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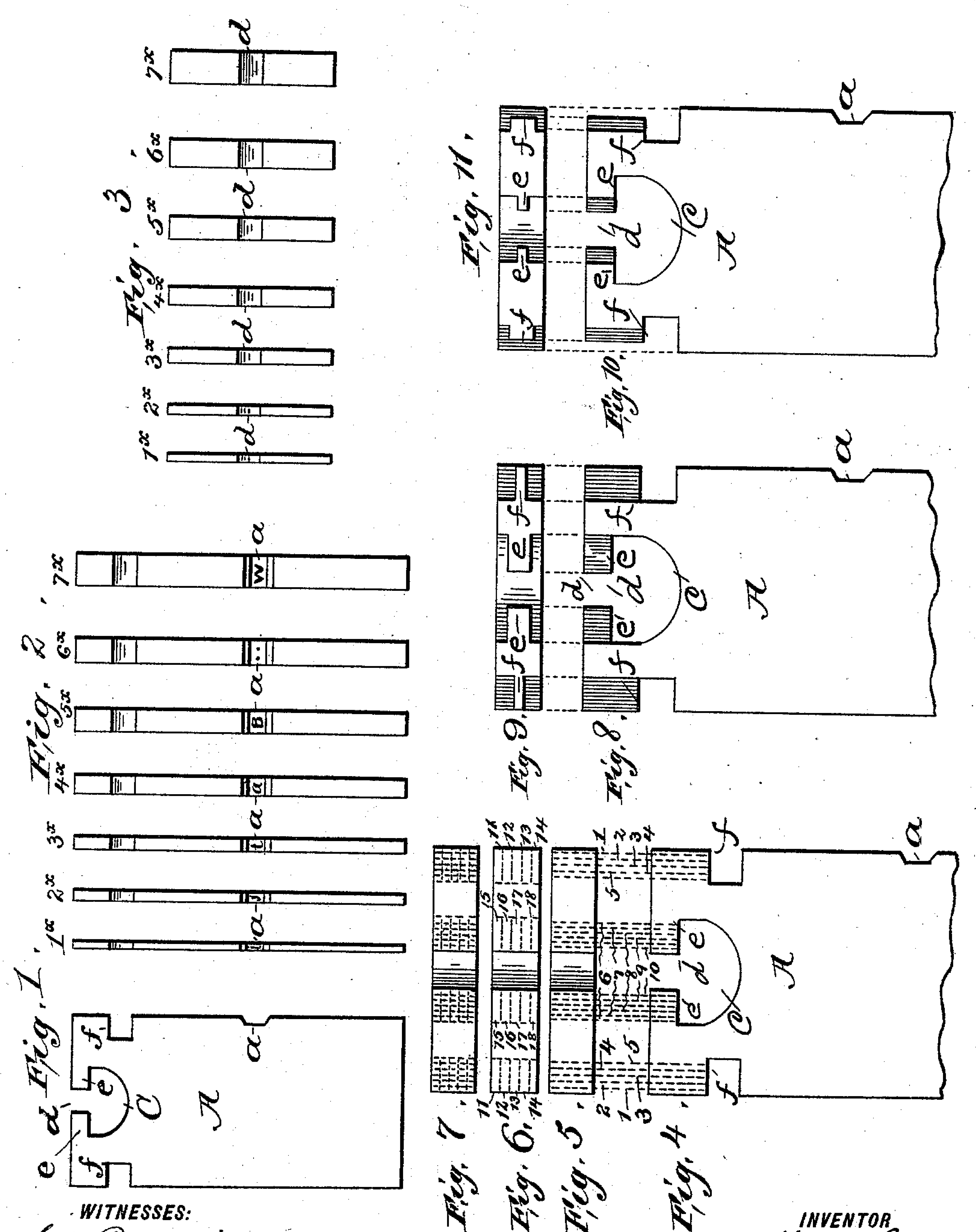
W. BERRI.

MATRICES AND APPARATUS FOR DISTRIBUTING SAME.

No. 573,199. Patented Dec. 15, 1896.



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MATRICES AND APPARATUS FOR DISTRIBUTING SAME.

No. 573,199. Patented Dec. 15, 1896.

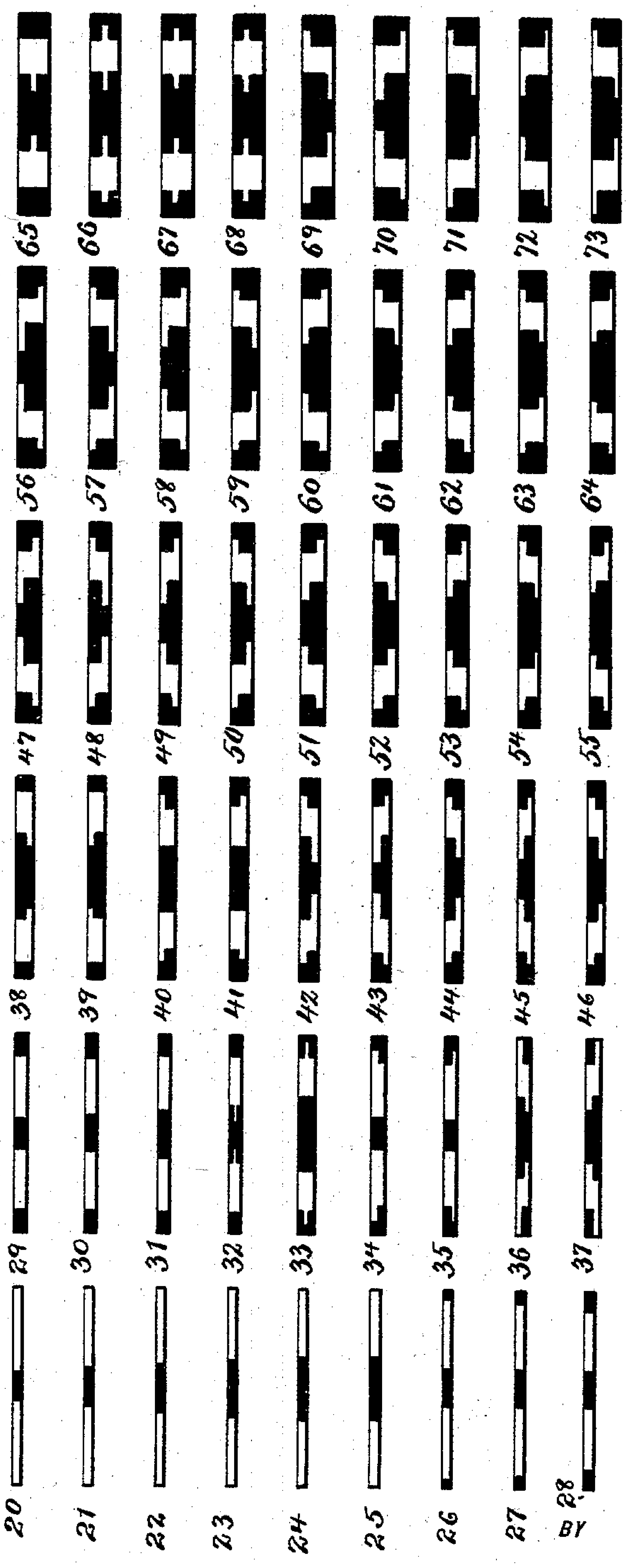

Fig. 12.

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Fig. 13.

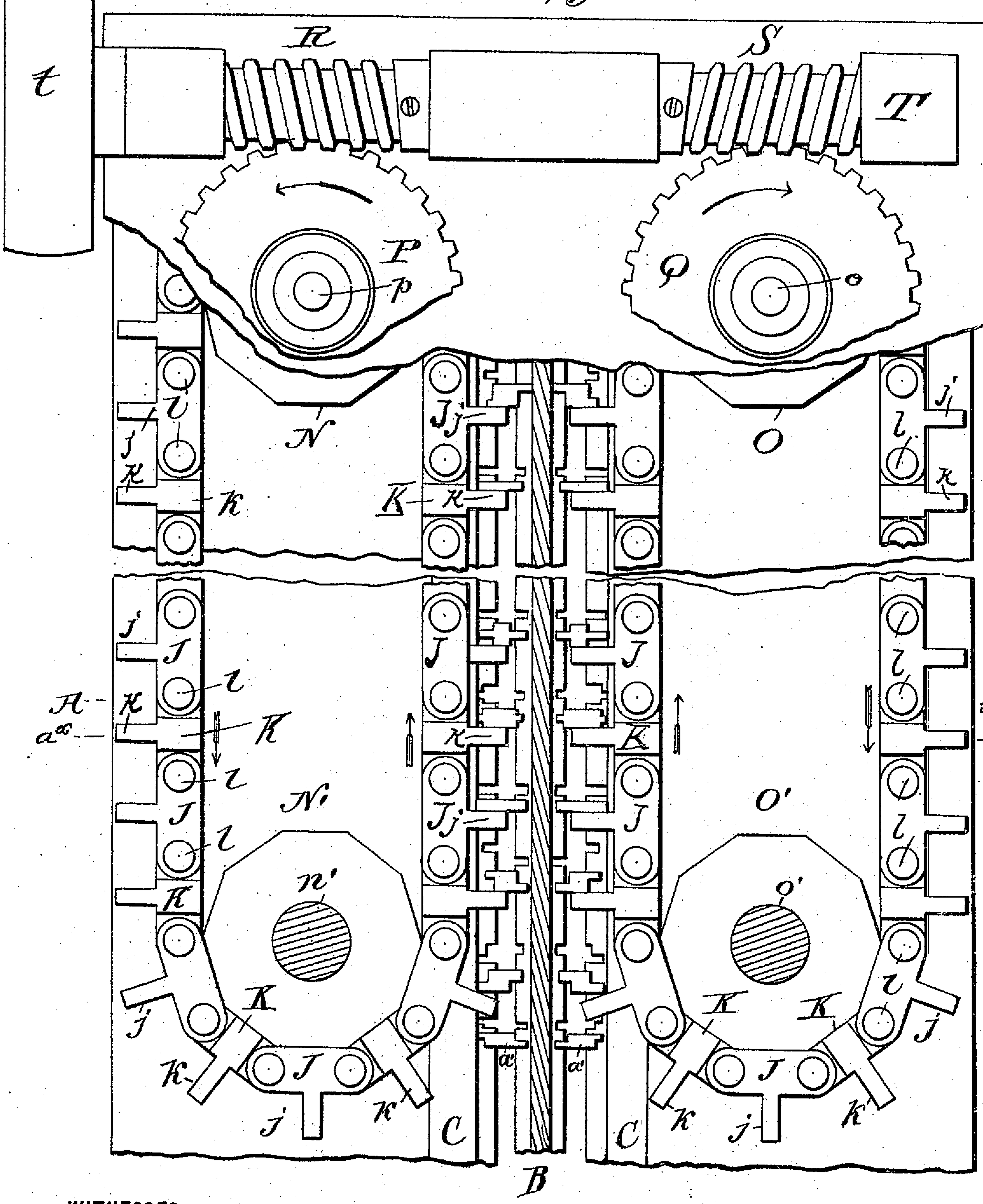

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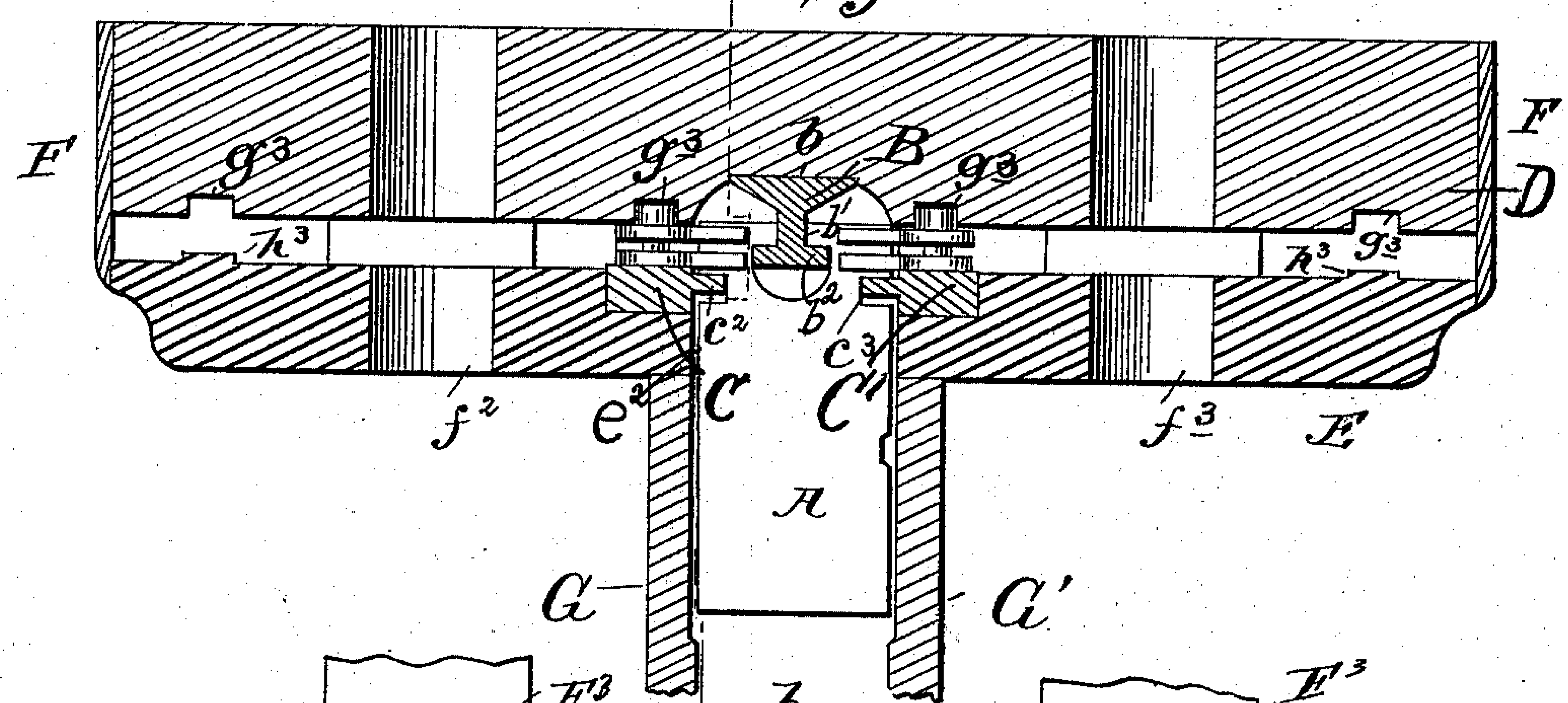
Fig. 15



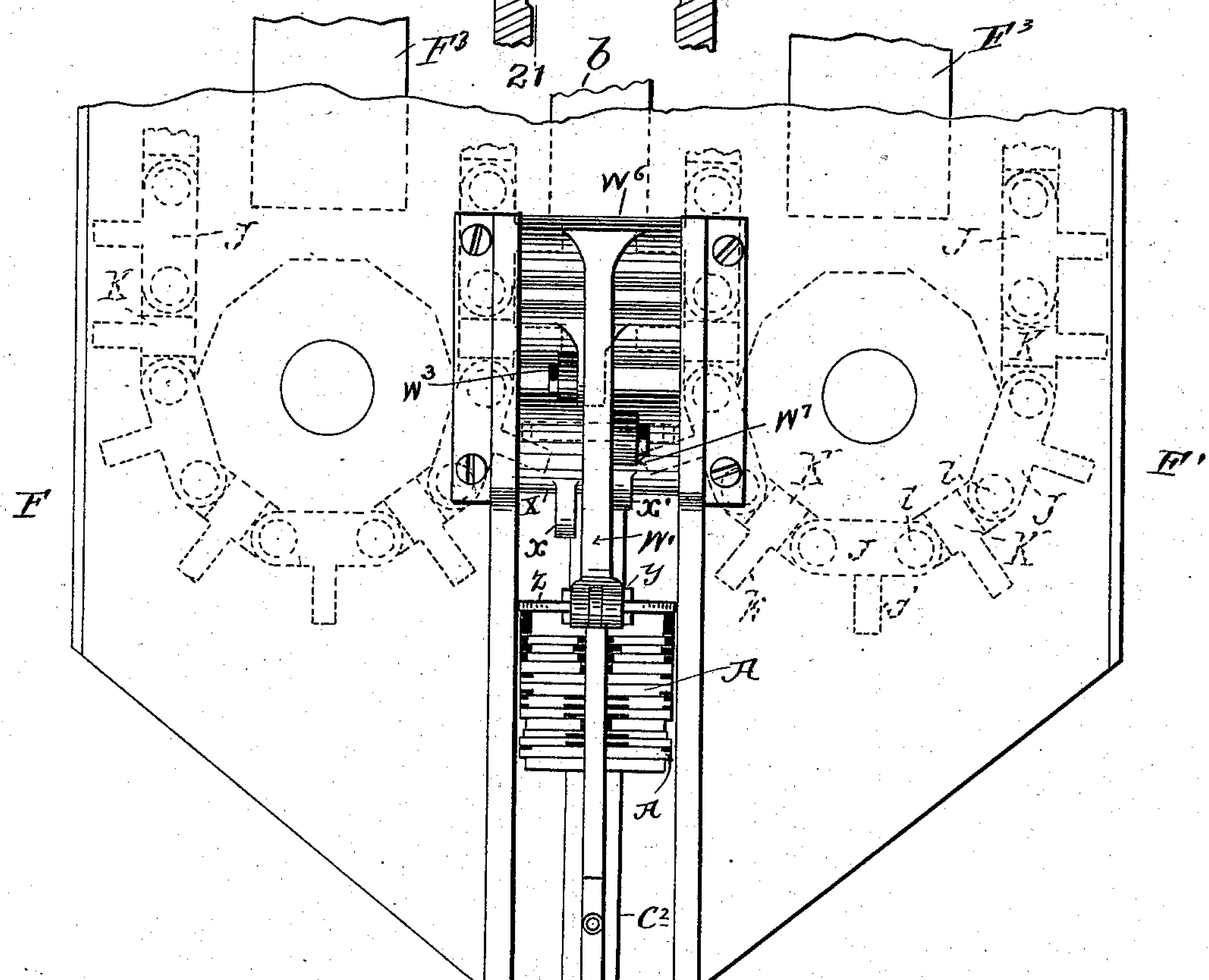


Fig. 14

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No. 573,199.

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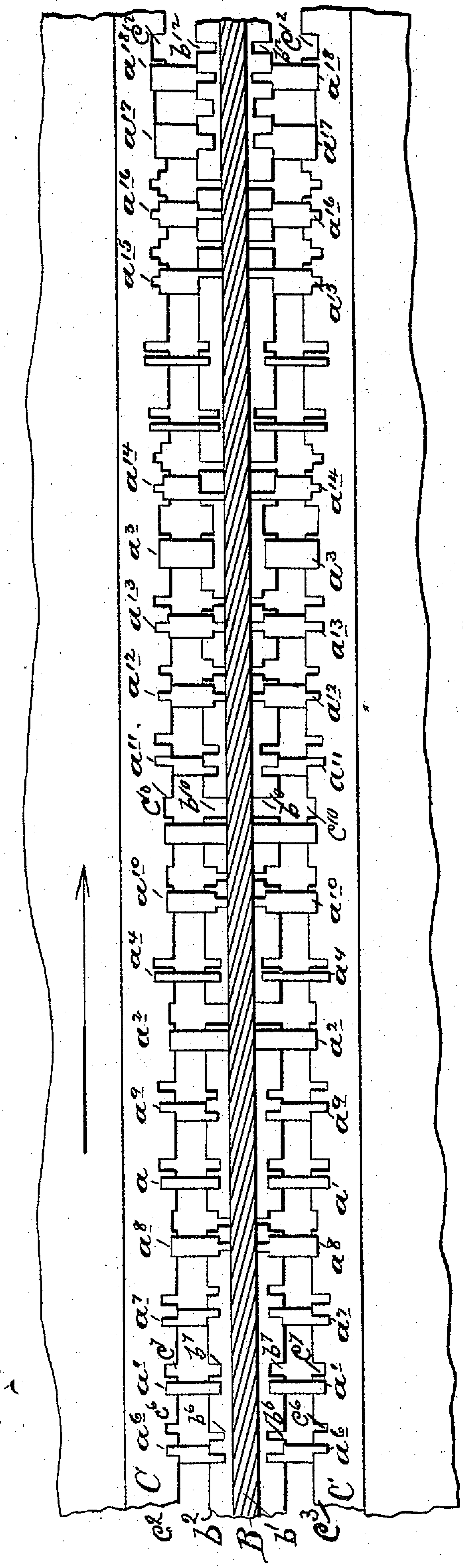

Fig. 16.

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MATRICES AND APPARATUS FOR DISTRIBUTING SAME.

No. 573,199. Patented Dec. 15, 1896.

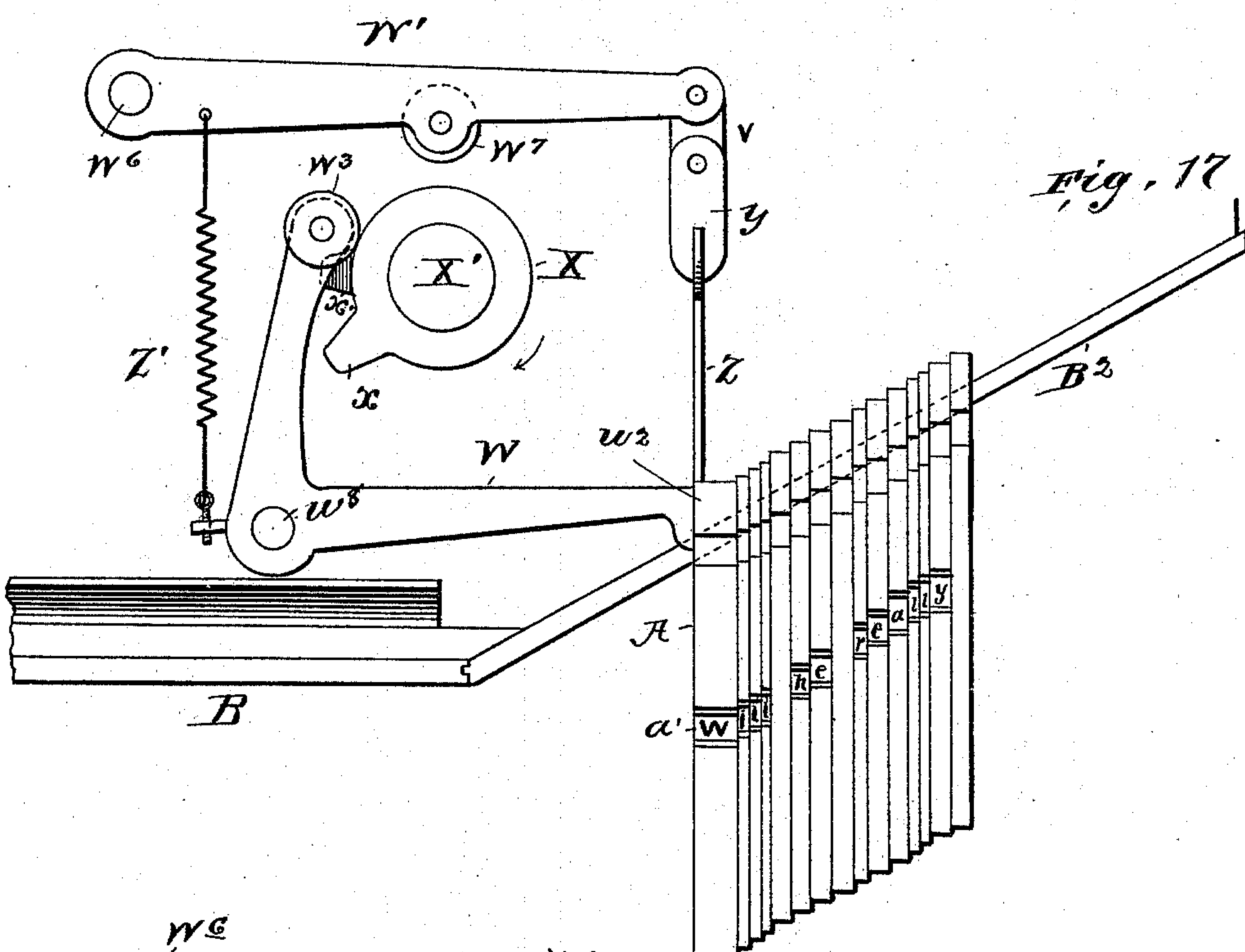

Fig. 17.

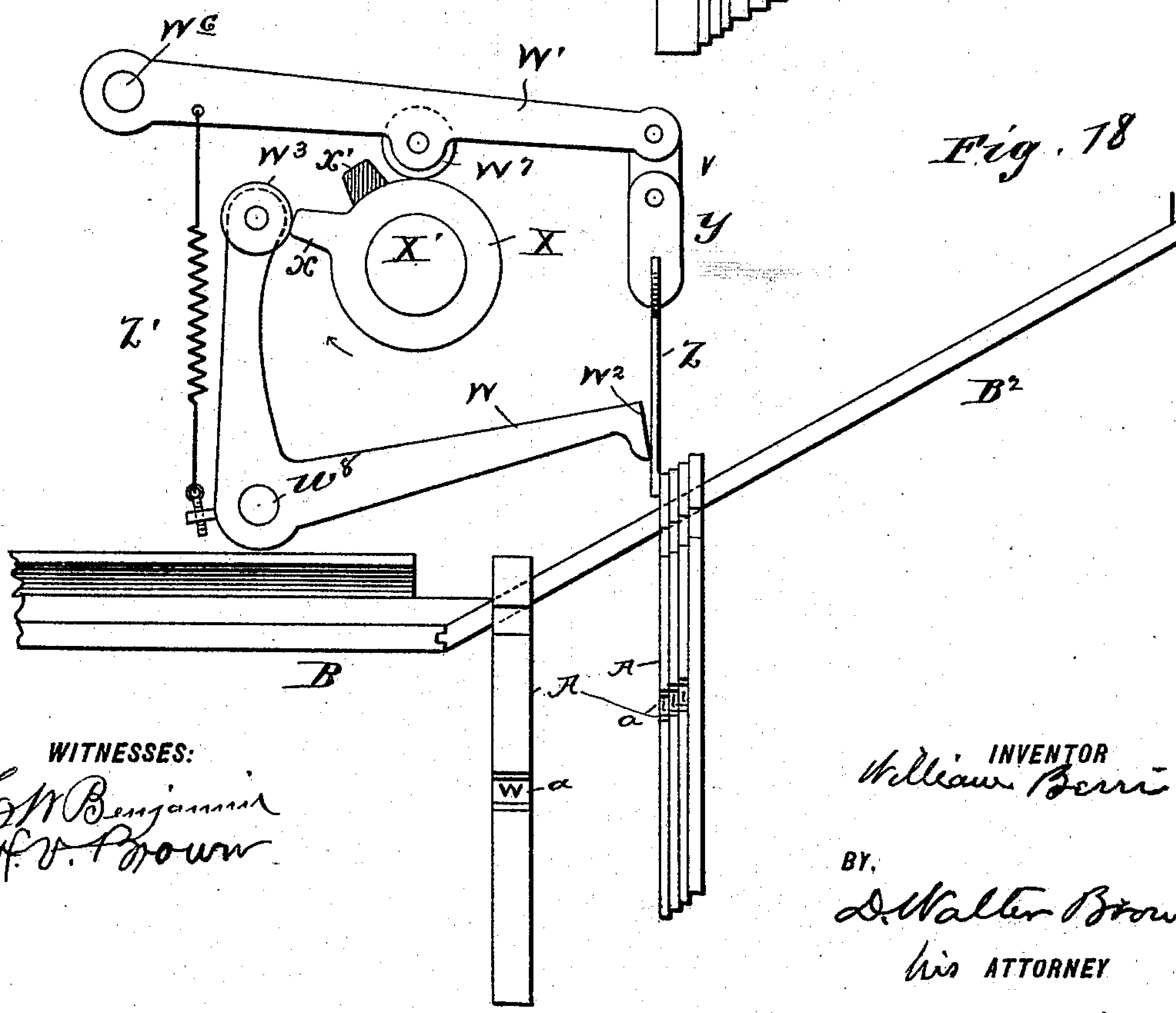

Fig. 18

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MATRICES AND APPARATUS FOR DISTRIBUTING SAME.

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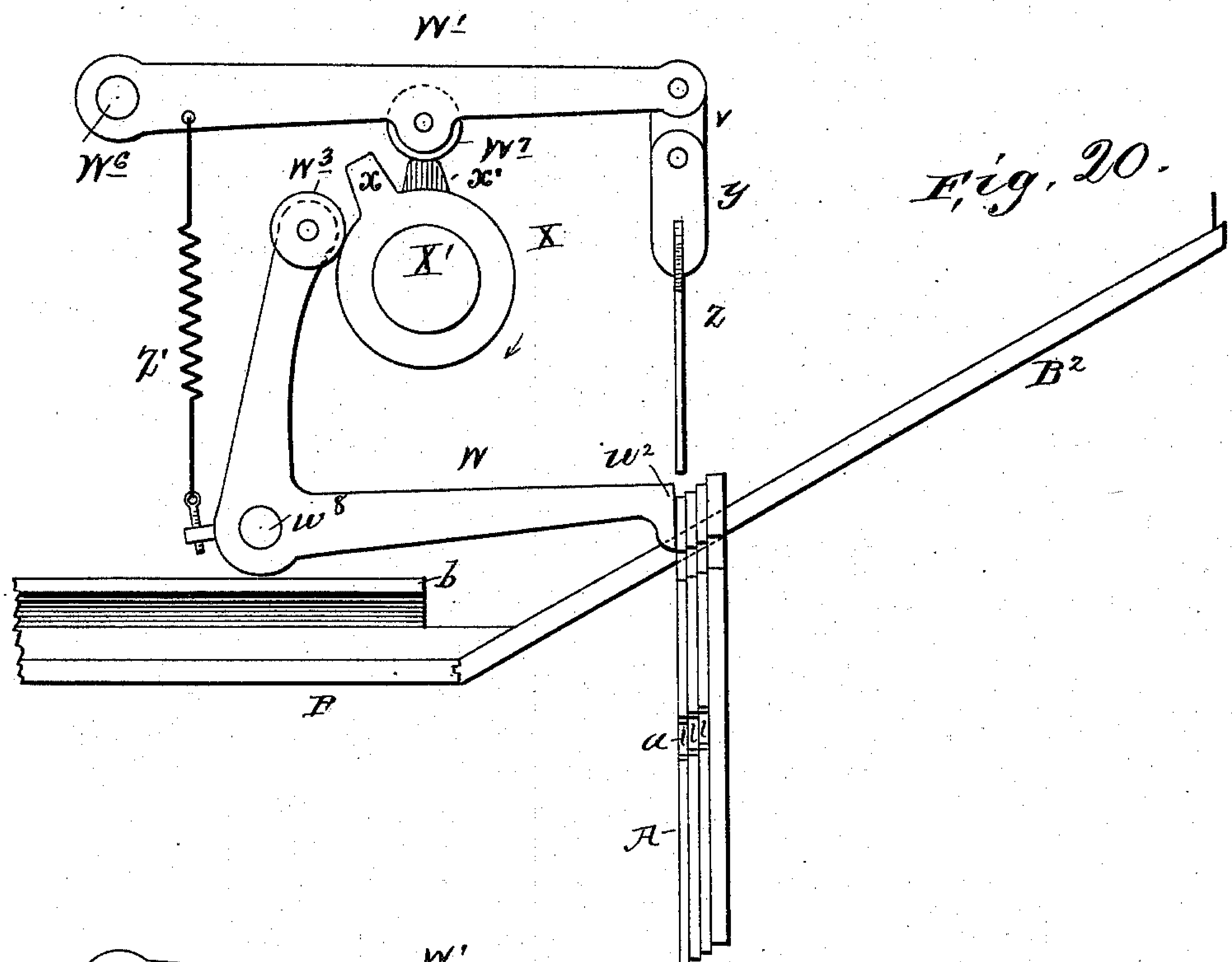

Fig. 20.

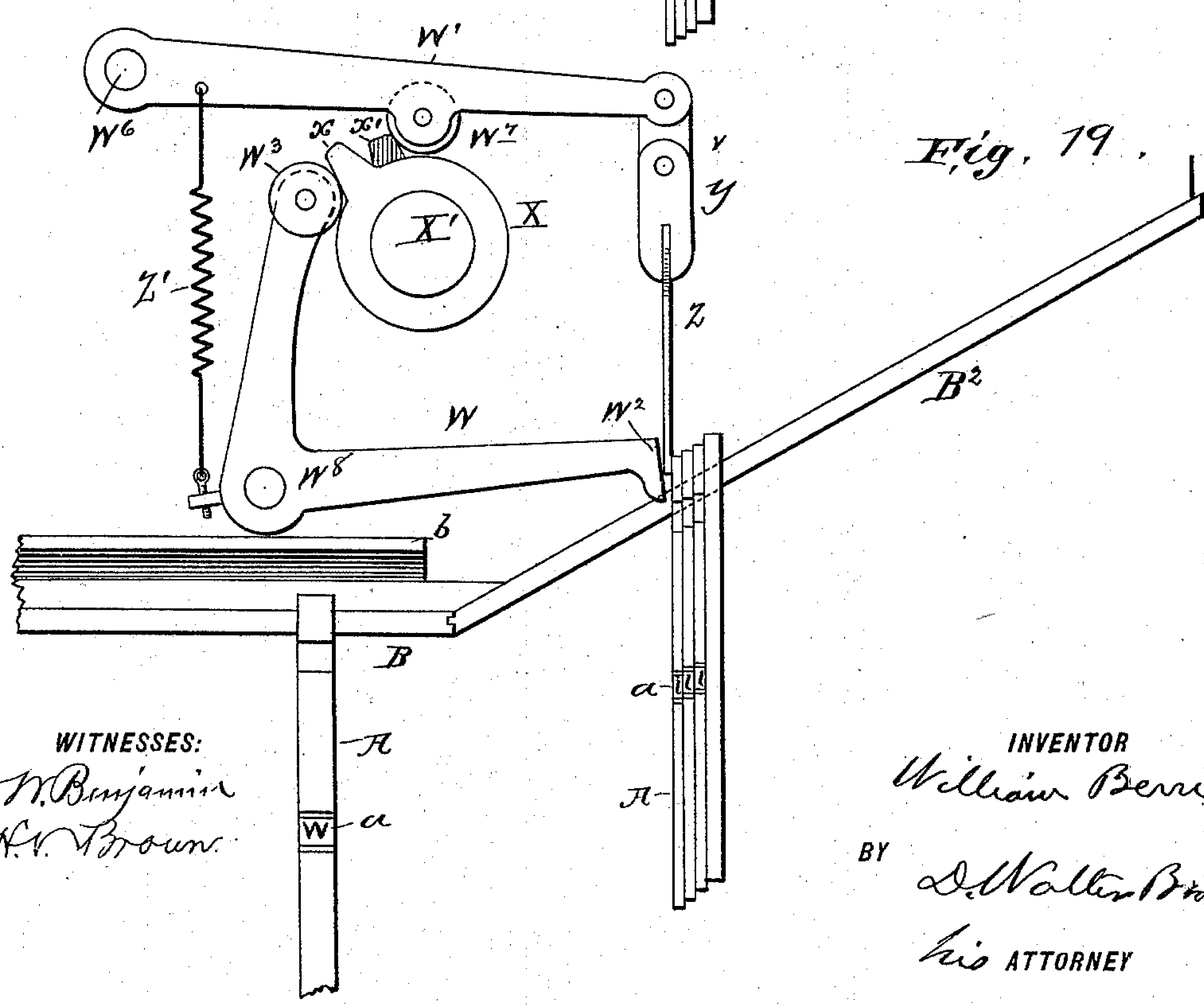

Fig. 19.

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MATRICES AND APPARATUS FOR DISTRIBUTING SAME.

No. 573,199. Patented Dec. 15, 1896.

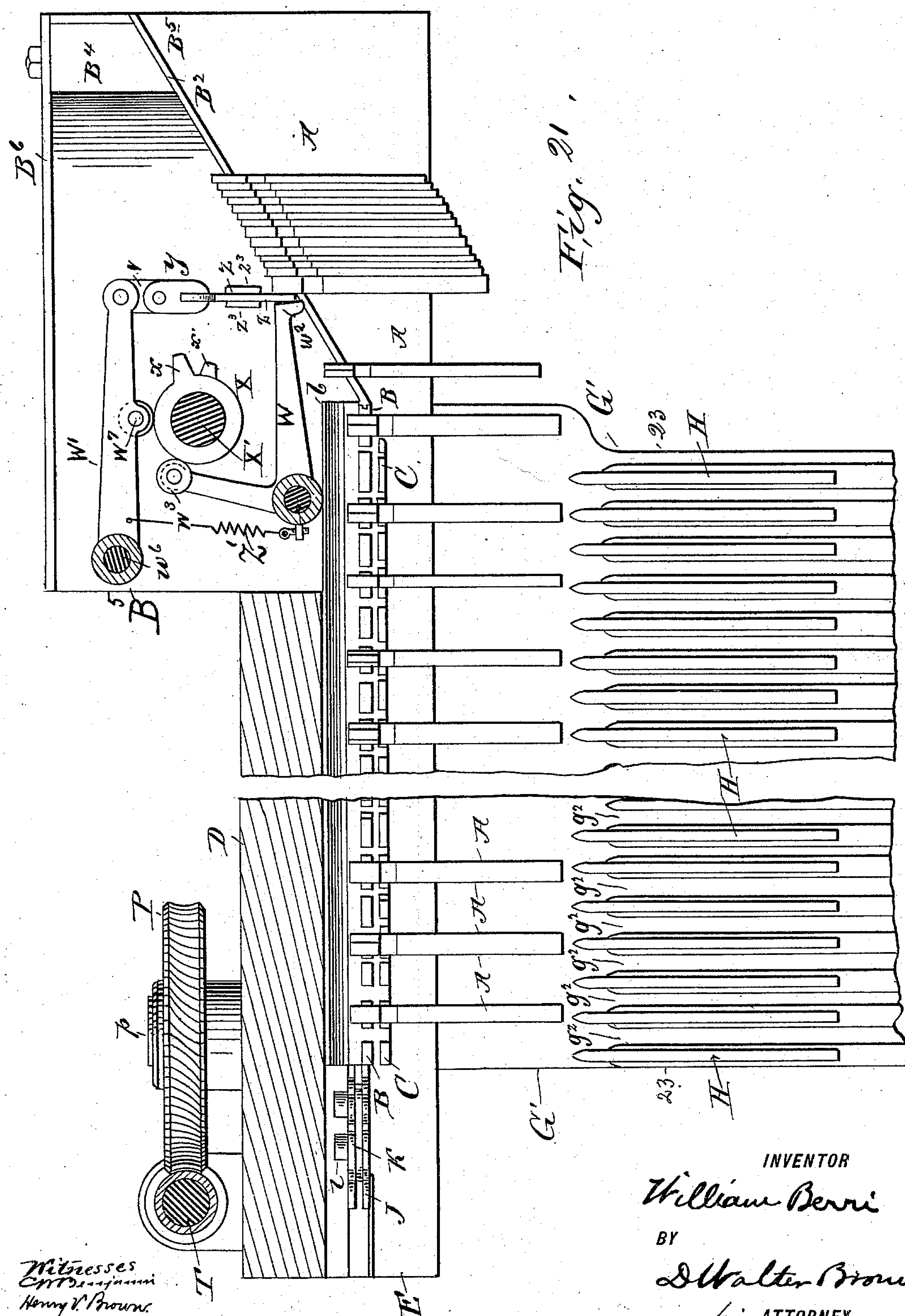

Fig. 21.

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No. 573,199. Patented Dec. 15, 1896.

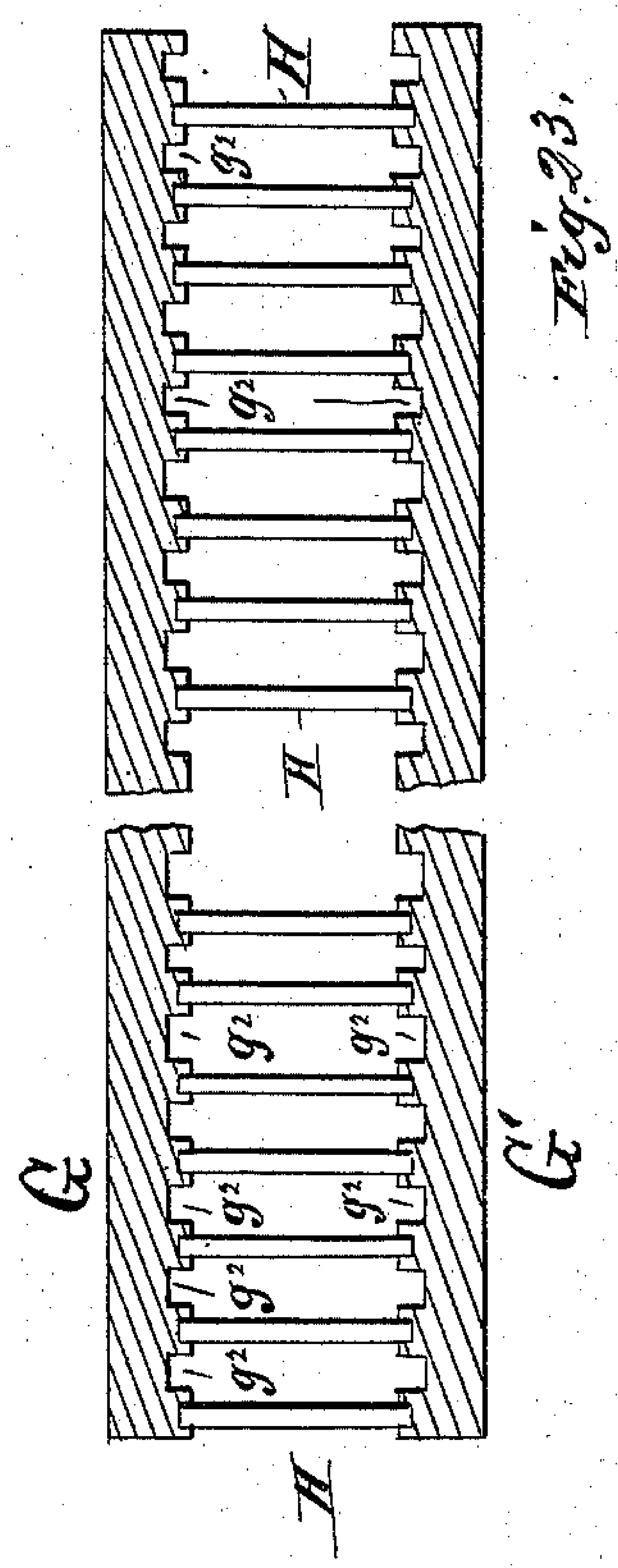

Fig. 23.

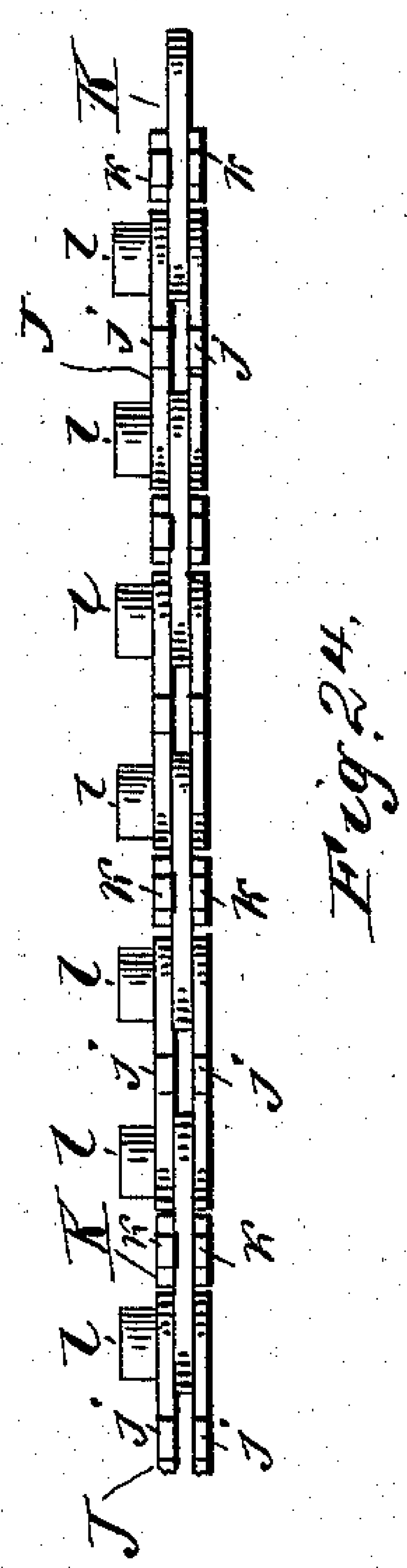

Fig. 24.

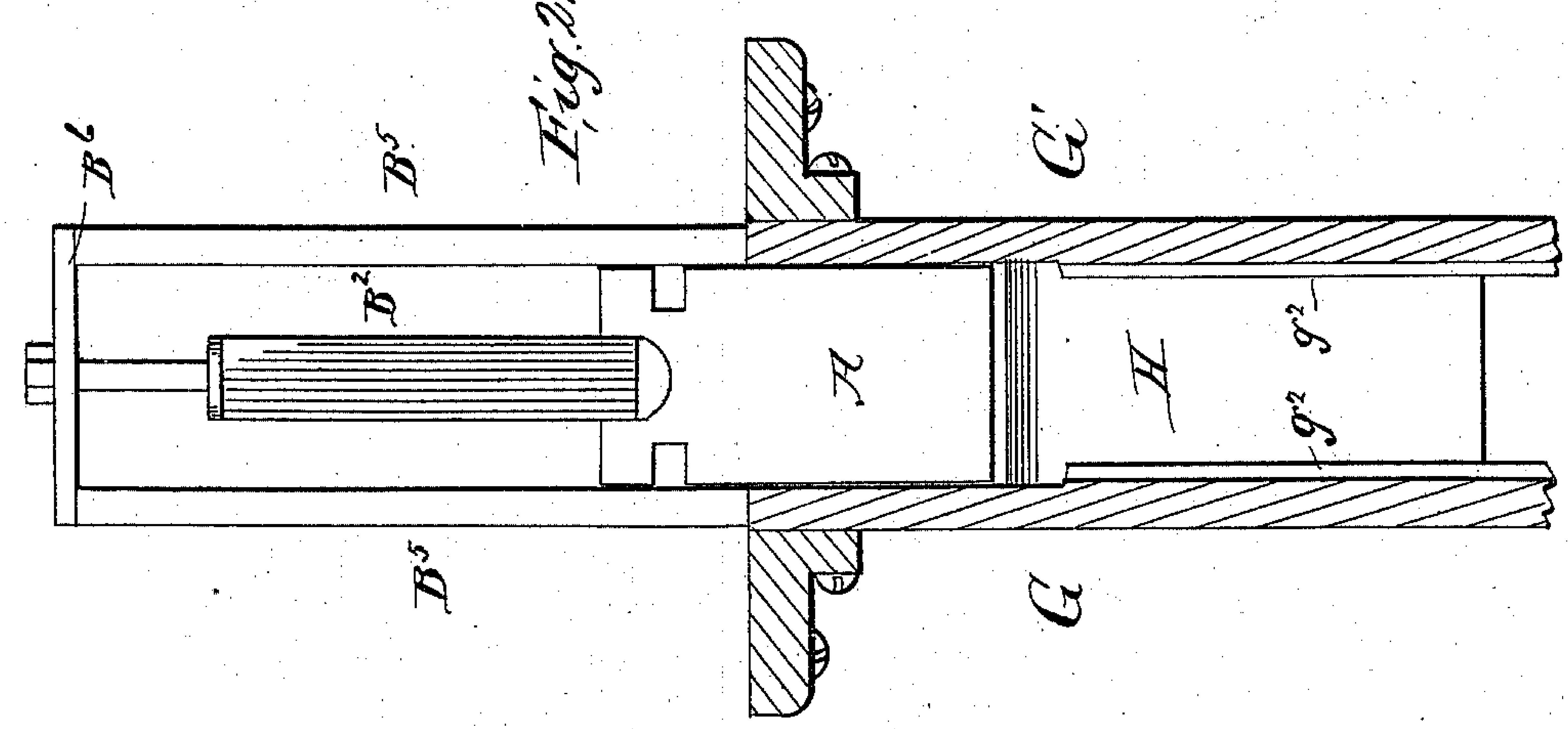

Fig. 22.

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UNITED STATES PATENT OFFICE.

WILLIAM BERRI, OF BROOKLYN, NEW YORK.

MATRICES AND APPARATUS FOR DISTRIBUTING SAME.

SPECIFICATION forming part of Letters Patent No. 573,199, dated December 15, 1896.

Application filed February 7, 1895. Serial No. 537,671. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BERRI, a citizen of the United States, and a resident of the city of Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Matrices and Apparatus for Distributing the Same, of which the following is a specification.

My invention relates to improvements in matrices and apparatus for distributing the same.

In the first place the invention relates to the matrices which are used in forming the molds from which to cast type and pertains in this respect to the form and construction of the matrices, so that each matrix shall differ from all the other matrices in such degree as to promote the distributing of the matrices by the aid of distributing-rails.

Essentially the invention consists in this respect in providing each matrix with four supporting-shoulders or sets of supporting-shoulders, each of said shoulders or set of shoulders being adapted to bear on an independent distributing-rail, and in making at least one shoulder of the set of shoulders on each matrix in respect either of width or thickness or form and position (or all these) different from the corresponding shoulder of every other matrix.

The invention in this respect also consists in the system by which I vary the width, thickness, form, and position of the shoulders, so that it is easily mechanically possible to form the shoulders of a great number of matrices with sufficient differences in width, thickness, form, and position to provide for the certain distribution of the matrices without fine and difficult variations in the matrices.

The invention also relates to the distributing-rails, of which there are three, each outer rail supporting one of the shoulders or set of shoulders and the inner rail supporting the two inner shoulders of the matrices. Each of said rails is provided with slots of such shape and size and so positioned as to permit the set of shoulders of only some one matrix to pass through that particular group of slots. In this manner the distribution is effected by the coöperation of the four shoulders or sets of shoulders on each matrix with the slots on the three rails, and the shoulders of every matrix are so constructed that, except when at the proper slot, each matrix is supported on at least two flanges of the rails.

The invention also relates to the mechanism for sliding the matrices along on the distributing-rails and to the separating and releasing devices by which the matrices are delivered one at a time upon the end of said rails.

Referring to the drawings which accompany the specification to aid the description, Figure 1 is a side elevation of a matrix wherein both the inner and outer shoulders are of the full width. Fig. 2 gives the edge view of seven matrices differing in width, as indicated by the characters $1^{\times}$ $2^{\times}$ $3^{\times}$ $4^{\times}$ $5^{\times}$ $6^{\times}$ $7^{\times}$, and Fig. 3 gives the top view of the same seven matrices. Fig. 4 is a broken side elevation, on a large scale, of a matrix, indicating by the vertical dotted lines 1 2 3 4 5 and 6 7 8 9 10, respectively, how the outer and inner shoulders may be shaved off in different matrices to make them of the different widths to effect the distribution. Fig. 5 is a top view of the same matrix. Fig. 6 is a top view of a similar matrix, but the horizontal dotted lines 11 12 13 14 and 15 16 17 18, respectively, show how the outer and the inner shoulders of different matrices may be thinned to effect distribution. Fig. 7 is a top view of a similar matrix, but in this case both vertical and horizontal lines are shown representing how both the outer and inner shoulders may be shaved or thinned, or both, in different matrices to effect distribution. Comparing Figs. 8 and 9 with Fig. 7, Fig. 9 being a top view of Fig. 8, the said Figs. 8 and 9 illustrate a matrix wherein neither the outer nor the inner shoulders have been shaved, but the outer shoulders have been very much and the inner shoulders somewhat thinned. Figs. 10 and 11 should also be compared with Fig. 7, and it will then appear, Fig. 11 being a top view of Fig. 10, that the outer shoulders have been both shaved off and thinned and the inner shoulders thinned but not shaved off.

Comparing Figs. 2 to 11, inclusive, it appears that Figs. 2 and 3 illustrate matrices which are distributed by reason of the different thickness alone of the supporting-shoulders, and that Figs. 4 to 11, inclusive, illustrate the manner in which either the width or the thickness (or both) of the inner or outer shoulders of one matrix varies from corresponding dimensions of the shoulders of other matrices, and it will be understood that Figs. 8 to 11, inclusive, illustrate only two of the very great number of variations which may be made in the width and the thickness of the inner or outer shoulders, or both.

Fig. 12 is a top view of a large number of matrices, illustrating many of the combinations. The solid white portions represent the substance of the matrix, and the solid black portions represent the parts which are cut away. The diagrams 20 to 28, inclusive, indicate thin matrices varying the one from the other only in the manner in which the one or the other set (or both sets) of supporting-shoulders is shaved off. In none of these matrices are the shoulders thinned. The remaining diagrams 29 to 73, inclusive, represent thicker matrices and illustrate how the width, thickness, and shape of the shoulders and upper part of the matrices may be varied. In examining these diagrams, it will of course be understood that the solid white parts at each side, separated by the central solid black part, are parts of the same matrix, the central solid black part representing the slot through which passes the web of the central supporting-rail, Fig. 15.

Fig. 13 is a broken plan view of the distributing mechanism proper. The upper plate is partly broken away to allow the driving-chains and distributing-rails to be seen. A few of the matrices are shown on the rails, and some of the slots in the rail are indicated. The chains are supposed to be moving in the direction of the arrows.

Fig. 14 is a broken plan view of the upper plate and its attachments from about the line $a^{\times}$ of Fig. 13. This figure illustrates in plan the inclined rails down which the matrices slide to the distributing-rails and the devices which release the matrices, so that they pass one at a time to the distributing-rails.

Fig. 15 is a vertical cross-section through the holes or bearings in which the shafts of the pulleys and worm-gears revolve. The said pulleys and gears, as well as the worm and the outer length of the drive-chains, are omitted.

Fig. 16 is a broken plan and section of a part of the distributing-rails and their slots. It corresponds with Fig. 13, except that the detail of the rails is elaborated and the pulleys and driving-chains are omitted. The purpose of this figure is to illustrate the system of distribution.

Figs. 17 to 20, inclusive, illustrate four different positions of the separators for releasing and separating the matrices, so that they shall glide one at a time downward upon the distributing-rails. The separators are the same as those shown in plan view in Fig. 14. The plane of Figs. 17 to 20 is of course vertical and perpendicular to the plane of Fig. 13.

Fig. 21 is a longitudinal sectional elevation as on the line 21 21 of Fig. 15 of the entire distributing and releasing mechanism and showing the relation of the separators to the distributing-rails and magazines.

Fig. 22 is a transverse sectional elevation as the mechanism appears when looking at the rear end, but the magazine-walls are shown in section.

Fig. 23 is a longitudinal horizontal section on the line 23 23 of Fig. 21 and indicating the manner of constructing the magazine-tubes.

Fig. 24 is a detail showing the construction of the drive-chains.

The matrices.—A is a matrix of any suitable material; *a*, a depression in the edge carrying the character in intaglio or relief. *c* is a chamber opening by the slot *d* through the top of the matrix. *e e* are shoulders at each side of the slot and adapted to bear on the central distributing-rail B, as hereinafter described. *f f* are shoulders on the outside of the matrix and each adapted to bear on one of the outer distributing-rails C and C′, as hereinafter described. The distribution of the matrices is effected through the coöperation of said shoulders *e e* and *f f* with slots in the central and the outer rails.

The system of distribution depends upon the fact that by reason of the suspension of the matrices on three rails by means of four independent sets of shoulders a change in either the thickness or in the width of one of said shoulders or of two or of all of said shoulders or in the position of one, two, or all of said shoulders can be availed of in combination with corresponding changes in the slots in one, two, or all of said rails to separate and distribute the matrices. For if we suppose the matrices to be moving along over the rails B C C′, then evidently when any matrix arrives at a place where the slots in each of the rails correspond with the width, thickness, and position of each of the shoulders that matrix will fall off the three rails, and no other matrix will do so at that point, for even if one of the shoulders of that other matrix corresponded with the slot in one of the rails, yet some one of the other shoulders would not correspond with the slot in some one of the other rails. This combination of four sets of shoulders with slots in three rails (which I believe is a new combination in the art) gives a very great number of possible changes which can be easily made within good operative mechanical limits. Having four shoulders to operate with, the least difference in thickness, for example, of the shoulders of any two matrices may be a thirty-second of an inch, and it requires no delicacy of mechanical operations to cut the shoulders to such different thicknesses. Again, the margin of difference in the shoulders being so great provides for easily cutting the slots in the rails enough wider than the corresponding shoulders of the matrices to provide that the matrices will not stick in the slots, and yet insures that the slots will differ sufficiently from each other to effect the certain and accurate distribution of the matrices.

By "thickness" I mean the dimension parallel to the edge of the matrix, and by "width" the dimension parallel to the top of the same. Therefore it is evident that the difference in the thickness of any of the shoulders affords the first means of distribution. This is illustrated in the edge and top views, Figs. 2 and 3, each figure showing seven matrices and each matrix having shoulders of a different thickness from those of any other matrix, (the shoulders of each being the same thickness as the body of the matrix.) In Fig. 16, a' a' represent a matrix of a certain thickness, a^2 a^2 a matrix of another, and a^3 a^3 a matrix of still another thickness, and each is approaching slots in the three rails of corresponding size. Evidently, even supposing the width of the corresponding shoulders of all the matrices were the same, neither of the thicker matrices can fall through the narrowest slot, and as the motion is from the narrowest toward the widest slots each matrix will fall at its proper place and not before; also, the width of either of said shoulders can be reduced by shaving off the shoulders, as indicated by the vertical dotted lines 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, Figs. 4 and 5, and evidently (without varying the thickness of the shoulders) the changing of the width of the shoulders will enable the matrices to be distributed; also, this change in the width of the shoulders may be combined with changes in the thickness of the matrices and the shoulders of the same to effect the distribution. Thus in Fig. 16, a' a' represent a matrix whose inner shoulders have been considerably and whose outer shoulders have been a little shaved off. a^2 a^2 indicate a matrix whose inner shoulders are left of full width, but whose outer shoulders are much shaved off, and a^4 a^4 represent a matrix whose outer shoulders have been left full width and its inner shoulders a little shaved off. Evidently each of said matrices will be supported by the rails B C C' until it reaches that place where the slots in each of said rails correspond with both the thickness and the width of each of the shoulders of that matrix.

Again, each of the shoulders of a matrix may be thinned, as indicated by the horizontal dotted lines 11, 12, 13, 14, Fig. 6, or both the width and the thickness of each of said shoulders can be reduced, as indicated by crossing vertical and horizontal lines, Fig. 7. These reductions in width or thickness, or both, of each of said shoulders give rise to a very great variety of forms, two of which are indicated in Figs. 9 and 11. In Fig. 9 the outer shoulders are left of full width, but are greatly reduced in thickness, and the inner shoulders, being also of full width, are slightly reduced in thickness. In Fig. 11 the outer shoulders and also the inner shoulders are somewhat reduced both in width and thickness. In Fig. 16, a^6 a^6, a^7 a^7, a^8 a^8, a^9 a^9, a^{10} a^{10}, a^{11} a^{11}, a^{12} a^{12}, a^{13} a^{13}, a^{14} a^{14}, a^{15} a^{15}, a^{16} a^{16}, a^{17} a^{17}, a^{18} a^{18} represent some of the great number of different forms produced by appropriate changes in the width or thickness, or both, of one, two, or all of the said shoulders. In each case Fig. 16 shows a corresponding slot immediately to the right (or in front) of its proper matrix.

The top views, Fig. 12, give a very clear idea of the application of the system to a large number of matrices; but, of course, many other combinations, too numerous to be shown in the drawings, can be made in the same manner in practice.

The distributing mechanism.—B and C C' being respectively the inner and the two outer rails, I effect the distribution of the matrices in the following preferred manner: The rail B is secured by its flange b to the under side of a supporting top plate D, which plate is chambered adjacent to the rail B, as shown in Fig. 15, b' being the web, and b^2 the head, on which bear the inner shoulders of the matrices.

E is an under plate having a lengthwise through-and-through slot e^2 beneath the rail B and a little wider than the body of the matrices. The rails C C' are secured in rabbets in the edges of said slot e^2, the bearing portion of said rails being the inwardly-projecting flanges c^2 c^3. The said rail B is provided along its edges with slots, as b^6 b^7 b^{10} b^{12}, Fig. 16, and each of the rails C C' is provided at its inner edge with corresponding slots c^6 c^6, c^7 c^7, c^{10} c^{10}, c^{12} c^{12}, each of the said slots in the rail B corresponding in size and position to the inner shoulders of some one matrix and the said slots in the rails C C' corresponding in size and position to the outer shoulders of that one matrix. Thus as each matrix moves along over the rails B C C' it comes to a place where the group of slots in the four flanges correspond with all four shoulders of that matrix, and therefore the matrix is released at that point and falls into its proper magazine. On the under side of the plate E are secured vertically-depending longitudinal and parallel magazine wall-plates G G'. The space between said plates G G' is open from end to end to a depth below the lower edge of the matrices, as indicated in Figs. 15 and 22, so that the matrices can move along in said space between the said plates G G'. At points vertically under the releasing-slots in the rails B C C' the plates G G' are provided with grooves, as at g^2 g^2, Fig. 23, said grooves being wide enough to let the proper matrix slide easily down, and said grooves being flared at the top, as shown in Fig. 21. Between said grooves g^2 g^2 are arranged transverse partition-plates H H, which rise to a point a little below the lower end of the matrices and are pointed at their upper ends, so as to direct the matrices into the grooves g^2. Said plates H may be conveniently inserted in rabbets in the wall-plates G G′, as shown in Fig. 23, and divide the space between said plates G G′ into magazines, each of which is vertically beneath a set of releasing-slots in the rails B C C′. Therefore when a matrix is released from said rails B C C′ it falls between the upper ends of the plates H and is directed into the grooves g^2 g^2, descending to the bottom thereof, where it is arrested by proper releasing devices operated by finger-keys in the usual manner. Such keys and devices are not here shown and described, since the same may be of any well-known kind and are not, *per se*, a part of this invention. Said plates D E are maintained a proper distance apart for the movement of the driving-chains by the pieces F^2 F^3.

f^2 f^3 are holes for the shafts of the gears and drive-pulleys.

g^3 g^3 are long slots to permit the pins of the links of the chains to move through them, and h^3 h^3 are ribs on the plate E to diminish friction between the chains and the plate E.

J K are links of the endless drive-chain, *l l* being the pins of the chain. There is such a chain at either side of the rail B, Fig. 15. Each link J and K has a finger (or fingers) *j k*, respectively. I prefer to form the links J in two pieces separated by and pivoted to a single-piece link K, as shown in Fig. 24. Each piece of the link J has a finger *j*, Fig. 15, and on each side of the link K is riveted a finger *k*. Thus there are two such fingers, one above the other, for every link of the chain. Near one end said chains J K go round ten-sided polygonal drive-pulleys N O, fixed on shafts *o p*, turning in the holes f^2 f^3.

P Q are gears fixed, respectively, on the shafts *o p* and meshing with the right and left worm-threads R S on the shaft T, which is driven by the pulley *t*. At the other end the chains go round similar ten-sided pulleys N′ O′, fixed on shafts *n′ o′*, turning in holes or bearings in the plates D E. The arrangement is such that the inner length of each chain travels with the same speed toward the front of the machine or from the junction of the inclined rail B^2, and that the fingers of a link of one chain are always directly opposite the fingers of a link of the other chain, Fig. 13. Now suppose the matrices placed one by one by any means, as by hand or by any suitable mechanism, (such, for example, as that hereinafter described,) on the rear end of said rails beyond the first of the slots and in such position that some one of the fingers *j k*, as it happens, will come in behind the matrix. Then as the chains move forward the matrix will be slid along on the rails B C C′ until the matrix comes to that place on the rails where the slots on each of said rails correspond with the position and size of the four shoulders of the matrix. Then the matrix will be released from all the rails at that point, and will fall into its proper magazine-tube to be released when wanted by any proper finger-key mechanism.

The separators and releasing mechanism.—The rail B is at its rear end and a little behind the pulleys N′ O′ connected with an upwardly-inclined rail B^2, Fig. 21, which is formed in cross-section similar to the rail B, but the head of the rail B^2 has no slots and is wide enough to engage with even the narrowest set of inner shoulders which any matrix in the entire series of matrices has, so that every matrix will, when once placed on the upper part of the rail B^2, remain suspended thereon by its said inner shoulders and will slide down said rail to the separating and releasing mechanism at the lower end thereof, Figs. 17 to 20. The matrices may be placed on said rail B^2 by hand or by any suitable mechanism as they come from the casting devices. Such mechanism is not here shown or described, because the same forms no part of the present invention and is not necessary to the operation thereof. Said matrices slide down the rail B^2 and are arrested near the lower end of said rail by the aforesaid separating and releasing mechanism. Said mechanism consists of two levers W W′ and their operating devices. The lever W (being a bent lever) is fixed on the horizontal shaft w^8, which turns in bearings in the side plates B^5 of the case which contains the separating and releasing mechanism. The said plates B^5 are secured in any suitable manner or may be upward extensions of the wall-plates G G′, as indicated in Fig. 22, the top of the case B^6 being bolted to the standard or web B^4 of the rail B^2. Said lever W has a head w^2 on one arm, which at certain times acts as a stop to prevent the descent of a matrix to the rails B C C′ and at other times rises to allow said matrix to so descend. A roller w^3 on the end of the other arm of said lever W is situated to be actuated by a projection *x* on a rotary cam X, which is fixed on shaft X′, turning in bearings in the plates B^5 and driven by any suitable mechanism, as by gears connected with a gear on the shaft *n′* or *o′* of the pulleys N′ or O′, in time with the motion of the drive-chains. The head w^2 of the lever W reciprocates vertically over the rail B^2. The lever W on a shaft w^6, turning in bearings on the plates B^5, carries a roller w^7, adapted to be actuated by a projection *x′* on the cam X, said rollers w^3 w^7 and projections *x x′* being so situated that the roller w^3 is never lifted by the projection *x′* and the roller w^7 is never lifted by the projection *x*. A link *v* connects the lever W′ with a piece Y, which carries a depending plate Z, which is a little thinner than the thinnest matrix and arranged at right angles to the rail B^2. Said plate Z may either be solid throughout or may be forked at its lower end, so that the prongs of the fork will bear against the flat of a matrix near the outside edges thereof, so as to keep the matrix true athwart the rail B^2.

Z′ is a spring connecting the levers W W′.

The operation is as follows: Suppose the levers W W′ in the position of Fig. 17 and the matrices resting against the head w^2 of the lever W and the lower edge of the plate Z resting on the top of the lowermost matrix. The cam X revolving in the direction of the arrow, the projection x lifts the lever W clear of the lowest matrix, Fig. 18, releasing the same, which slides down the rail B^2 and onto the rails B C C′ to the position indicated by the matrix a', Fig. 13, where it will be engaged by the fingers of the drive-chains, as hereinbefore described. Meanwhile the tension of the spring Z′ has drawn down the lever W′ and the plate Z to the position of Fig. 18, thereby preventing the descent of the second matrix. The cam X continuing its revolution, the projection x passes beyond the roller w^3 and the lever W descends to the position of Fig. 19, where it opposes the descent of the next matrix. The cam X still revolving, the projection x' lifts the lever W′ clear of the matrices, Fig. 20, and the tension of the spring Z′ brings the lever W clear down in front of the matrices. Next the revolution of the cam brings the levers W W′ successively to the positions of Figs. 17 and 18, releasing the next matrix, and so in succession. It will be observed that there never is a time when both the levers W W′ are clear of the matrices, but one or the other is always in front of the foremost matrix until it reaches the position shown in Fig. 17, where the lever W is in front of it and the plate X on the top of it. The next movement of the cam lifts the lever W clear above the first matrix and depresses the lever W′ in front of the next matrix. Thus the two levers coöperate to separate the matrices and release them one by one. The movement of the cam is so timed by any suitable mechanism in respect of the movement of the chains that the levers W W′ release a matrix to descend to the rails B C C′ just as the one set of fingers of the chains are about to close in behind it, and thereby the matrices are pushed regularly along on the rails as they are released by the levers.

The plate Z may be guided in its movements by any suitable guides z^3, Fig. 21.

Now, having described my improvement, I claim as my invention—

1. A series of matrices whereof each matrix is equipped with duplicate sets of shoulders for effecting the distribution of the matrices, and the corresponding shoulders of the one matrix have a different relative position, or a different thickness in a direction perpendicular to the plane of the matrix, or a different width in a direction parallel to the plane of the matrix, from the position, thickness, or width, of the corresponding shoulders of all the other matrices, substantially as described.

2. In apparatus for distributing matrices, and in combination with matrices having duplicate sets of shoulders, two sets of distributing-rails, whereof each rail is adapted to support one of the shoulders of a matrix, and said rails being provided with slots so that each transverse set of slots forms a group whereof the position of a slot or its thickness parallel to the rails or its width perpendicular to the rails differs from the position or the thickness or the width of the corresponding slot in every other group of slots, substantially as described.

3. In apparatus for distributing matrices as described the combination of two sets of distributing-rails, whereof each rail is adapted to support one of the shoulders of a matrix, said rails being provided with slots so that each transverse set of slots forms a group whereof the position of a slot or its thickness parallel to the rails or its width perpendicular to the rails differs from the position or thickness or width of the corresponding slot of every other group, drive-chains parallel to the rails and fingers on the chains adapted to propel the matrices along the rails, substantially as described.

4. In machines for distributing matrices, the combination with a plurality of rails provided with distributing-slots, of an inclined rail rising from said first-named rails, and alternating separating and releasing levers adjacent to said inclined rail and adapted to separate and release the matrices at said rail one by one, substantially as described.

5. The combination with the distributing-rails B C C′, of an inclined rail rising from the end of the distributing-rails, alternating-motion levers W W′ coöperating to arrest, release and separate matrices, and rotating cams adapted to reciprocate said levers in opposite directions, substantially as described.

6. The combination in a machine for distributing matrices of the rail B^2 and the levers W W′ coöperating to arrest, release and separate matrices descending on the rail B^2, a cam X provided with a projection for lifting the lever W and also with a projection for lifting the lever W′ as the lever W is descending and a plate Z operatively connected with said lever W′, substantially as described.

7. In machines for distributing matrices, the combination with pulleys of drive-chains the links of which are alternately double and single, a lateral finger on each part of the double links, and two such fingers on each single link, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 3d day of January, 1895.

WILLIAM BERRI.

Witnesses:
ALBAN V. RUCKMICH,
WM. H. AITKEN.