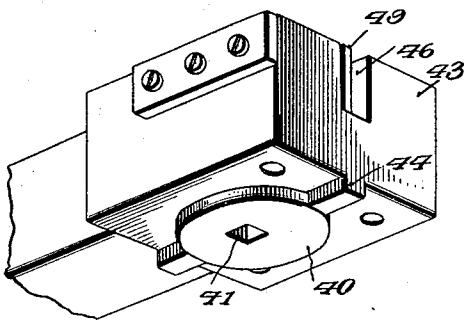
MATRIX MARKING MACHINE.

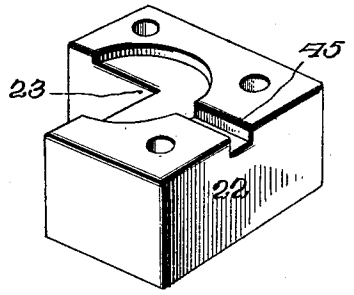
APPLICATION FILED APR. 16, 1910.

1,008,302. **Patented Nov. 14, 1911.**

15 SHEETS—SHEET 9.







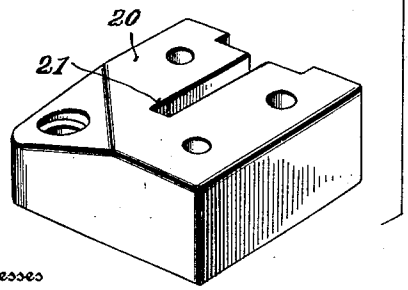


Fig. 13.

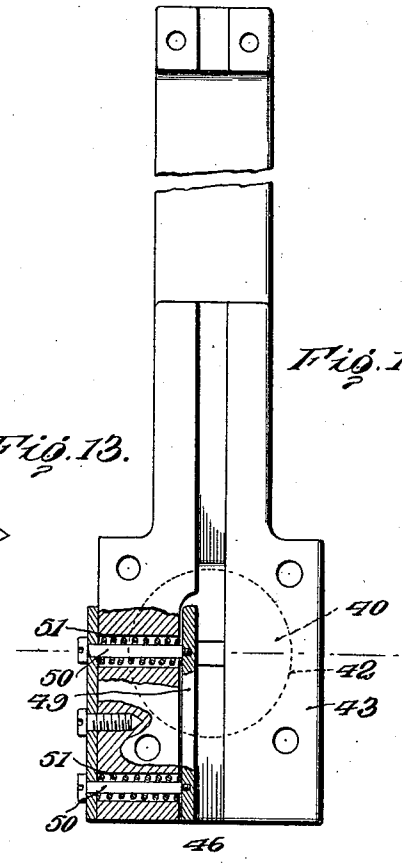
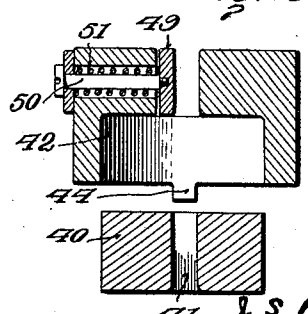


Fig. 14.

Fig. 15.



Witnesses

Helge O. Hanna.

Herbert P. Brown.

Inventors

J. S. Bancroft

M. C. Indahl

By Church & Church

their Attorneys

J. S. BANCROFT & M. C. INDAHL.

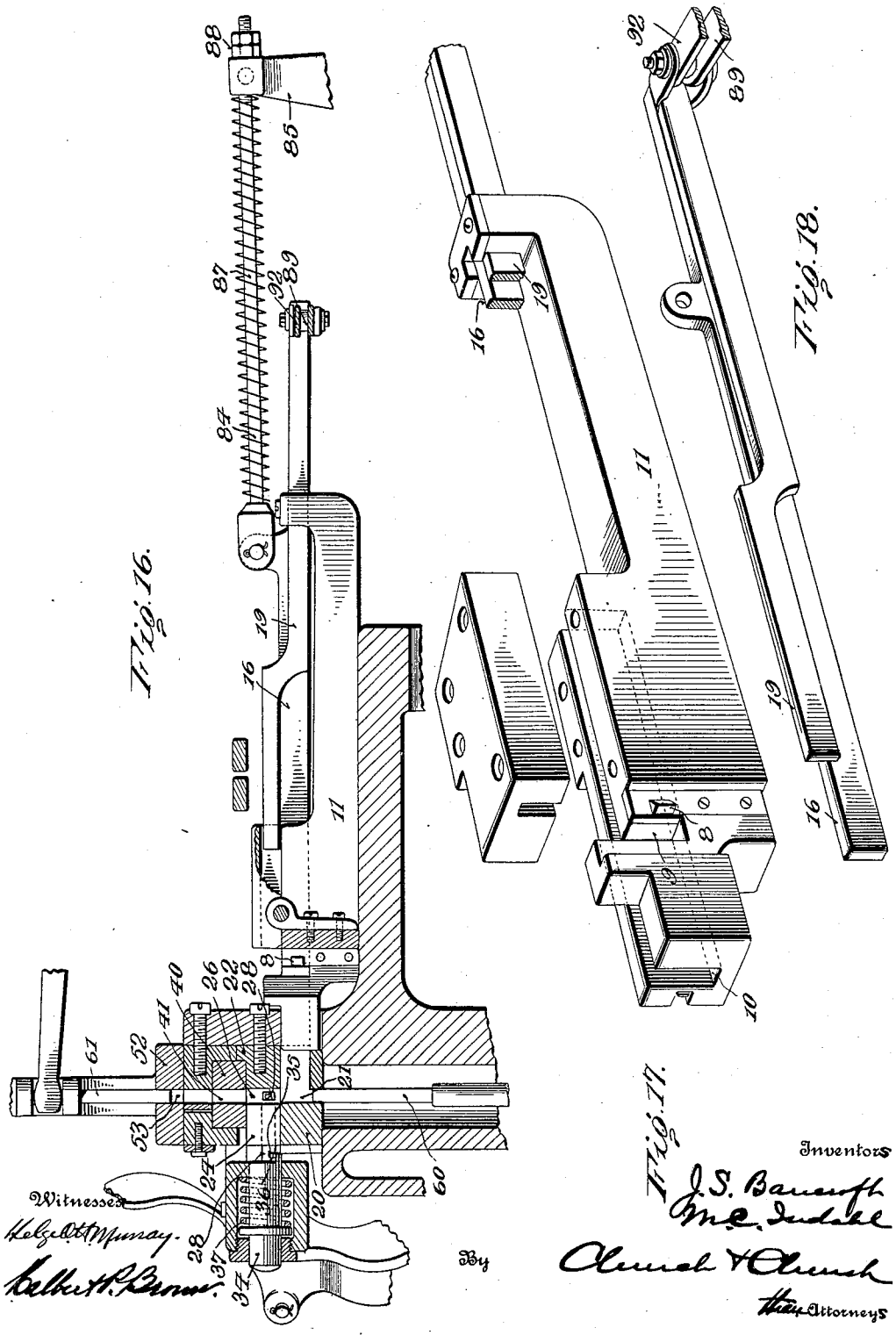
MATRIX MARKING MACHINE.

APPLICATION FILED APR. 16, 1910.

1,008,302.

Patented Nov. 14, 1911

15 SHEETS—SHEET 10.



J. S. BANCROFT & M. C. INDAHL.

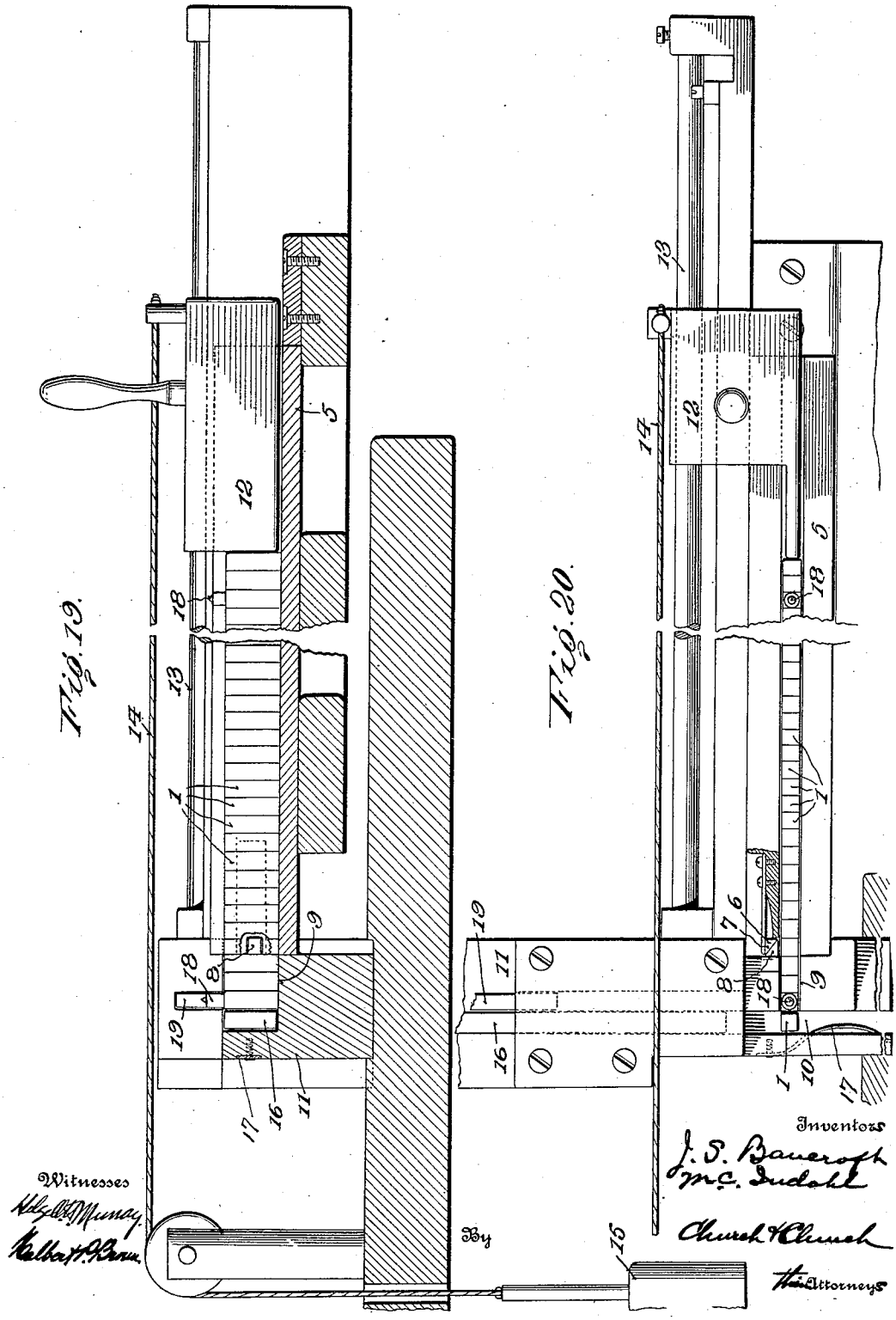
MATRIX MARKING MACHINE.

APPLICATION FILED APR. 16, 1910.

1,008,302.

Patented Nov. 14, 1911.

15 SHEETS—SHEET 11.



COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

J. S. BANCROFT & M. C. INDAHL.

MATRIX MARKING MACHINE.

APPLICATION FILED APR. 16, 1910.

1,008,302. **Patented Nov. 14, 1911.**

15 SHEETS—SHEET 12.

Fig. 30.

Fig. 29.

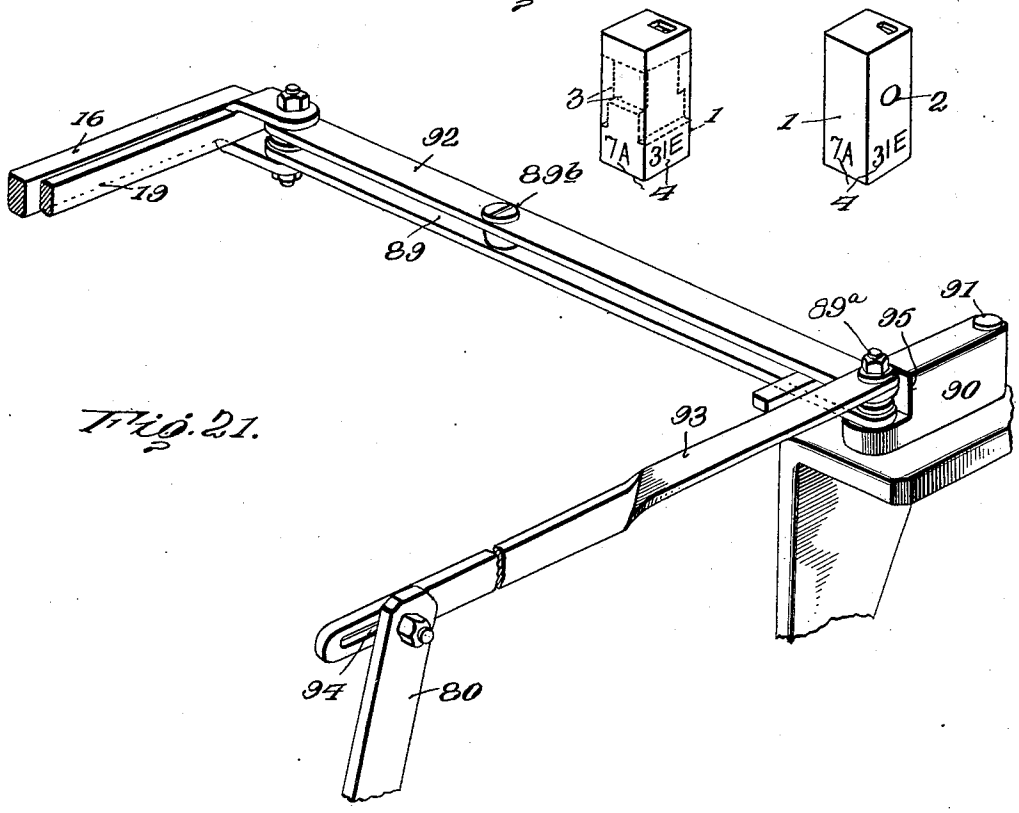
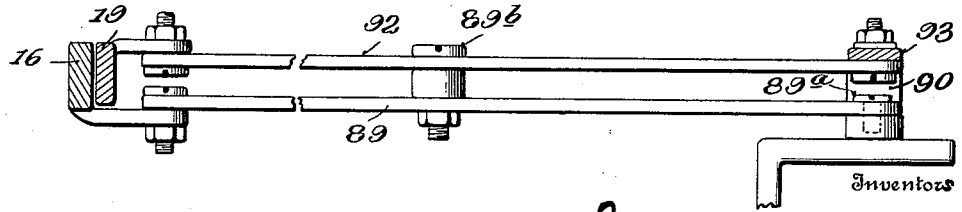


Fig. 21.

Fig. 22.



Witnesses

Helge A. Murray.

Halbert P. Brown.

Inventors

J. S. Bancroft

M. C. Indahl

By Church & Church

their Attorneys

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

J. S. BANCROFT & M. C. INDAHL.

MATRIX MARKING MACHINE.

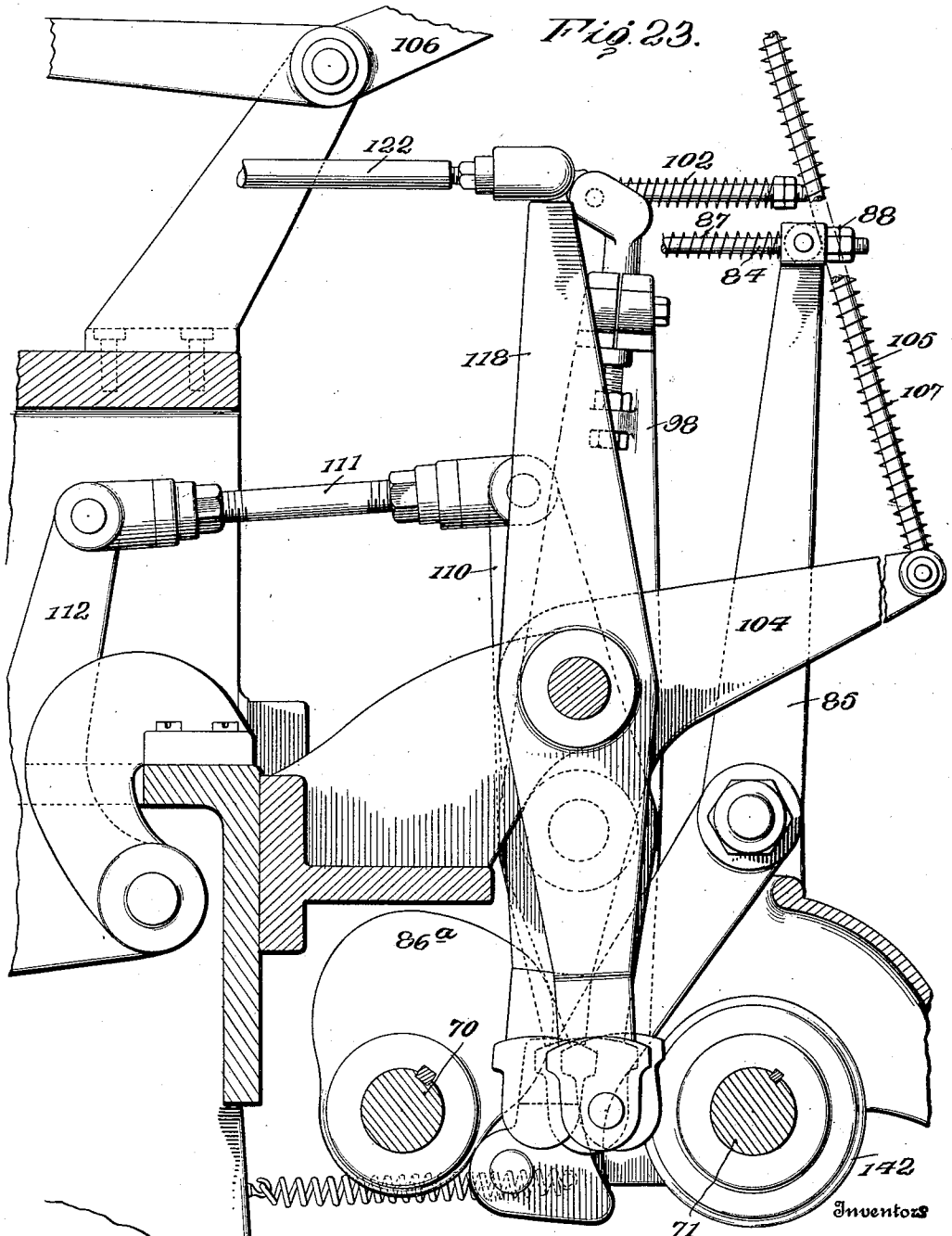
APPLICATION FILED APR. 16, 1910.

1,008,302.

Patented Nov. 14, 1911.

15 SHEETS—SHEET 13.

Fig. 23.



Witnesses

Walter W. Murray.

Hubert P. Brown.

Inventors

J. S. Bancroft

M. C. Indahl

By Church & Church

their Attorneys

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

J. S. BANCROFT & M. C. INDAHL.

MATRIX MARKING MACHINE.

APPLICATION FILED APR. 16, 1910.

1,008,302. **Patented Nov. 14, 1911.**

15 SHEETS—SHEET 14.

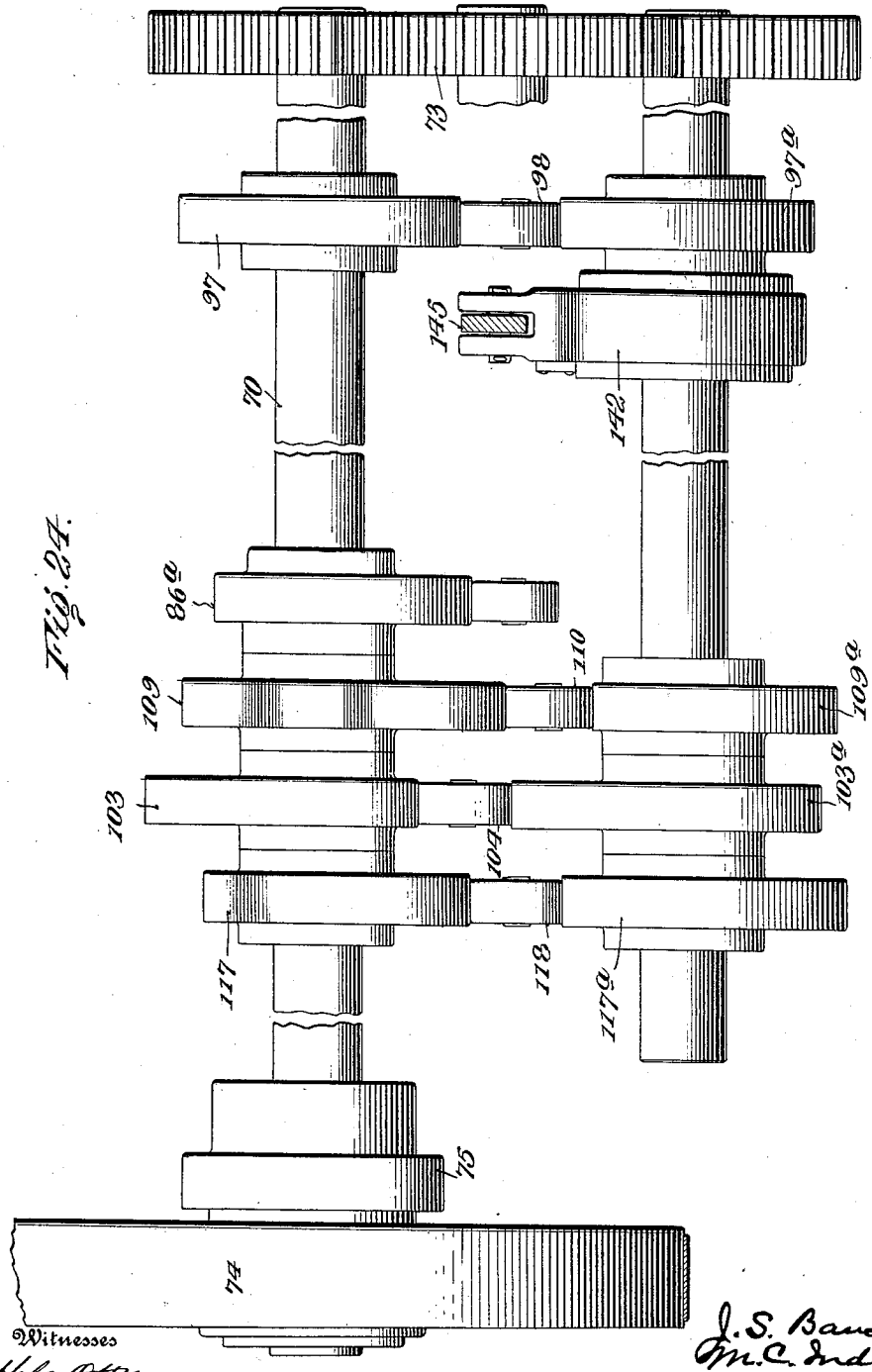


Fig. 24.

Witnesses

Helge Ostmann.

Albert P. Brown.

Inventors

J. S. Bancroft

M. C. Indahl

By Church & Church

their Attorneys

J. S. BANCROFT & M. C. INDAHL.

MATRIX MARKING MACHINE.

APPLICATION FILED APR. 16, 1910.

1,008,302. **Patented Nov. 14, 1911.**

15 SHEETS—SHEET 15.

Fig. 25.

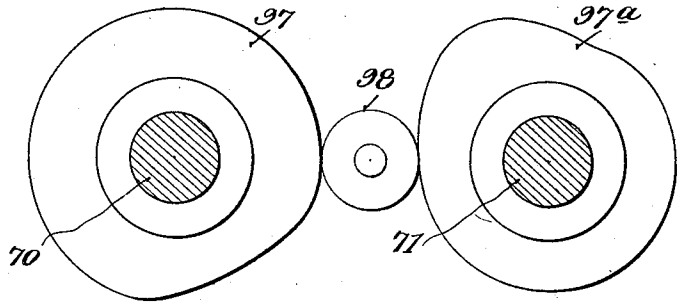


Fig. 26.

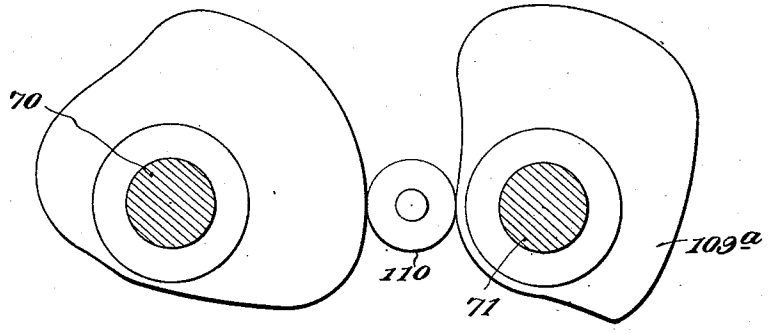


Fig. 27.

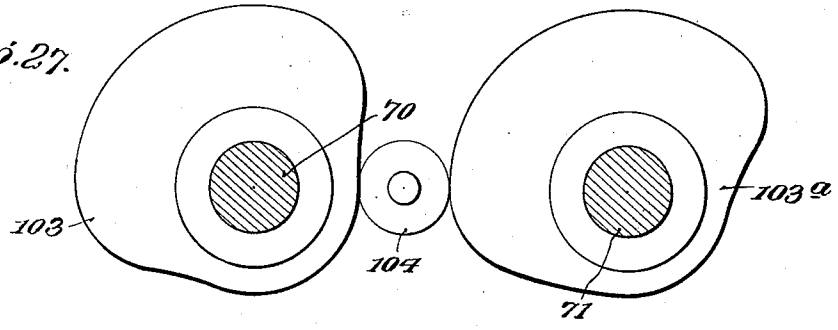
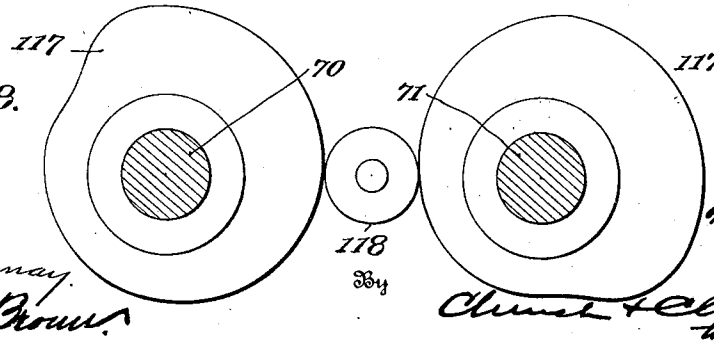


Fig. 28.



Witnesses

Helgella M. Murray.

Hubert P. Brown.

Inventors

J. S. Bancroft

M. C. Indahl

By Church & Church

their Attorneys

UNITED STATES PATENT OFFICE.

JOHN SELLERS BANCROFT AND MAURITZ C. INDAHL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO LANSTON MONOTYPE MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF VIRGINIA.

MATRIX-MARKING MACHINE.

1,008,302. Specification of Letters Patent. **Patented Nov. 14, 1911.**

Application filed April 16, 1910. Serial No. 555,854.

To all whom it may concern:

Be it known that we, JOHN SELLERS BANCROFT and MAURITZ C. INDAHL, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Matrix-Marking Machines; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

This invention relates to automatic means for applying the identifying or distinguishing markings to type machine matrices, more especially the varieties disclosed in Patents Nos. 625,998, dated May 30, 1899 and 784,245, dated March 7, 1905, although applicable in whole or in part to other uses. These matrices, when finished ready for use, consist of small parallelopiped blocks of metal, approximately $\frac{7}{16}$ inch long and $\frac{2}{10}$ inch square, each provided with a cone hole in one end and a matrix cavity in the other end. Each is also provided with either a transverse perforation or circumferental grooves coöperating with the retaining members of the die case. The markings (comprising figures, letters, etc., designating font, set or point dimensions, or other characteristics) are usually countersunk in one or more sides of the block, it being customary heretofore so far as applicants are aware to perform this operation with hammer and punches manipulated by hand, resulting in a more or less irregularity both in position and depth, and a loss of product due to faulty and misplaced markings.

One of the main objects of this invention is to not only render the position of the markings more uniform and regular, but to greatly expedite and cheapen the manufacture, to which ends the invention consists in constructions, combinations and arrangements of parts hereinafter fully described and pointed out in the appended claims.

In the accompanying drawings illustrating a preferred form of embodiment of the several novel features of the invention—Figure 1 is a view in perspective. Fig. 2 is a top plan view. Fig. 3 is a right end elevation and Fig. 4 is a partial front elevation of the organized machine. Fig. 5 is a perspective view of the hammers together with connected portions of the actuating mechanism therefor. Fig. 6 is a detail view of the safety cut out latch for the hammer actuating devices. Fig. 7 is a vertical section on line *v—v*, Fig. 2. Fig. 8 is a side elevation of the reversing brake, with cover plate removed. Fig. 9 is a partial vertical section on line *w—w*, Fig. 2. Fig. 10 is a top plan view, Fig. 11 is a front elevation, and Fig. 12 a side elevation of the punch carrier or holder. Fig. 12[A] is a plan view partly in section of the punch block and punches. Fig. 13 is a detail view in perspective of the bottom guide block, anvil, upper guide or finishing die, cap plate and guiding shoe, the members being separated and the shoe inverted. Fig. 14 is a top plan view, partly in section, of the upper guide block showing the clamping plate. Fig. 15 is a vertical transverse section through the upper guide with inserted finishing block detached. Fig. 16 is a partial vertical section on the line *x—x*, Fig. 2. Fig. 17 is a detail view, in perspective, of the delivery channel block intermediate the supply galley and lower guide block and serving as a guide for the pusher and feeler. Fig. 18 is a detail view showing the pusher and associated feeler. Fig. 19 is a longitudinal vertical section of supply galley and a transverse section of the delivery block or channel with one of the punches in position to be engaged by the feeler or detector. Fig. 20 is a top plan view of the detachable supply galley and delivery channel block or frame showing the means for automatically opening the gate at the delivery end of the galley and the arrangement of the pusher and detector. Fig. 21 is a perspective view and Fig. 22 an elevation of a part of the actuating devices coupled with the associated pusher and feeler. Fig. 23 is a vertical section showing the cams and connected transmission members. Fig. 24 is a top plan view of the twin driving shafts, cams and transmission members. Fig. 25 is a detail view of the horizontal pusher cams. Fig. 26 is a detail view of the vertical plunger cams. Fig. 27 is a detail view of

the gaging plunger cams. Fig. 28 is a detail view of the hammer cams. Fig. 29 is a view in perspective of the blank, and Fig. 30 is a similar view of the finished matrix.

Corresponding numerals designate like parts in the several views.

The machine represented in the drawings illustrates a preferred, although not an exclusive, form of embodiment of the present invention, and is specially designed to operate upon and in connection with type machine matrices of the character shown in Figs. 29 and 30, each consisting of a small rectangular block of metal 1, bearing a drive or matrix cavity in one end and a centering conehole in the opposite end, and provided with suitable suspension means in the form of a transverse side hole 2 (Fig. 30) or peripheral grooves 3 (Fig. 29). With the exception of the drive, which of course varies in form and lateral dimensions to correspond with the character and their set and point sizes, all matrices of the same class are of uniform dimensions externally, hence it is desirable to provide each with certain distinguishing markings 4, representing characteristics of the individual, such as set and point sizes, font, etc., as well as the line side of the character. This data is utilized in assembling the matrices in the die case and is very difficult to obtain from the drive alone, in the absence of the distinguishing markings, referred to. Ordinarily, each matrix is provided on adjacent sides with two markings 4, pertaining to different series and distinguished by their position in relation to a fixed standard of comparison, such as the side hole 2 or peripheral grooves 3 of different widths.

Heretofore so far as applicants are aware the markings have been separately applied by means of manually controlled hammers and punches, the proper positioning and depth of the impression being dependent entirely upon the skill of the operator. Moreover, much time was consumed both in positioning the matrix to receive the impression, and in properly locating the punch upon the selected face of the matrix, and any error in these respects resulted in a corresponding loss of product. The present machine is designed to automatically perform all the operations incident to the production of said markings save the supplying of the matrices to be operated upon and the selection of the appropriate punches.

Before proceeding to describe the mechanism it may be remarked that the markings are preferably, although not necessarily, applied to the matrices as they are delivered from the driving press (of which examples are to be found in Patent No. 687,779, of December 3, 1901, and application, Serial No. 482,873, filed March 12, 1901) and before the finishing operations are performed; and, further, that the matrices as delivered by the driving press are discharged sequentially and in corresponding orderly arrangement in a removable galley. When the desired number of characters have been driven by any given punch, the latter is detached from the press and deposited in the receiving galley. The punches being slightly longer than the blanks serve as markers to divide the column into as many sections as there are different drives contained therein, and to indicate the character of the drive in the matrices found associated with each punch.

In the present case the galley 5 containing the matrices and punches as delivered from the press is provided at one end, that most distant from the press, with a spring actuated gate 6 normally closing one end of the channel to prevent accidental displacement of the matrices. The side of said gate is beveled, as at 7, so that when the galley is inserted in the groove or channel provided in the frame of the machine it will contact with a complemental member or projection 8, and be thereby displaced to open the channel and permit the matrices and associated punches to be advanced, so that one end of the column will enter a passage 9 in the frame and advance therein until arrested by the opposite wall of a transverse passage or channel 10. Conveniently, the passages 9 and 10 are formed in a detachable frame 11, and the advance of the column of matrices is effected through the agency of a pusher 12 guided on a rod 13 and coupled by a cord 14 with a pendant weight 15.

Guided to reciprocate on frame 11 within channel 10 is a pusher 16 lying normally to one side of passage 9 in position to engage and advance the innermost matrix through channel 10, said pusher at the same time serving as a gate or cut-off to restrain the forward movement of the column until the pusher shall be again retracted. Passages 9 and 10 are dimensioned to permit free movement of the matrices and to prevent the latter from turning, and passage 10 is preferably equipped with a frictional retainer in the form of spring 17 for sustaining the matrix in upright position while engaged by pusher 16.

Located in such relation to the advancing column of matrices as to be successively engaged by the punches or markers 18 associated therewith is a feeler or detector 19 whose function it is to automatically arrest the machine after the last matrix in each section has received its marking, thereby preventing the mark intended for one series from being carried forward onto those of another series and at the same time advising the operator that other marking devices or punches should be substituted. Conveniently, feeler 19 is supported in bearings on

frame 11 immediately in front of pusher 16 and is arranged to reciprocate in parallel with the latter transversely of passage 9 in a plane just above the matrices and intersecting the path traversed by the projecting section of the punches or markers 18.

The end of channel 10 opposite pusher 16 registers with a similar passage in a guide block 20, the latter preferably formed separate from and detachably secured to a seat on the main frame, said passage communicating with a transverse passage 21 whose cross-section corresponds with that of the matrices. Rigidly secured to the face of guide block 20 is the anvil block 22 provided with an angular or V-shaped seat 23, and fitted to the latter is the wedge shaped punch block 24 grooved or cut away at the point as at 25, to form, in conjunction with the intersection of the walls of seat 23, a passage 26 the walls whereof register with and form prolongations of those of passage 21. Block 24 is also provided with a guide or way 27 perpendicular to each wall of seat 23 for the reception of a marking punch 28. The purpose in thus forming the impressing die in two longitudinal sections, instead of integral, as might otherwise be done, is to permit the ready withdrawal of the section supporting the punches and thereby facilitate inspection and replacement, and with these ends in view block 24 is detachably mounted upon a carrier or frame 29 pivotally connected to the frame, as at 30, and held to working position by a spring actuated bolt 31 engaging a seat 32 on the frame. Bolt 31 is movable radially of axis 30 and is provided with oppositely inclined surfaces 33, through which the bolt may be automatically retracted against the pressure of its spring when force is applied to swing the carrier to retract or advance block 24. Carrier 29 is also equipped with two plungers 34, each located in rear of and in longitudinal alinement with one of the punches 28 to which latter it is connected by a side opening coupling such as that formed by a transverse rib 35 on a projecting portion of plunger 34 entering a transverse slot 36 on one side of punch 28. A spring 37 interposed between a seat on the frame and a shoulder on the plunger serves to retract the latter and with it the connected punch, to withdraw the latter for the passage of the matrix.

To the upper face of anvil block 22 is secured the finishing die 40 provided with a passage 41 accurately formed to correspond in cross-section with that of the matrices to be operated upon, and designed primarily to correct any deformation of the surface produced by the action of the punches upon the matrices.

To facilitate the insertion and removal of the punches 28 block 24 is provided at its rear with a tail piece or extension 24^a resting loosely in a groove or seat 29^a in carrier 29, the outer end of said tail piece extending beneath an overhanger or bridge 29^b, as indicated in Figs. 7 and 10. When in working position block 24 is secured against lateral displacement by its engagement with the diverging faces of the anvil block and the proximate faces of guide block 20 and die 40; but when carrier 29 is retracted block 24 can be tilted in its seat, to uncouple the punches from the plungers, after which it is free to be withdrawn from the carrier.

Preferably die 40 is of cylindrical shape and detachably secured, as by pressure, in a seat 42 formed in the under face of a block 43, the latter provided with a rib 44 for engaging a radial notch 45 in the upper face of anvil block 22, the arrangement being such that when blocks 22 and 43 are brought together and secured in position, die 40 will be accurately located with relation to block 22, so that two adjacent walls of passage 41 will register or be in parallel with the corresponding walls of the angular seat 23. The upper face of block 43 is provided with a transverse way or channel 46 into which the matrix is delivered from die 40. One end of channel 46 communicates with a receiving galley 47 into which latter the matrices are transferred, one at a time, by a pusher 48, said galley being removably supported in a seat on the frame. To prevent the matrix from falling, one side of channel 46, from a point opposite the opening in die 40 to the delivery end, is made yielding, as by the insertion of a movable plate or section 49 secured to screws 50 extending through block 43 or a plate attached thereto and provided with springs 51, the latter operating to advance plate 49 toward the opposite wall of the channel until arrested by the contact of the heads of the screws with block 43 or the attached plate. The space between plate 49 and opposite wall of the channel is normally slightly less than the width of the matrix and the lower edge of said plate is slightly beveled so that as the matrix is delivered into the channel the springs will be compressed.

To the upper face of block 43 is applied the cap plate 52 containing a vertical guide 53 in alinement with the opening in die 40 and a groove 54 registering with channel 46. Above the delivery end of said channel the under surface of the cap plate is recessed, as at 55, for the reception of a shoe 56, the latter held under the elastic pressure of springs 57 in contact with block 43 and provided on its under side with a groove 58 registering with channel 46, the bottom of said groove being inclined downwardly toward the delivery end of channel 46, the purpose of said incline being to insure the seating

of the matrix in channel 46 so that it may enter the receiving galley.

A plunger 60 is guided to reciprocate through passage 21 in the lower guide block 20, while an opposing plunger 61 works through guide 53 in cap plate 52.

Opposite each of the plungers 34 is arranged a hammer 61^x adapted, when operated, to engage the head of the plunger and drive the attached punch against a matrix properly positioned on seat 23 of anvil block 22. In the embodiment illustrated each of the hammers is carried upon one arm of a bell crank lever 63 pivotally attached to the frame, as at 64, and provided with an impelling spring 65 and a spring actuated retaining latch 66, the latter pivoted to the frame at 67 and engaging and holding one arm of lever 63 when the latter is moved to place spring 65 under tension.

The mechanism thus far described includes what may be termed the operating as distinguished from the actuating devices, and before entering upon a description of the latter it will be advantageous to explain the cycle of operations to be performed by said operating devices under the control of the actuating devices.

The machine being supplied with a loaded galley 5 and pusher 12 applied to the column of matrices contained therein the inner end of said column will advance through passage 9 until arrested by the opposite wall of passage 10, thus bringing the inner member of the column opposite pusher 16 and the next succeeding member opposite feeler 19. Pusher 16 and feeler 19 are now advanced, the former transferring the inner matrix through passage 10 into passage 21 in guide block 20 above plunger 60, while feeler 19 passes freely over the second member of the column if it is a matrix, and engages and is arrested by said member should it chance to be a punch or marker 18. Plunger 61 is now advanced to its extreme lower or gaging position, and plunger 60 is advanced or elevated until arrested by the contact of the matrix with gaging plunger 61 thus bringing the matrix into position on anvil block seat 23 in proper relation to the punches 28. While the matrix is thus firmly held between the plungers, catches 66 are operated to release hammers 61^x and the latter impinging upon plungers 34 drive the punches 28 into the sides of the matrix. A single stroke of each hammer suffices for the purpose, any second stroke incident to the rebound being absorbed or cushioned by the punch retracting springs 37. Plunger 61 now retracts and plunger 60 resumes its advance, thereby forcing the marked matrix through die 40 into channel 46 in the upper face of block 43 and in front of pusher 48. To insure the matrix clearing the orifice in block 43 the motion of plunger 60 is continued slightly above the floor of channel 46. After plunger 60 has retracted sufficiently to withdraw from the path of pusher 48 the latter is advanced and delivers the marked matrix into the receiving galley 47, thereby completing the cycle of operations.

During the passage of the matrix through die 40 any projections formed on the sides of the matrices incident to the entrance of the punches is flattened down or removed by the action of die 40, and as the matrix is advanced by pusher 48 it is brought down and seated on the floor of channel 46 by shoe 56 engaging the upper end thereof.

The actuating devices which produce and control the movements of the operating members described include two novel and important features, to-wit; means for automatically arresting the machine when the last matrix of the series for which it is at the time equipped has been operated upon or delivered, to the end that the markings of one series may not be carried over to the members of another series; and means for automatically suspending or preventing the action of the hammers upon the punches when, from any cause, a matrix is not in position to receive the impact of said punches, to prevent mutilation of the punches, their guides or the anvil, such as is liable to occur if no matrix is present.

The actuating mechanism derives motion from two shafts 70, 71 mounted in bearings on the frame and connected through a gear train 73 to rotate in unison and in the same direction. One of said shafts —70— is coupled with a motor device, represented by pulley, 74, through a one revolution clutch 75 of any known or approved type, provided with a member 76 carried by the driven section and so organized and arranged that when engaged by a stop, such as 77, the clutch will open, and when said stop is withdrawn the clutch will close automatically. A clutch of this description is illustrated in our application, Serial No. 470,576, filed January 4, 1909.

In the present instance stop 77 is pivotally supported upon the frame, and is held normally in the path of unclutching member 76 by a spring 78, and is adapted to be swung on its axis and thereby withdrawn from the path of member 76, to permit the closing of the clutch, by a bearing 79 carried by a link 80, the latter coupled with suitable actuating devices, such as foot lever 81, shaft 82 and arm 83. By a longitudinal movement of link 80 stop 77 is tilted to withdraw from engagement with member 76 and so long as this condition is maintained through pressure upon lever 81, the clutch will remain closed and the machine continue in motion. Means may be applied for retaining lever 81 in the depressed or

working position but it is preferred that this condition shall be maintained by the action of the operator to insure his presence and avoid loss of time when a change of punches is required.

To pusher 16 is pivoted one end of a rod 84 extending through a bearing on a lever 85 the latter carrying a roller engaging cam 86[a] on shaft 70. A spring 87 is interposed between a bearing on rod 84 and one side of lever 85, and said rod carries a head or nut 88 engaging the opposite side of said lever, the arrangement being such that the forward or feeding motion of pusher 16 is transmitted through the spring, while the return motion is transmitted through head 88, hence is positive. To a rear extension of pusher 16 is pivotally attached a lever 89 whose opposite end is pivotally connected to the frame through a joint permitting slight movement longitudinally of said lever, to compensate for variations in the distance between the point of attachment to the pusher and point of suspension on the frame due to the right line motion of said pusher, as, for example, by pivoting the lever at 89[a] to a block 90, the latter in turn pivoted to the frame at 91.

To the rear end of feeler 19 is attached one end of a lever 92 pivoted to lever 89 at 89[b] intermediate the points of attachment of lever 89 to pusher 16 and block 90, the opposite end of said lever 92 being pivotally coupled with a link 93 opposite the point of attachment of lever 89 to block 90. Link 93 is coupled with link 80 by a pin and slot connection 94 permitting a limited degree of independent motion to said links.

Levers 89 and 92 constitute a pair of floating tongs. So long as no obstruction is placed in the path of feeler 19 the latter is caused to reciprocate in unison with pusher 16 under the influence of lever 85. During such action lever 89 oscillates about pivot 89[a] and through its connection 89[b] with lever 92 causes the latter to oscillate about its point of connection with link 93, the latter for the time being held stationary against a shoulder 95 on block 90 by spring 96 acting upon link 80 to retain bearing 79 in contact with unclutching member 76. If, as represented, corresponding arms of levers 89 and 92 on opposite sides of the connecting pivot 89[b] are equal, the motion of pusher 16 and feeler 19 will be simultaneous and equal in extent. When, however, during the advancing movements of the pusher 16 and feeler 19 the latter is arrested by contact with a marker or punch 18, the fulcrum of lever 92 shifts from the point of attachment to link 93 to that on feeler 19, with the result that during the final movement of said pusher what was before the fulcrum and is now the weight end of lever 92 will be shifted. This motion of lever 92 is transmitted through link 93 to link 80 in a direction to withdraw bearing 79 from its engagement with stop 77, permitting the latter to swing into the path of unclutching member 76, thus opening the latter at the completion of its revolution, despite the circumstance that link 80 maintains its elevated position. It is to be noted in this connection that the so-called floating tongs perform the double function of transmitting motion to the feeler and of transmitting the signal from the feeler to the stopping or unclutching devices.

Preferably the motions are so timed that the feeding motion of pusher 16 takes place after pusher 48 has delivered the previously marked matrix and before unclutching member 76 arrives opposite stop 77 to the end that the last matrix of the series associated with the engaged marker may be completed and delivered before the machine is brought to rest.

Pusher 48 derives motion from opposed cams 97, 97[a], through lever 98, rod 99, lever 100 and link 101. One side of lever 98 engages a shoulder on rod 99 and the opposite side a spring 102, the latter engaging a shoulder on said rod, the advance or feeding movement of pusher 48 being transmitted through said spring. Gaging plunger 61 receives motion from opposed cams 103, 103[a], through lever 104, rod 105 and lever 106, the latter engaging the plunger. Between lever 104 and a shoulder on rod 105 is interposed a spring 107, the opposite side of said lever contacting with stop 108 on said rod. Motion is transmitted to plunger 60 from opposed cams 109, 109[a], through lever 110, link 111 and lever 112. This last named lever is coupled to a sleeve 113 carrying a spring 114 and provided with a perforated cap to receive the lower end of plunger 60, the latter provided with a cross-pin 115 riding in a slot in said sleeve and held against the upper end of said slot by the pressure of spring 114, thereby forming a one way yielding coupling between lever 112 and plunger 60.

The hammer actuating connections are controlled by cams 117, 117[a] and lever 118 as follows: A bell crank lever 119 pivotally supported on the frame has connected to each arm a link 120 the opposite end of the latter slotted to receive a pin 121 on one of the hammer levers 63. One arm of lever 119 is connected by a link 122 to actuating lever 118, the arrangement being such that when said last named lever is advanced to one extreme of its movement both hammer levers 63 will be retracted to extend their impelling springs 65 and engage retaining latches 66. This setting of the hammers is effected before plunger 60 completes its first movement of advance to bring the matrix to marking position, and is immediately followed by the recession of lever 119.

Each latch 66 is coupled by a link 123

to one arm of a bell crank lever 124. Preferably the connection between said bell crank and the latches is such as to permit a limited degree of lost motion with respect to one of the latches, to the end that when said lever is swung in a direction to withdraw the latches the latter will release successively rather than simultaneously. An arrangement of the kind referred to is illustrated wherein one of said links is pivotally connected to its latch by a pin 125 while the other is provided with a longitudinal slot 126 embracing a pin 127 on the latch.

One of the hammer setting links 1-20 is coupled with one of the latch links 123 in such manner that during the retraction of links 120 after setting the hammers motion will be communicated to links 123 in a direction to withdraw latches 66 and thus permit the hammers to make their strokes. Such a connection may be made by providing link 123 with a pivoted spring actuated latch 128 in position to engage a shoulder 129 on link 120 when said link 123 is retracted.

For obvious reasons it is desirable that the hammers should not be released until the matrix has been properly positioned upon the anvil block, to insure which the following arrangement has been devised. Plunger 60 is provided with a collar or shoulder 130 in position to contact with one arm of a lever 131 the other arm whereof rests normally in contact with an adjustable stop 132 and is coupled with a rod 133 extending through a bearing 134. The upper portion of rod 133 is reduced to form a bearing for a sleeve 135 the latter provided with an offset or shoulder 136 above bearing 134, and a pin 137 overlying the tail of latch 128. A spring 138 is interposed between sleeve 135 and bearing 134 and a second and heavier spring 139 between said sleeve and nut 140 carried by rod 133.

The parts are so arranged and combined that when plunger 60 advances a matrix into contact with gaging plunger 61 it will be arrested and spring 114 compressed before sleeve 113 completes its first movement of advance. During this movement collar 130 will be brought into contact with or close proximity to lever 131, but will not displace the latter sufficiently to effect a withdrawal of latch 128 through the movement of pin 137; in other words, this movement of plunger 60 will not affect the operating connection between links 120 and 123, hence the hammers will be released upon the return of link 120. If, however, when plunger 60 makes its first advancing movement no matrix or an abnormally short matrix is interposed between it and plunger 61, no compression of spring 114 will be produced and plunger 60 will advance beyond its normal stopping place. The excess movement of plunger 60 will be communicated through lever 131, rod 133, spring 139, and sleeve 135 to pin 137, causing the latter to withdraw latch 128 and thus sever the connection between links 120 and 123. In this movement spring 138 being lighter than 139 or 114 yields until relieved by the contact of off-set 136 with bearing 134. Spring 139 yields during the second advance of plunger with or without a matrix and returns the parts to normal position when said plunger is retracted.

Suitable means, such as a hand wheel 150, is provided for turning the actuating mechanism when the clutch is open, and to insure the proper direction when thus manipulated, one of the driving shafts (71) is equipped with a reverse brake, Fig. 8, in the form of a cylinder 141 loosely encircled by a casing 142 containing a roller 143 the latter interposed between and contacting with the circumference of cylinder 141 and the inclined wall of its seat 144 in casing 142. The casing is suspended from the frame as by a link 145, and when it is attempted to turn the machine backward roller 143 is drawn down into the narrower space between seat 144 and cylinder 141 and arrests further motion in that direction.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States is—

1. In a matrix marking machine, the combination of the following elements, to-wit: an anvil block provided with an angular seat; a wedge shaped punch block grooved or recessed at its point and fitting the sides of the angular seat; and a punch mounted in guides on said punch block.

2. In a matrix marking machine, the combination of the following elements, to-wit; an anvil block provided with an angular seat; a wedge shaped punch block recessed at the point to form in conjunction with the anvil seat a guide for the matrix, said block fitting between and engaging the walls of said angular seat; and a plurality of punches mounted upon said punch block each member whereof is guided to move longitudinally in a line perpendicular to the face of the anvil seat to which it is opposed.

3. In a matrix marking machine, the combination with an anvil provided with an angular seat, of a wedge shaped punch block movable relatively to said seat and engaging the diverging walls or faces of the latter, said punch block being grooved on its inner end or face to form in conjunction with said angular seat a passage for the matrix, and two punches arranged on converging lines each of the latter perpendicular to one of the faces of the anvil seat.

4. In a matrix marking machine, the combination of the following elements, to-wit; an anvil block provided with an angular

seat; a punch block fitted to and engaging said seat at points remote from the angle of intersection of its faces; a punch mounted upon said punch block to move perpendicular to one of the faces of the seat; and a carrier for said punch block movable laterally of the anvil block.

5. In a matrix marking machine, the combination of the following elements, to-wit; an anvil block provided with an angular seat; a movable carrier; a punch block detachably mounted upon said carrier and adapted to register with the seat in the anvil block; a punch guided on the punch block, and a yieldable retainer for holding the carrier in operating relation to the anvil block.

6. In a matrix marking machine, the combination of the following elements, to-wit; an anvil block with an angular seat; a punch block adapted to register with said seat; a movable carrier to which the punch block is detachably secured; and a punch guided on the punch block and removable therewith and therefrom.

7. In a matrix marking machine, the combination of the following elements, to-wit; an anvil block with angular seat; a punch block registering with the walls of said seat but removable therefrom; a movable carrier upon which the punch block is removably mounted; a punch removably supported upon the punch block; and a spring retracted plunger mounted upon said carrier and detachably coupled with said punch.

8. In a matrix marking machine, the combination of the following elements, to-wit; an anvil, a carrier movable laterally of said anvil and provided with a spring retracted plunger; a punch block detachably mounted upon said carrier and adapted to form in conjunction with the anvil a guiding passage for the matrix; a punch mounted upon the punch block; and coupling devices intermediate the plunger and punch adapted to interlock when the punch block is in position on the carrier and to be uncoupled by the withdrawal of the punch block from the carrier.

9. In a matrix marking machine, the combination of the following elements, to-wit; an anvil provided with an angular seat the surfaces whereof are formed by intersecting planes; a wedge shaped punch block registering with the walls of said seat at points remote from the angle of intersection of its surfaces and carrying two punches each perpendicular to one of the surfaces of the seat in the anvil block; a movable carrier provided with two spring-retracted plungers, one for each punch, and with means for detachably supporting said punch block; and detachable coupling means between each punch and the complemental plunger, whereby the withdrawal of the punch-block from the carrier will automatically effect the uncoupling of the punches from their plungers.

10. In a matrix marking machine, the combination with the anvil and opposed punch, of a finishing die, and means for transferring the matrix from the anvil through the finishing die after the punch has operated.

11. In a matrix marking machine, the combination of the following elements, to-wit; marking devices including opposed punch and anvil; a finishing die; and automatic means for removing the blank from the marking devices and forcing it through the finishing die.

12. In a matrix marking machine, the combination of the following elements, to-wit; a guide block; an anvil and associated punch block, the latter equipped with a punch; a finishing die; and means for transferring a blank from the guide block to the anvil, gaging its position relatively to the punch, and removing the stamped blank from the anvil and discharging the same through the finishing die.

13. In a matrix marking machine provided with a guide block, an anvil and associated punch-bearing punch block, and a finishing die arranged in sequence in the order named, and in combination therewith, means for automatically transferring a blank from the guide block to the anvil and from the latter to and through the finishing die.

14. In a matrix marking machine, the combination of the following elements, to-wit; an impressing means including an anvil and associated punch-carrying punch block forming an intermediate guiding passage; a guide block provided with a passage registering with one end of the guiding passage of the said impressing means; a finishing die communicating with the opposite end of said guiding passage; a blank translating plunger working through the guide block for transferring a blank therefrom to the anvil and through the finishing die; and a movable gaging member for arresting the blank opposite the anvil in predetermined relation to the punch.

15. In a matrix marking machine, the combination of the following elements, to-wit; a guide block, anvil block and finishing die arranged in sequence in the order mentioned; a punch carrying block associated with the anvil; a gaging plunger working through the finishing die; and a translating plunger working by successive movements through the guide block and past the anvil and through the finishing die.

16. In a matrix marking machine, the combination of the following elements, to-wit; a guide block provided with intersecting channels, an anvil and associated punch-carrying punch block with intermediate matrix pas-

sage, the latter communicating with one of the guide block channels; a perforated finishing die in register with the anvil and punch block passage; a receiving channel beyond the finishing die; a translating plunger adapted to traverse through the guide block between the anvil and plunger block and through the finishing die; a gaging plunger opposed to the translating plunger and working through the finishing die; and a pusher working in the receiving channel transversely of the translating plunger on the discharge side of the finishing die.

17. In a matrix marking machine, the combination of the following elements, to-wit; a guide block, an anvil and associated punch support, and a finishing die arranged in sequence in the order named and presenting a continuous matrix passage; a translating plunger working through said matrix passage from the guide block end thereof; a gaging plunger working in said matrix passage from the finishing die end thereof; and actuating devices for said plungers adapted to effect the advance of both plungers toward the anvil and subsequently retract the gaging plunger and continue the advancing movement of the translating plunger.

18. In a matrix marking machine provided with a guide block, impressing means and a finishing die arranged in sequence in the order named and presenting a continuous blank passage, and in combination therewith the following elements, to-wit: a translating plunger entering said blank passage through the guide block end thereof; actuating devices coupled with said translating plunger through a yieldable connection and operating to effect successive advance movements of said plunger; a gaging plunger entering the blank passage through the finishing die; and actuating devices for alternately advancing said plunger to gaging position and withdrawing the same clear of the finishing die.

19. In a matrix marking machine provided with marking means including an anvil and opposed punches, and in combination therewith, a pivotally supported spring impelled hammer for each punch, a restraining latch for each hammer, means for withdrawing said latches, and means for forcibly retracting both hammers, to place their impelling springs under tension and reëngage the latches.

20. In a matrix marking machine, the combination of the following elements, to-wit; an impressing device including an anvil and opposing punch; a spring retracted plunger to which the punch is coupled; a hammer provided with an impelling spring and a restraining latch; means for retracting the hammer to place the impelling spring under tension and engage the latch; and means for withdrawing the latch at stated intervals.

21. In a matrix marking machine, the combination of the following elements, to-wit; an impressing device including an anvil and a plurality of punches; a hammer for each punch provided with an impelling spring and a restraining latch; means for retracting the hammers to place their impelling springs under tension and engage the restraining latches; and means for successively withdrawing the restraining latches.

22. In a matrix marking machine, the combination of the following elements, to-wit; a plurality of punch actuating hammers each equipped with impelling means and a restraining latch; means for retracting the hammers including a lever coupled with each hammer through a link; and a latch controlling means including a lever coupled with said latches.

23. In a matrix marking machine, the combination of the following elements, to-wit; a plurality of punch operating hammers each equipped with an impelling spring and a restraining latch; and means operating upon said latches to effect the release of the hammers in succession.

24. In a matrix marking machine, the combination of the following elements, to-wit; a punch operating hammer equipped with an impelling spring and a retaining latch; a reciprocatory member coupled with the hammer for retracting the latter to engage said latch; and a latch operating member coupled with said reciprocatory member through a controllable latch.

25. In a matrix marking machine, the combination of the following elements, to-wit; a punch operating hammer provided with an impelling spring, a retaining latch, a reciprocatory resetting member and an actuating member for said latch detachably coupled with said resetting member; a yieldable blank translating plunger; a gaging member; and means intermediate the translating plunger and the coupling connecting the resetting and latch actuating members for preventing the release of the hammer during an excessive stroke of the translating plunger.

26. In a matrix marking machine, the combination with the hammer actuating mechanism and the yieldable translating plunger and opposing blank stop or gage for positioning the blank, of means controlled by said plunger and operating upon the hammer actuating devices to automatically suspend the action of the hammer upon an abnormal advance of the translating plunger.

27. In a matrix marking machine equipped with an impressing punch, a ham-

mer and actuating devices therefor, a positioning gage, and a translating plunger acting in conjunction with said gage to position the blank relatively to the punch, and in combination therewith, a yieldable connection between said plunger and its actuating devices and means controlled by said plunger and operating upon the hammer to suspend its action in the absence of a blank between said gage and plunger when the latter is advanced.

28. In a matrix making machine provided with impressing and feeding means including a hammer, actuating devices therefor, a gage, and a reciprocatory yielding blank translating plunger, and in combination therewith, a lockout or means for automatically preventing the action of the hammer, the same being coupled with or controlled by the translating plunger.

29. In a matrix marking machine equipped with impressing and blank positioning means including a punch, a hammer with actuating devices therefor, a positioning gage, and a translating plunger, and in combination therewith, means for automatically suspending or preventing the action of the hammer in the absence of a blank between the gage and plunger during the advance of the latter.

30. In a matrix marking machine provided with impressing and positioning means including a punch, a hammer, a gage, a yielding translating plunger, and actuating devices therefor, and in combination therewith, the following elements, to-wit; hammer actuating devices including a retaining latch, a reciprocatory resetting member, a latch operating member, and a latch coupling said resetting and latch operating members; and means controlled from the translating plunger for withdrawing said coupling latch, to arrest the hammer, the same including a lever disposed in the path of the plunger and a latch-engaging member coupled with said last named lever.

31. In a matrix marking machine provided with impressing and positioning means including a punch, a hammer, a positioning gage and a yielding translating plunger, and in combination therewith the following elements, to-wit; hammer actuating devices including an impelling spring, a retaining latch, an operating member for said latch connected through a detachable coupling device with a reciprocatory driving member; and means for actuating said detachable coupling device the same including a lever in the path of the translating plunger and coupled with a yieldably supported member engaging said coupling device.

32. In a matrix marking machine provided with impressing, positioning and translating devices including a punch and anvil, a hammer, a reciprocatory gaging plunger and a reciprocatory yielding translating plunger, and in combination therewith the following elements, to-wit; hammer actuating devices including an impelling spring, a retaining latch, a reciprocatory driving member, and an operating member for the latch coupled through another latch with said driving member; and means for controlling said last named latch, the same including a lever projecting into the path of said translating plunger at or beyond the point where the latter is arrested when a blank is interposed between it and the gaging plunger, and a yieldingly supported block or member coupled with said lever through a yielding connection.

33. In an automatic matrix marking machine provided with a one revolution driving clutch and a reciprocatory pusher adapted to remove successive blanks or matrices from a supply column, and in combination therewith, the following elements, to-wit; a clutch opening member or stop and means for holding the same in inoperative relation to the clutch; a feeler disposed outside the path traversed by the blanks but in that traversed by an associated marker; and connections between said feeler and clutch opening member or stop whereby the latter is thrown into operative relation with the clutch when the feeler is engaged by said marker, to open the driving clutch and bring the machine to rest.

34. In an automatic marking machine driven by a one revolution clutch and provided with a reciprocatory pusher, and in combination therewith, the following elements, to-wit; an unclutching member adapted to engage and open the clutch; means for sustaining said unclutching member in inoperative relation to the clutch; a reciprocatory feeler whose path is to one side of blanks of normal dimensions but intersects blanks or markers of abnormal dimensions; and means controlled by the feeler and operating upon the unclutching member to advance the latter into the path of the clutch when said feeler is arrested by engagement with a blank or marker of abnormal dimensions.

35. In a matrix marking machine, the combination of the following elements, to-wit; means for sustaining and advancing a column of matrices; a reciprocatory pusher whose path intersects the column, to remove successive matrices therefrom; a feeler lying outside of but in proximity to the column of matrices in position to engage a marker associated therewith; and means controlled by the feeler for automatically arresting or suspending the action of the pusher.

36. In a matrix marking machine, the combination with a power driven feeding pusher and means for advancing a column of blanks or matrices and associated markers, the latter differing in form or dimensions from said blanks, of a feeler adapted to be engaged by said markers, and means under the control of said feeler for automatically arresting or suspending the action of said pusher through the engagement of the feeler with a marker.

37. In a matrix marking machine, the combination of the following elements, to-wit; a power driven blank feeding mechanism adapted to engage and advance successive blanks from a column of mixed blanks and markers, the latter distinguished by differences in form or dimensions, a feeler intersecting the path traversed by said markers during the advance of the column toward the feeding mechanism; and means for suspending the action of the feeding mechanism controlled by the feeler when engaged by a marker.

38. In a matrix marking machine, the combination of the following elements, to-wit; a blank feeding or delivering mechanism including means for supporting and advancing a column of blanks with associated markers, a power driven pusher reciprocating transversely of said column to remove successive blanks therefrom, and provided with means for arresting or suspending the action of said pusher; a reciprocatory feeler adapted to engage the markers and be arrested thereby; and connections between said feeler and the pusher arresting or suspending means for automatically bringing the latter into action through the engagement of the feeler with a marker.

39. In a matrix marking machine and in combination with the feeding mechanism thereof, a removable supply galley provided with a gate; a seat for said galley; and means associated with said seat for engaging the gate to open the latter when the galley is inserted.

40. In a matrix marking machine provided with a reciprocatory blank feeding pusher and in combination therewith a reciprocatory feeler and a floating tongs connection intermediate the pusher and feeler.

41. In a matrix marking machine provided with a reciprocatory blank feeding pusher, a feeler and actuating devices including a one revolution driving clutch and a movable unclutching member therefor, and in combination therewith, a floating tongs connection between the pusher and feeler the same including a lever member fulcrumed on the frame and pivotally connected to the pusher, a second lever member connected to the feeler and pivotally attached to the first named member intermediate its points of attachment to the frame and pusher, respectively, and a connection between said second member and said unclutching member.

42. In a matrix marking machine, the combination of the following elements, to-wit; a reciprocatory pusher and actuating mechanism therefor including a driving clutch; a feeler coupled with said pusher through a floating tongs connection; and means coupled with said floating tongs for controlling the opening of said clutch.

43. In a matrix marking machine, the combination with the finishing die, translating plunger, receiving channel and pusher, of a yielding shoe overlying the said channel and provided with an inclined surface for engaging the matrices.

44. In a matrix marking machine provided with a delivery channel and a pusher working therein, and in combination therewith a shoe engaging the open side of said channel under spring pressure and provided with an inclined face bridging the channel, said incline tapering inward from the receiving toward the delivering end of the channel.

45. In a matrix marking machine provided with an anvil and opposed punch and in combination therewith means for engaging the face of the matrix acted upon by the punch for the removal of the bur occasioned thereby and means for transferring the matrix from the anvil to said finishing means.

JOHN SELLERS BANCROFT.
MAURITZ C. INDAHL.

Witnesses:
MORTIMER A. JONES,
FRED WEINDEL, JR.