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

MATRIX DIMENSIONING MACHINE.

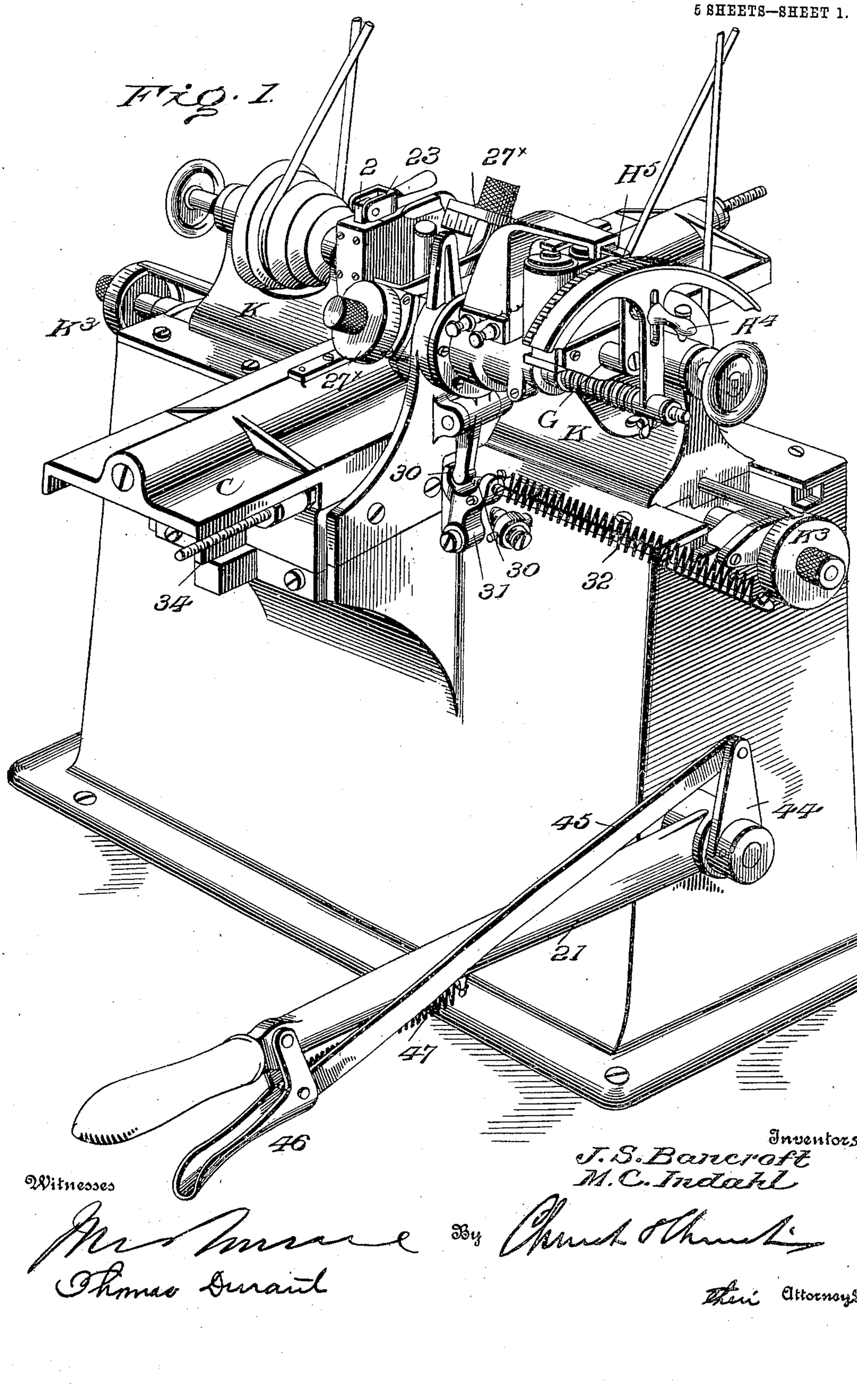
APPLICATION FILED AUG. 13, 1906.

952,596.

Patented Mar. 22, 1910.

5 SHEETS—SHEET 1.

FIG. 1.



Witnesses

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5 SHEETS—SHEET 2.

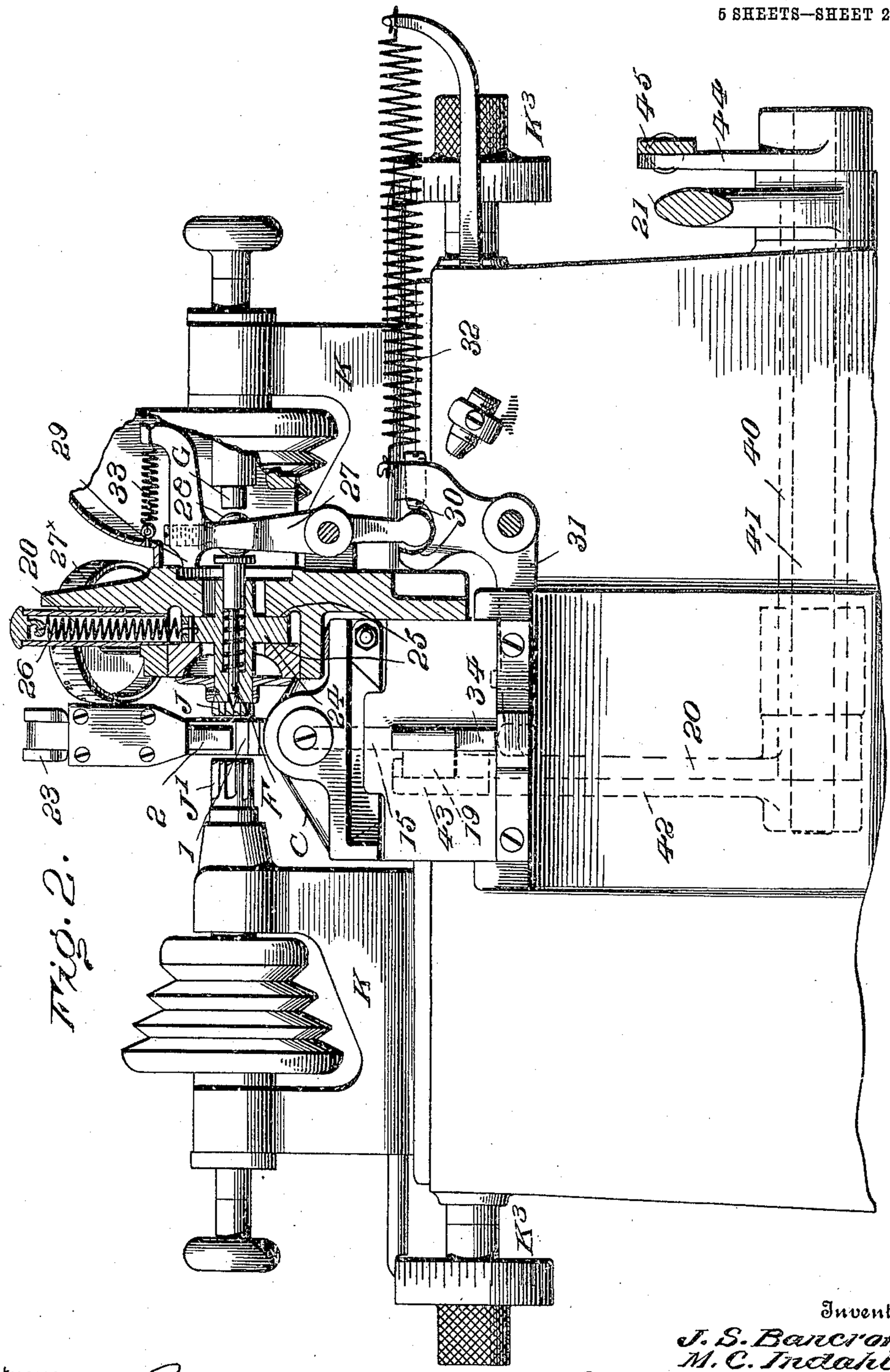

Fig. 2.

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5 SHEETS—SHEET 3.

Fig. 3.

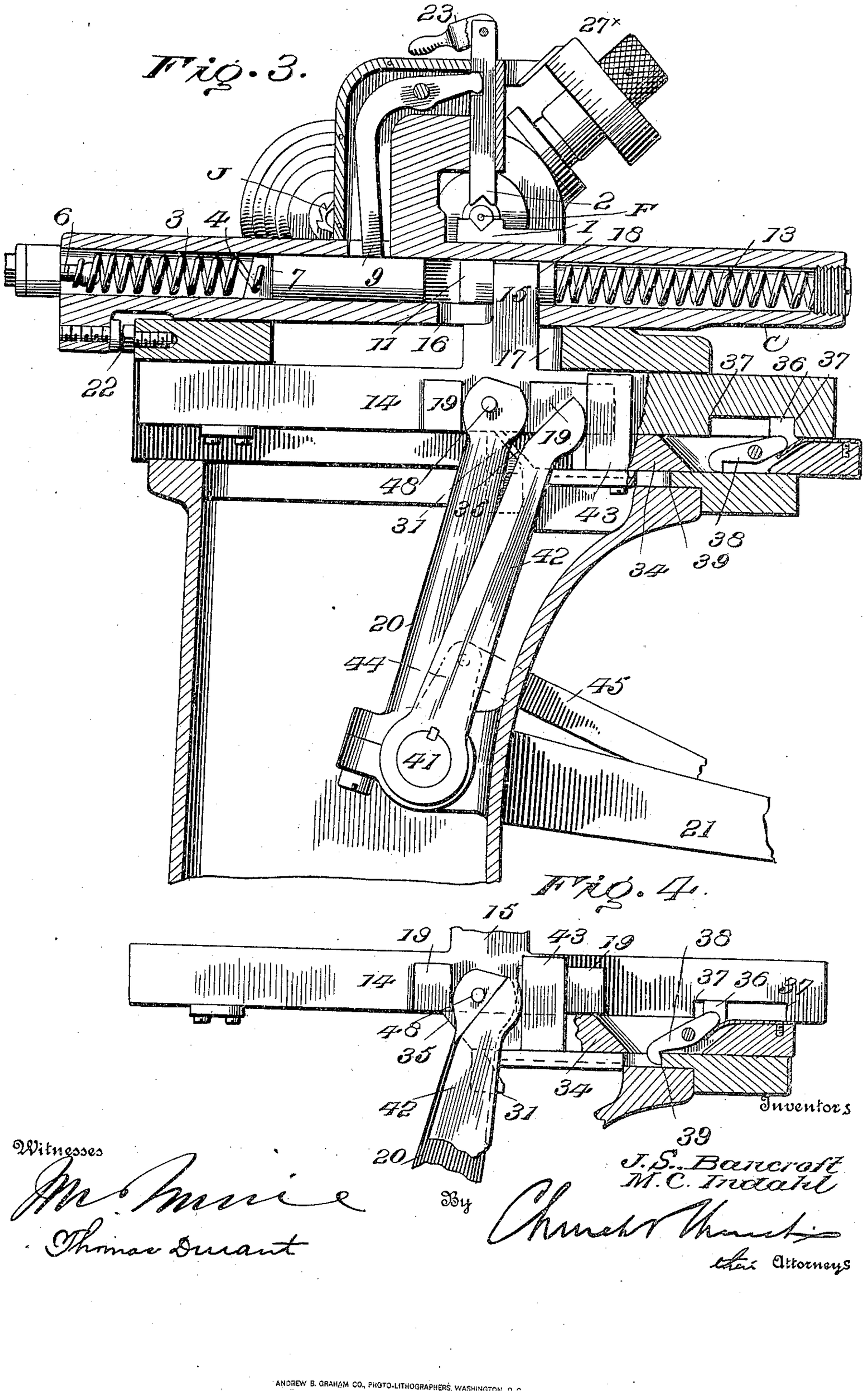

Fig. 4.

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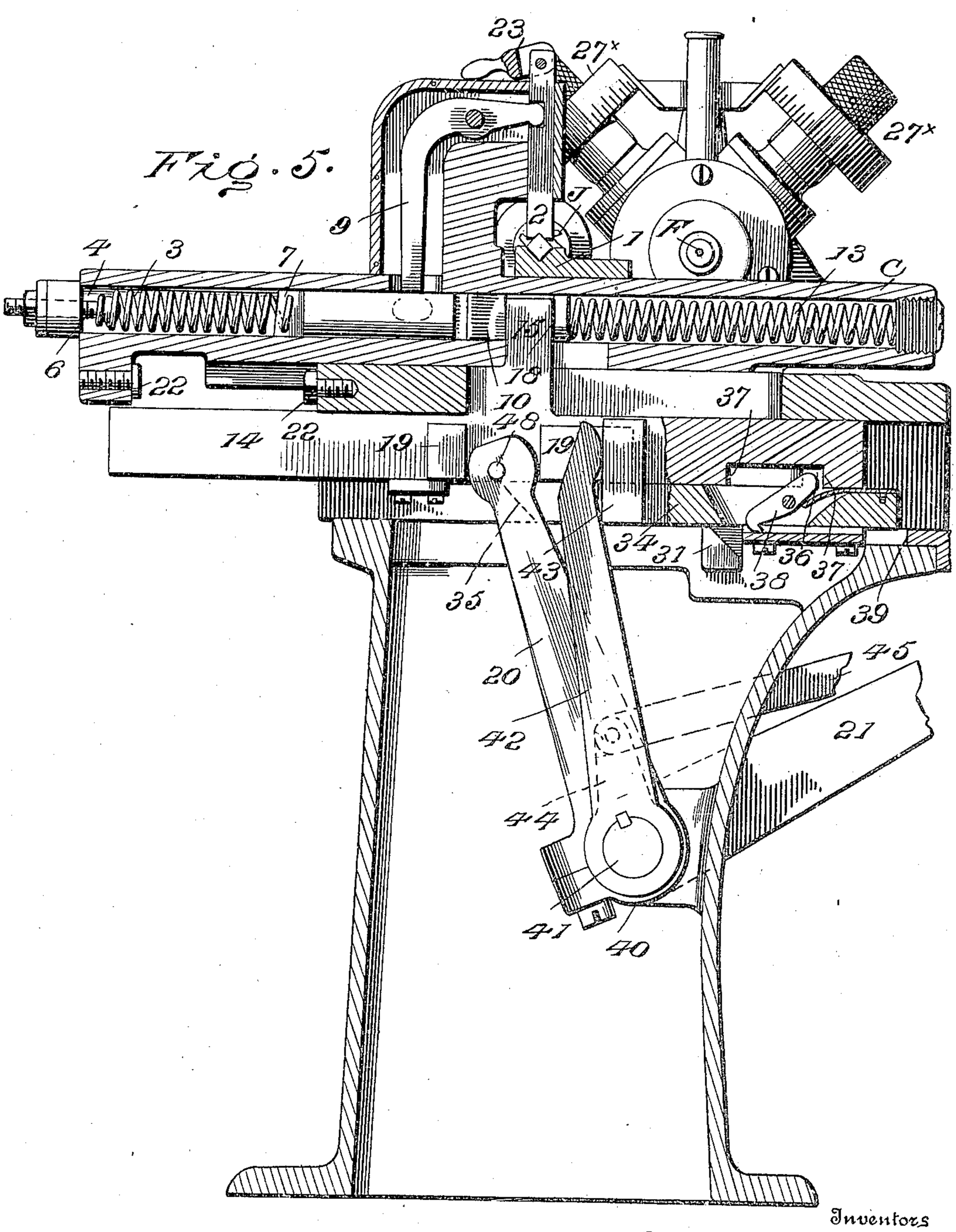
5 SHEETS—SHEET 4.

Fig. 5.



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5 SHEETS—SHEET 5.

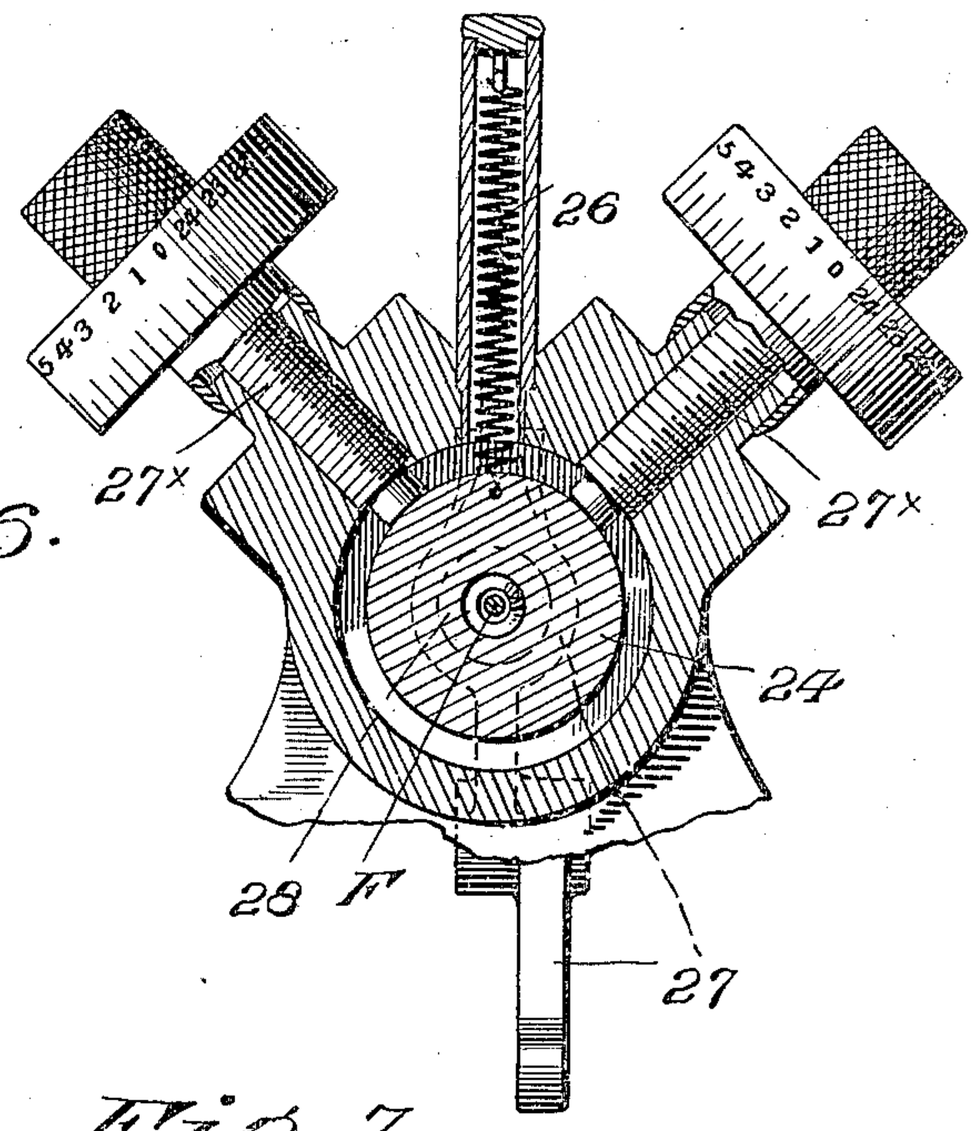

Fig. 6.

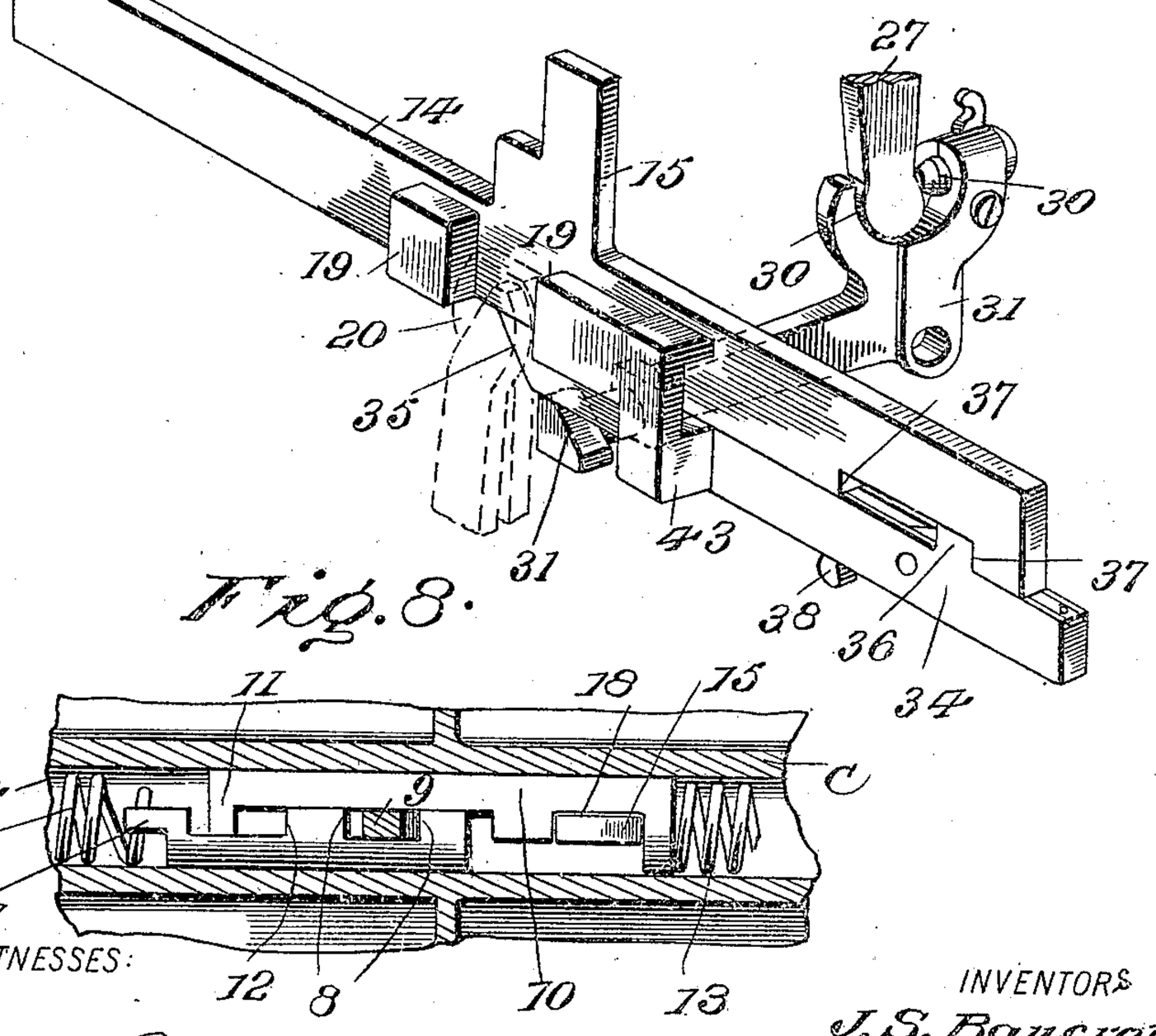

Fig. 7.

Fig. 8.

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MATRIX-DIMENSIONING MACHINE.

952,596. Specification of Letters Patent. **Patented Mar. 22, 1910.**

Application filed August 13, 1906. Serial No. 330,457.

To all whom it may concern:

Be it known that we, JOHN SELLERS BANCROFT and MAURITZ C. INDAHL, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Matrix-Dimensioning 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 improvements in the class of milling or grinding machines employed in the manufacture of type machine matrices for reducing the latter to a uniform and exact height or length and with relation to the face of the character contained in the drive or matrix cavity in the end thereof, and it has for its principal objects to facilitate and simplify the operations of gaging and clamping the matrix blocks in exact position preliminary to dressing off the end or ends thereof, and to the prevention of injury to the gaging device and matrix due to failure on the part of the operator to properly manipulate the machine; to which end the said invention consists in providing automatic or motor actuated clamping means for holding the matrix in adjusted position and while undergoing the dimensioning operation; in controlling the action of said clamping means by or through the medium of the actuating devices for effecting the relative motions of clamp and cutter incident to dimensioning, in such manner that the clamping of the matrix will be automatically effected preliminary to its presentation to the cutting or reducing media, thus incurring its retention in adjusted position and preventing accidental displacement, while undergoing the dimensioning operation; in providing means for preventing the advance of the gaging member or needle to operative position, for locating the matrix while the latter is grasped and held by the clamp, or until the pressure of the latter is sufficiently relieved to permit longitudinal movement of the matrix, whereby injury to the matrix cavity by the engagement of said gaging member or needle is prevented; in coupling the actuating devices for advancing the gaging member or positioning needle with the clamp actuating and controlling mechanism in such manner that the gaging member or needle will be automatically retracted and withdrawn from the matrix cavity prior to the shifting of the matrix, thus preventing injury to the gage and matrix; and in minor features of construction, combinations and arrangements of parts, all as hereinafter fully described, and pointed out in the claims.

In the accompanying drawings illustrating a preferred form of embodiment of the invention—Figure 1 is a perspective view of the complete machine. Fig. 2 is a front elevation of the machine with a portion of the gaging devices cut away and the balance in section to disclose the gaging member or needle. Fig. 3 is a sectional view of the matrix clamping and carrying devices and the actuating mechanism therefor with the parts in gaging position. Fig. 4 is a detail view showing the shifting member or bar and latch in one position of adjustment. Fig. 5 is a sectional view of the matrix clamping and carrying devices and the actuating mechanism therefor with the parts in milling position. Fig. 6 is a partial transverse vertical section through the support for the gaging member or needle and adjusting devices therefor. Fig. 7 is a perspective view of a portion of the actuating devices for the clamp, carrier and gaging needle. Fig. 8 is a top plan view of a portion of the clamping motor and its connection with the shifting member.

Like letters and numerals designate the same parts in the several figures.

The present invention is illustrated as applied to and used in connection with the machine of Patent No. 687,781, dated Dec. 3, 1901, to which reference may be had for a full disclosure thereof. It will suffice, for present purposes, to designate corresponding elements of the two machines, such as the heads K with their alined rotating milling tools J, J′, between which the matrix is carried in dressing off its ends; the micrometer adjusting devices K^3 for the cutter heads; the slide C for the matrix clamping devices mounted to reciprocate in a plane perpendicular to the axes of the cutters; the gaging member or needle F for entering the matrix cavity and by contacting with the bottom thereof, gaging the position of the matrix in the clamp; and the micrometer contact screw

G, actuating switch handle H^4, and electrically operated index finger H^5 for gaging the depth of drive after the dimensioning cut has been made. The reference letters correspond with those used to designate like parts in the prior patent.

The matrix clamp or holder, like that of the prior machine is provided with fixed and movable jaws 1, 2, mounted on slide C and grooved on their proximate faces for the reception of the matrix, to prevent lateral displacement thereof when the movable jaw is retracted; but, instead of equipping the clamp with manually operated actuating devices whereby varying degrees of pressure might be applied to the matrix, the movable or clamping member 2 is provided with a motor for effecting the closing or gripping action, said motor being in this instance represented by a spring 3, arranged to exert pressure upon the movable jaw 2 in a direction to cause its approach toward the opposite or fixed jaw 1.

In the preferred form illustrated the motor spring 3 is situated within a recess or chamber 4 formed in the upper section of the slide and extending longitudinally thereof. One end of the spring is connected to the slide through appropriate adjusting devices 6 and the opposite end is coupled with the movable jaw 2, through a block 7 provided with bearings 8 between which latter is received one end of a lever 9, the opposite end of said lever engaging jaw 2.

Within the chamber 4, in juxtaposition to block 7, is another block 10 provided with a shoulder or offset 11 in position to engage a shoulder 12 on block 7 when said block 10 is moved in a direction opposed to the stress of spring 3, but normally held removed from said should 12 by the action of a spring 13 interposed between the slide and said block 10, as seen in Figs. 3 and 5.

Below slide C and guided on the main frame to reciprocate longitudinally of slide is the shifting member or bar 14 through which motion is communicated to slide C for carrying the matrix from the gage to the dimensioning cutters and vice versa. This bar 14 is furnished with an off-set or arm 15, extending through limiting slots 16, 17, in the top plate of the frame and the bottom of the slide C, respectively, said arm 15 entering a recess 18 in block 10. The tension of spring 13 is such as to normally hold arm 15 against the opposite end wall of slot 17 in slide C, as represented in Fig. 5, in which position shoulder 11 of block 10 is removed from shoulder 12 in block 7, Fig. 8, and the motor spring 3 is exerting full pressure upon the clamp. The shifting member or bar 14 is provided with shoulders 19 between which is received the arm 20 of the hand lever 21, through which latter motion is communicated to the slide.

The arrangement and proportioning of the parts thus far described is such that when in normal position with the clamping jaws opposite the gage, and stops 22 carried by the slide and frame respectively, in contact, the arm 15 will be held under yielding pressure of spring 13 in contact or nearly so with the rear end of slot 17 in slide C, with shoulder 11 of block removed from shoulder 12, thus leaving motor spring free to exert full pressure on the clamp, to close the jaws thereof. If now the outer end of hand lever 21 is elevated the movement of bar 14 derived therefrom will, through the engagement of arm 15 with the slide cause a positive movement of the latter, whereby the matrix held between the jaws of the clamp will be carried back between the cutters and its end or ends trimmed thereby. Upon the reverse movement of the hand lever the slide and clamp will be returned to first position, opposite the gage, the clamp retaining its hold upon the matrix. If it is desired at this time to release the matrix so that it may be advanced against the face gage, to measure the depth of drive, means must be provided for relieving or overcoming the pressure of the clamp motor. Two independent means are provided for this purpose, one adapted for depth gaging, and the other for position gaging.

For depth gaging, which is performed as heretofore with the gaging needle F in retracted position, the movable jaw 2 is equipped with an eccentrically pivoted lever 23 in position to engage the frame and thereby elevate or retract said jaw against the pressure of its motor spring. It is for position gaging, which requires the gaging needle F to be advanced or projected with its point in fixed and predetermined relation to the plane of movement of slide C, and to permit the removal and insertion of matrices, that the actuating connection or bar 14 is coupled with the slide and clamp motor through the independently movable block 10. If the downward pressure on hand lever 21 is continued or resumed after stops 22 are brought into contact to positively arrest slide C, its motion will be communicated to block 10, against the pressure of spring 13, thus causing shoulder 11 to engage block 7 and draw the latter forward against or in opposition to its motor spring 3, thereby reversing the clamping action and retracting the movable jaw 2, without, however, otherwise changing the relation of the clamp to the gaging devices. So long as the hand lever is thus held at the extreme of its movement, the clamp will remain open for the removal or insertion of a matrix; but as soon as the pressure is relaxed or the lever moved in the opposite direction, the clamp will immediately close, under the action of its motor, the slide retaining its

position, owing to the reaction of spring 13 until arm 15 reëngages the rear end of slot 17.

In operating with the machines of the prior patent it sometimes happened that the matrix was clamped before the gaging needle was advanced to position, or the matrix was shifted laterally before the withdrawal of the needle, in the one case deforming the face of the matrix cavity, and in the other deforming the sides or face of the matrix cavity or bending or breaking the point of the needle. To prevent such accidents provision is made for automatically controlling the advance and withdrawal of the gaging needle F through the slide actuating and clamp controlling devices, so that the needle will be advanced only while the clamp is open, and will be withdrawn from the matrix cavity before the lateral shifting of the matrix takes place, and, in addition, means are provided for adjusting the gaging needle laterally with relation to the clamping devices, so that its point may stand in proper position to enter that portion of the matrix cavity best suited for positioning purposes.

By reference to Figs. 2 and 6 it will be seen that the needle F, together with its retracting spring are supported and guided in a head 24 provided with a radial flanged section fitted between parallel guiding walls 25 in the supporting frame. The head 24 is held by a spring 26 in yielding contact with angularly disposed adjusting screws 27* engaging the periphery of the head and serving to effect and control the adjustment of the needle in all directions in the plane of the guiding walls 25.

Between the head of needle F and the depth gaging micrometer contact screw G is interposed a lever 27 carrying a ball 28, the latter furnishing convex bearing faces for engagement with the needle and micrometer screw, and provided with a gaging member 29 arranged to contact with a fixed abutment to determine the advanced position of the needle. Lever 27 projects between opposed bearings 30 carried by the actuating lever 31, the latter provided with retracting spring 32 of superior tension and acting in opposition to the retracting spring of the needle. One of the bearings 30 is adjustable, to assist in determining the projection of the needle, and lever 27 is provided with a spring 33 operating to maintain contact with the needle. One arm of lever 31 projects beneath a slide 34, Figs. 3, 4, 5 and 7, the latter guided to reciprocate in parallel with the clamp actuating connection or bar 14 and provided with an incline or cam section 35 for engaging lever 31, to move the latter in opposition to motor spring 32. Slide 34 is provided with a lug 36 movable between shoulders 37 on bar 14 and carries a pawl 38 in position to engage a shoulder 39 on the frame.

Through the center of sleeve 40 forming the pivot of hand lever 21 is a shaft 41 carrying an arm 42 in position to engage a lug or shoulder 43 on slide 34, and to the opposite end of shaft 41 is attached an arm 44 coupled by link 45 with a finger lever 46 carried by lever 21. A spring 47 serves to hold arm 42 normally against a stop 48 on arm 20 of hand lever 21.

When it is desired to withdraw a matrix the hand lever is depressed, as before explained, to open the clamp. In so doing bar 14 is retracted to engage pawl 38 and thereby unlock slide 34. If it is desired to insert and locate a matrix for dressing down to gage, the finger lever 46 is grasped, causing arm 42 to engage lug 43 on slide 34 and retract the latter until its cam section 35 moves off lever 31, thus permitting the needle F to be advanced to gaging position by its motor spring 32. The matrix is now inserted in the clamp until the bottom of the cavity rests against the point of the needle, when the hand lever is raised to move bar 14 rearward into contact with the rear wall of slot 17, in slide C, the latter, owing to the reaction of spring 13, remaining stationary with stop 22 in contact. During this rearward movement of bar 14 and before arm 15 engages the rear end of slot 17 in slide C to move the latter, blocks 7 and 10 retreat, under the action of springs 3 and 13 until jaw 2 engages and firmly clamps the matrix, whereupon shoulder 37 on bar 14 engaging lug 36 advances slide 34 and causes its cam section 35 to engage and operate lever 31, to withdraw or retract pin F. Thus the gaging pin is advanced to position, the matrix slid forward against the pin and clamped, and the gaging pin positively retracted while slide C is stationary and before the engagement of the latter by arm 15 to carry the matrix to the dimensioning cutters. The matrix thus accurately positioned and firmly held in the clamp is now, by the continued motion of the hand lever carried between the cutters and its ends dressed. Upon the reverse motion of the hand lever the clamp is drawn back toward the gaging devices, slide 34 retaining its advanced position as seen in Fig. 5, so that its pawl 38 will reengage shoulder 39 to arrest the movement when the clamp is opposite the gage. By relaxing the grip on the finger lever the cycle of operations is completed and the mechanism brought to position to permit the preliminary depression of the hand lever as above explained.

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

1. In a matrix dimensioning machine the combination with the gaging and cutting de-

vices, of a matrix carrier provided with an automatic matrix clamp, a stop or abutment for limiting the motion of the carrier in one direction and actuating devices for the carrier coupled with the clamps and operating to open the latter when the carrier is arrested by said stop.

2. In a matrix dimensioning machine the combination of the following elements, to wit; cutting and gaging devices located in fixed relation; a reciprocating carrier or slide provided with matrix clamping devices; a motor for actuating said clamping devices to grasp and hold the matrix; and an actuating lever for the carrier coupled with the clamping devices and acting in opposition to the motor to open the clamp.

3. In a matrix dimensioning machine, the combination of the following elements, to wit; a carrier provided with matrix clamping devices; a motor for actuating said clamping devices; and means for reciprocating said carrier and controlling the action of said motor the same including an actuating member connected to the carrier in a manner permitting limited independent movement, and motor control devices engaged by said actuating member within the limits of its independent movement.

4. In a matrix dimensioning machine the combination of the following elements, to wit; a reciprocatory carrier provided with an automatic matrix clamp; gaging devices for positioning a matrix relative to the clamp; and actuating devices coupled with both the clamp controlling and gaging devices and operating to first open the clamp and then advance the gaging member.

5. In a matrix dimensioning machine, the combination of the following elements, to wit; a matrix carrier provided with an automatically closing clamp or matrix holder; a positioning gage provided with a movable member for contacting with the matrix; actuating devices coupled with the carrier to reciprocate the latter; and means controlled by said carrier actuating devices and coupled with the clamp and movable gaging member, to automatically open the one and advance the other.

6. In a matrix dimensioning machine provided with spaced end cutters, a positioning gage, and a matrix carrier, and in combination therewith, the following elements, to wit; an automatically closing clamp mounted on the carrier; means for reciprocating the contact member of the gage; and actuating devices for reciprocating the carrier, coupled with said contact member and the clamp to open the latter and advance the gaging member.

7. In a matrix dimensioning machine the combination of the following elements, to wit; dimensioning cutters spaced for the passage of the matrix; a carrier bearing matrix clamping devices movable in a path intermediate said cutters; a matrix positioning device provided with a movable gaging member; and actuating devices for the carrier coupled with said matrix clamping devices and movable gaging member in a manner to compel the opening of the clamp and the withdrawal of the gaging member while the matrix is in gaging position and before its removal therefrom to the cutters.

8. In a matrix dimensioning machine, the combination with the gaging needle and its support, the latter guided to move transversely of said needle, of a plurality of adjusting devices radially disposed relatively to and engaging the periphery of said support, and means for yieldingly retaining said support in contact with said adjusting devices.

9. In a matrix dimensioning machine the combination with a laterally movable matrix clamp, of a longitudinally reciprocating laterally adjustable gaging member.

10. In a matrix dimensioning machine the combination of the following elements, to wit; a matrix clamp; a positioning gage provided with a gaging member or needle movable with relation to said clamp for positioning a matrix therein; and actuating devices coupled with said clamp and gaging member to automatically open the clamp and advance the gaging member to position.

11. In a matrix dimensioning machine the combination of the following elements, to wit; a reciprocating carrier provided with actuating devices therefor; a matrix clamp mounted upon said carrier and provided with means for opening and closing its holding members or jaws; a positioning gage provided with a movable gaging member for entering the matrix cavity; and means controlled by the carrier actuating devices for automatically opening the clamp when in alinement or opposite the positioning gage.

12. In a matrix dimensioning machine the combination of the following elements, to wit; a reciprocatory carrier provided with actuating devices therefor and a matrix clamp; actuating devices for opening and closing the holding members of said clamp; a positioning gage provided with a movable gaging member; and means coupled with the carrier actuating devices and acting upon the clamp and movable gaging member to automatically open the clamp, advance and retract the gaging member and close the clamp.

13. In a matrix dimensioning machine, the combination of the following elements, to wit; a reciprocatory carrier provided with a matrix clamp; a motor for closing the members of the clamp; an actuating member engaging the carrier positively in one direction and through a yielding connection in

the opposite direction; gaging devices for arresting the carrier in a predetermined position when acted upon through said yielding connection; and means for communicating motion from said yielding connection to the movable member of the clamp to open the latter by the continued movement of the actuating member after the carrier has been arrested.

14. In a matrix dimensioning machine the combination of the following elements, to wit; a reciprocatory carrier provided with a matrix clamp and a motor spring for closing the latter; a matrix positioning gage; a stop for limiting the motion of said carrier toward the gage; and a shifting member engaging between fixed and yielding members on the carrier and coupled with the clamp, to open the same against the pressure of its motor spring.

15. In a matrix dimensioning machine, the combination of the following elements, to wit; a reciprocatory carrier provided with a matrix clamp; a stop for limiting the motion of the carrier in one direction; a positioning gage located in predetermined relation to said stop for engaging the matrix in the clamp; a shifting member interposed between fixed and yielding contacts on the carrier; and means for transmitting motion from the shifting member to the movable jaw of the clamp while the carrier is in engagement with its limiting stop.

16. In a matrix dimensioning machine, the combination of the following elements, to wit; a reciprocatory carrier or slide provided with a spring actuated matrix clamp; a shifting member engaging an abutment on said carrier; a spring interposed between the carrier and said shifting member, to hold the former in contact with the abutment; a stop for limiting the motion of the carrier; and means for transmitting motion from said shifting member to the clamp to open the latter.

17. In a matrix dimensioning machine the combination of the following elements, to wit; a reciprocatory carrier or slide provided with an automatic matrix clamp and a jaw closing motor therefor; an actuating mechanism for said carrier provided with a shifting member engaging opposed bearings on the carrier, one of said bearings being yieldable to permit independent motion of the shifting member; a stop for limiting the motion of the carrier as transmitted through said yielding bearing; and means for coupling said yielding bearing with the movable jaw of the clamp, to retract said jaw by the movement of the shifting member while the carrier is in engagement with its limiting stop.

18. In a matrix dimensioning machine, the combination of the following elements, to wit; a reciprocatory carrier or slide provided with matrix clamping devices; a positioning gage; a stop for limiting the motion of said carrier in a direction to cause the approach of the clamping devices and gage; means for advancing and retracting the gaging member relatively to the path of the clamping devices and in a direction transverse thereto; a shifting member coupled with the carrier through a yielding bearing or connection permitting a movement of the shifting member independently of the carrier; a stop for arresting the carrier; a movable member controlling the device for advancing and retracting the gaging member provided with an arresting pawl; a lever for actuating the shifting member; and means carried by said lever for controlling the gage advancing and retracting devices.

19. In a matrix dimensioning machine provided with dimensioning cutters, a reciprocatory slide carrying a matrix clamp, and a gage for positioning the matrix in the clamp, and in combination therewith the following elements, to wit; means for reciprocating the gaging member; means for reciprocating the slide, including a shifting member engaged between a shoulder on the slide and a spring interposed between said shifting member and the slide; means for coupling the said shifting member with the movable jaw of the clamp, to open and close the latter; and means for controlling the gage reciprocating devices, including a movable member provided with a detaining device or pawl.

20. In a matrix dimensioning machine, the combination of the following elements. to wit, a matrix positioning gage provided with a movable gaging member and means for advancing and retracting the latter; a reciprocatory slide bearing a matrix clamp provided with a movable jaw and automatic closing motor or spring; means for arresting the slide with the clamp in alinement with the gaging member; a shifting member or bar engaging a yielding bearing on the slide; a reciprocatory member controlling the devices for advancing and retracting the movable gaging member; a latch for arresting the movable gage controlling member during the movement of the clamp carrying slide toward the gage; and a bearing or shoulder on the slide engaging said latch to release its slide and permit further motion thereof when the shifting member is advanced independently of the first mentioned slide by the compression of its yielding bearing.

21. In a matrix dimensioning machine provided with a dimensioning device, a movable gaging member and a movable clamp provided with separable jaws, and in combination therewith an actuating mechanism coupled with said movable

clamp its separable jaws and the gage in a manner to separate the jaws and advance the gaging member, close the jaws and retract the gaging member while holding the clamp stationary and subsequently advancing the clamp toward the dimensioning means.

22. In a matrix dimensioning machine provided with a dimensioning cutter, a gaging member and a clamp provided with separable jaws and a motor operating to close the latter, said clamp being movable between the cutter and gaging member and the latter also movable relatively to the path of the clamp to engage and withdraw from the blank, and in combination therewith, actuating devices, including a controlling lever, coupled with said clamp and the movable jaw thereof, and operating to first open the jaws to permit the insertion of a blank into contact with the gage, then close the jaws to clamp the blank before the gage is retracted and finally advance the clamp from the gaging to the cutting position.

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