

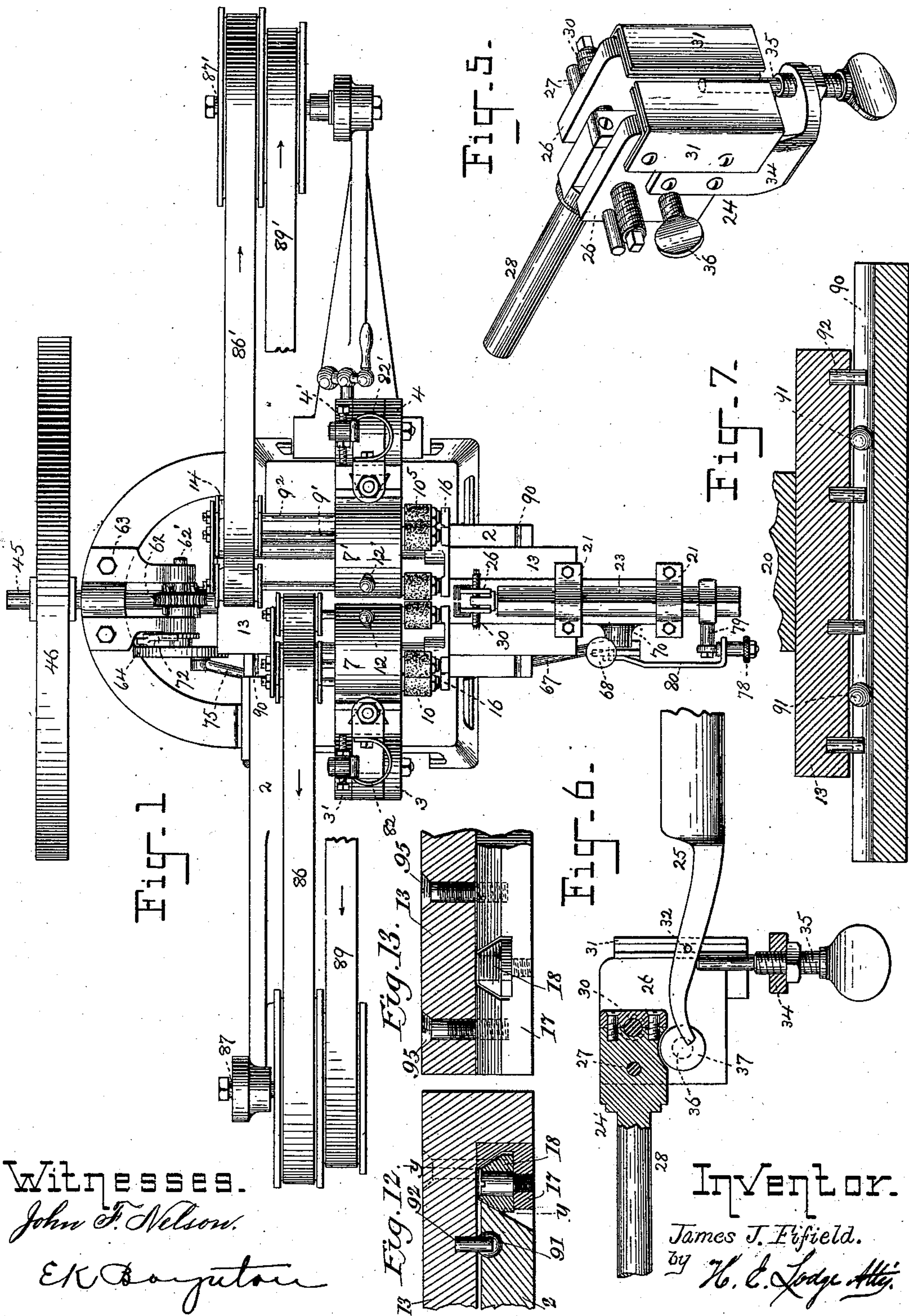
(No Model.)

3 Sheets—Sheet 1.

J. J. FIFIELD.
MACHINE FOR CONCAVING RAZORS.

No. 531,368.

Patented Dec. 25, 1894.



Witnesses.
John F. Nelson.
E. K. Boynton

Inventor.
James J. Fifield.
by *W. C. Lodge Atty.*

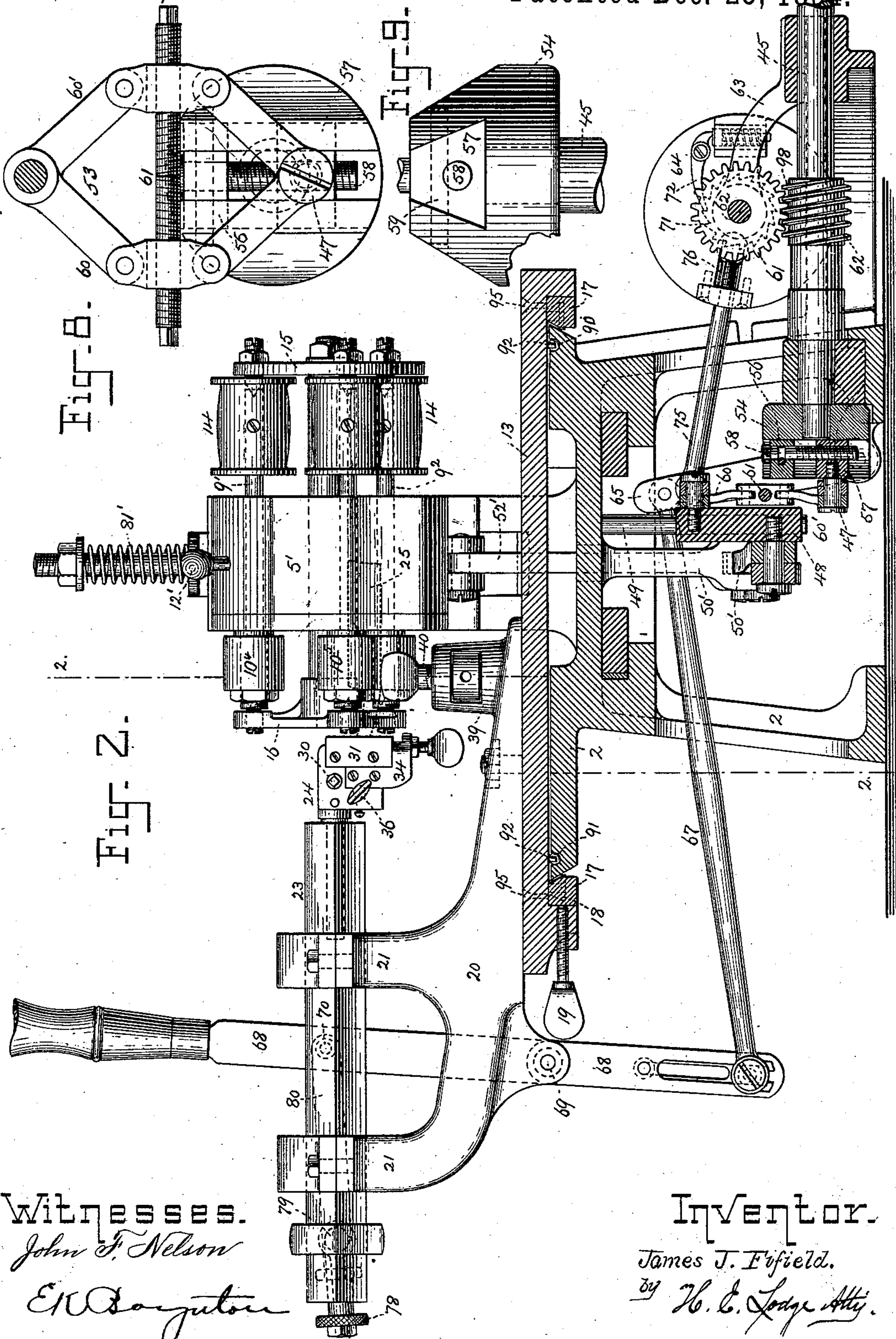
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Witnesses.
John F. Nelson
E. W. Sargent

Inventor.
James J. Fifield.
by H. C. Lodge Atty.

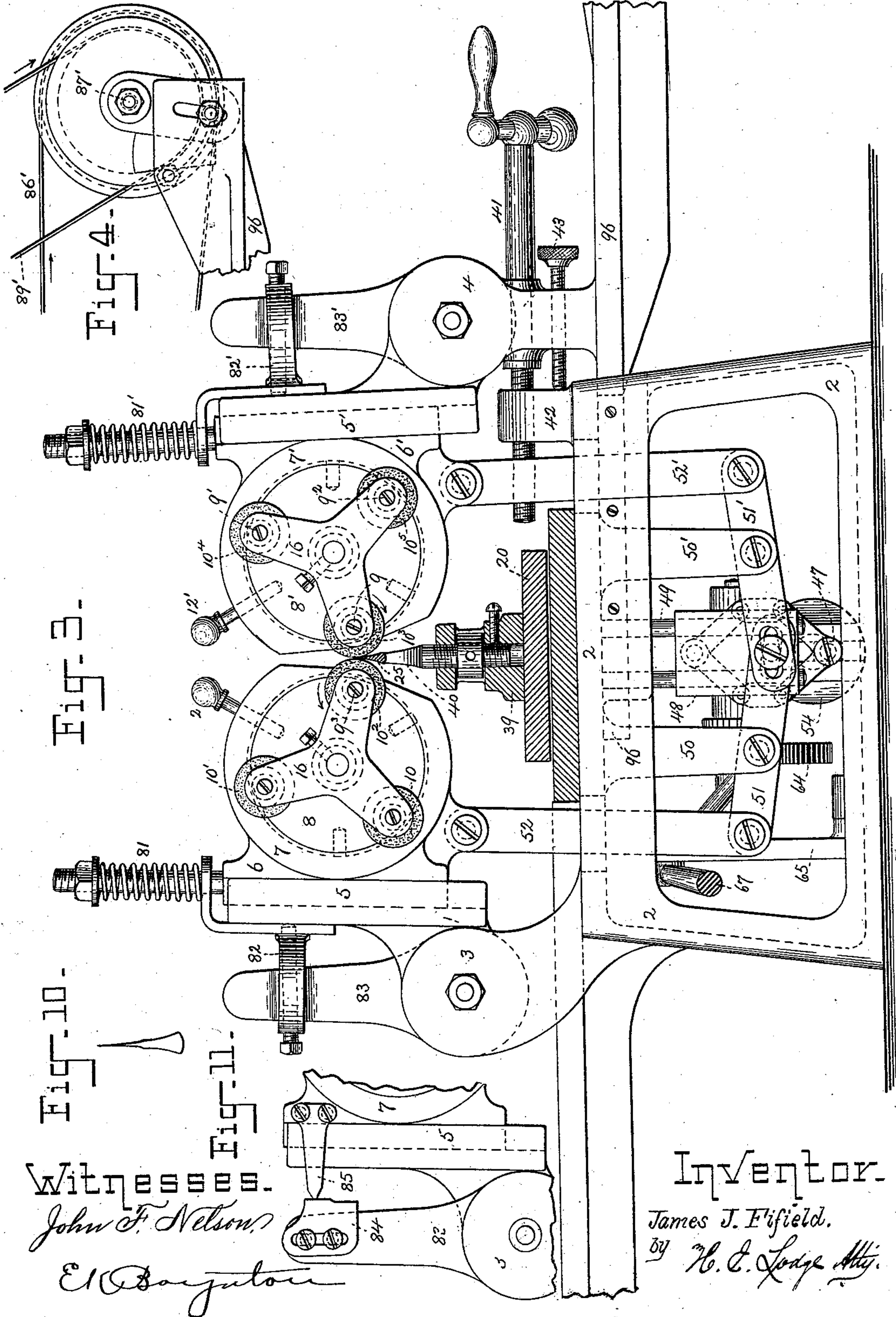
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E. O. Baylton

Inventor.

James J. Fifield.

by H. C. Lodge Atty.

UNITED STATES PATENT OFFICE.

JAMES J. FIFIELD, OF CHELSEA, MASSACHUSETTS.

MACHINE FOR CONCAVING RAZORS.

SPECIFICATION forming part of Letters Patent No. 531,368, dated December 25, 1894.

Application filed February 23, 1894. Serial No. 501,084. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. FIFIELD, a citizen of the United States, residing at Chelsea, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Machines for Concaving Razors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention relates to apparatus for concaving razors and consists in mechanism whereby the act of concaving may be done automatically and completely. This apparatus embodying my invention may be considered as relating to an invention described in United States Letters Patent No. 466,777, issued in my name on the 12th day of January, 1892.

My improvements are embodied in the tool-stock for holding the razor, likewise in mechanism by which feed movement to and fro of said tool-stock is produced longitudinally of the razor which passes between revolving stones or grinders; also in providing two grinder-heads, which are revoluble axially in order to change the grinders; and in vertically reciprocating carriages to cause the grinders to move across the razor blade from the back of the razor to the edge and conversely; moreover in the use of a templet by which the shape of the curvature or the form of the razor in cross-section is regulated. Other peculiar features and characteristics will be more fully hereinafter described and explained.

The drawings represent in Figure 1 a plan of a machine embodying my invention and employed in concaving razors. Fig. 2 is a vertical longitudinal sectional elevation of the same. Fig. 3 is a vertical sectional elevation transversely on line 2. 2. in Fig. 2. Fig. 4 is a side elevation of the pulley-stand which is attached to and forms a part of the end of the movable frame shown as broken in Fig. 2. Fig. 5 is a perspective view of the tool-stock. Fig. 6 is a vertical longitudinal section of the same. Fig. 7 is a vertical section of the tool-

stock table showing the roller bearings. Fig. 8 is a side elevation of the adjustable connecting rod. Fig. 9 is a plan view from beneath. Fig. 10 is a cross section of a razor as concaved. Fig. 11 is a side elevation of a templet adapted to produce a peculiar form of concaving. Fig. 12 is a vertical section, enlarged, in part of the movable table showing its anti-friction bearings. Fig. 13 is a section of the same parts likewise enlarged on line *y y* in Fig. 12.

This machine for concaving razors as illustrated in the accompanying drawings comprises a suitable frame or casting 2 for a base or bed-plate provided with oppositely disposed vertical twin brackets 3. 3'. 4. 4'. on which are pivoted similar standards 5. 5', fitted to receive vertically moving carriages 6. 6', composed of short cylindrical shells 7. 7'. These latter are bored to contain grinder-heads 8. 8' in which are mounted three rotary shafts 9, 9', 9², carrying grinders 10, 10', 10², which vary in quality, some coarse, others fine according to the work to be operated upon. Said heads are adjustable axially, and radially bored in order to enable them to be held in three different positions by pins 12 12'. Rotation of the shafts is effected by the pulleys 14, one for each shaft, while a circular disk 15, at the rear, and a triangular plate 16 in front serve to keep said shafts in parallelism.

The top surface of the frame or base 2 supports a movable table or plate 13 adapted to move transversely of the frame and beneath the standards 5, 5'. To remove friction to a minimum, parallel grooves 90 are cut in the opposite ends of the frame 2 to receive anti-friction balls 91, while pendent pins or legs 92 engage said grooves. Hence while rolling freely upon its bearings the pins act as guards to keep the balls in place. A still further adjustment to maintain uniform travel of the table to secure it in place and to overcome lost motion will be seen in Fig. 2. Here is shown a gib or intermediate strip 17, which is interposed between the base 2 and said table, while anti-friction conical rolls 18 rest against said frame. A set screw 19 is employed to thrust the gib against the frame and thus obviates any lateral play, while the table is still allowed to move freely and transversely across

the frame. Holding screws 95, serve to prevent the gibs from moving out of place.

At the front side of the machine and rising from the top surface of the frame 2 is secured
5 a bracket 20 equipped with posts 21 which serve as bearings for a horizontal bar 23, rectangular in cross section, adapted to reciprocate and furnished at its inner end with a tool-stock 24 which is adapted to carry the
10 razor 25. Reference to Fig. 5 shows this head to comprise two vertical parallel plates 26 adapted to open and close by sliding on a guide-pin 27 secured transversely of an arbor or short rod 28.

15 Positive opening or closing is obtained by means of a right and left-handed screw 30, both ends of which are squared and either of which may be operated by a socket wrench. Upon the face of the tool-stock are affixed split
20 guide-plates 31, the space therebetween being adapted to receive a pin 32, which is passed through the joint of the razor. A pendent bracket 34 supports an adjustable rest 35. The sides of the plates 26 are pierced at a
25 point about opposite the rear extremity of the razor in order to receive screw pins 36, which terminate in holding disks 37 adapted to grip the razor in this part; while if the razor is not in proper alignment, that is normal to the face
30 of the grinders, retraction of one of the said holding disks and advance of the other will remedy the difficulty. The above-described tool-stock is intended to support the rear of the razor. The front end is upheld by an abutment 39 on the front of the bracket. This
35 abutment contains a vertically adjustable post 40 adapted to receive the back of the razor.

This machine, as before premised, embodies
40 one of the essential features shown in my previous patent—that is the shell 7 and grinder-head 8, with its appurtenances are fixed or stationary with respect to a plane drawn vertically and longitudinally through the razor
45 blade. On the other hand the corresponding shell 7' and grinder head 8' are movable laterally to and fro being controlled by the hand feed-screw 41 which is secured between the brackets 4 4' and engages a boss 42 affixed
50 to the frame 2. Furthermore the bed-plate 96 which carries the counter pulleys and screws as a support for the brackets 4 4', slides in the frame. Thus the boss 42 is a fixture. Hence rotation of the screw 41 compels advance or
55 retreat of the bed-plate 96 upon which is carried the standard 5', carriage 6' and grinder head 8'. An adjustable stop-pin 43 in the bracket is arranged to contact against the frame 2. Thus excessive advance of the movable cutter-head is avoided by said stop-pin
60 43. When the razor is in position upon its free-moving table, the feed 41 is operated and one of the grinders in the head 8' is brought in contact with the razor which is pushed laterally until it is stopped by the opposing
65 grinder in the head 8 on the opposite side. In

this way equal friction is applied simultaneously on both sides of the razor.

In order to have the grinding stones wipe the entire breadth of the blade a vertical
70 movement is necessary. To produce this a main shaft 45 with a pulley 46, continuously rotary from some prime motor, is supplied. At the inner end of this shaft is secured a
75 crank-pin 47, see Figs. 2 3, and 8, while a cross-head 48 reciprocates on parallel guides 49. Bars 50 50' pendent from the main frame uphold two levers 51 51' pivotally therefrom. Connecting rods 52 52' from the outer extremities of said levers extend to and are
80 fastened to the carriages 6 6'. The inner opposite extremities of said levers are joined to the crank-rod 53 which comprises several parts to enable its length to be varied to suit the different widths of razor blades. This
85 adjustment of the crank-rod is produced as follows: The end of the main shaft 45 is furnished with a hub 54 in which is an undercut slots, see Figs. 2, 8 and 9, diametrically across
90 its end. In this slot are placed two twin blocks 56 57, the former fast in the slot, the latter movable therein, while an adjusting screw 58 which engages the block 56 is held fast therein but allowed to rotate by means of
95 a transverse pin 59. Hence rotation of the latter will cause the block 57 to advance up and down upon the screw, and this changes the position of the crank-pin. From the latter
100 extends the crank proper, which consists of twin, jointed arms 60 60' adapted to be moved toward or from each other by means of a right and left screw-threaded bolt 61. Thus
105 approach of the arms accompanied by a movement of the block 57 downwardly will lengthen the crank, while reverse movements will shorten it, and in this way increase or lessen the reciprocations of the carriage 6, 6', and consequently the rise and fall of the grinders. The above-described assemblage of parts now
110 provides for a free-moving table which carries the razor; also two grinder-heads, one of which is stationary with respect to the razor, while the other is movable; likewise revoluble grinders or grinding disks which are carried by said heads and are adapted to
115 rise and fall in order to wipe the razor for its full width; but as it is necessary that the razor should be operated upon for its entire length, and to render such feed perfectly automatic the following group of mechanism is
120 provided: Upon the main shaft is fitted a worm 62 while a worm gear 61 upon a shaft 62' secured in a bracket 63 supports the same. A pin-plate 64 is also mounted upon said shaft and is connected by a shaft 75 to an oscillating
125 finger 65 affixed to the base 2. From the free end of said finger is a connecting rod 67 which operates a feed-lever 68. This latter is pivotally mounted at 69 upon the bracket 20 and engages the bar 23 which carries the
130 tool-stock at the point 70. The upper end of this feed-lever is surmounted with a handle,

while the end of the connecting rod 67 is forked in order to allow the latter to be thrown off and permit the feed to be operated manually, if occasion should require it.

5 A ratchet 71 and pawl 72, see Fig. 2, make the feed positive, while the travel of the tool-stock can be changed by adjustment in the length of the shaft 75 through the medium of the screw 76. The pin-plate during one
10 half its revolution causes the tool-stock with the razor to advance toward the grinders, on the other half to retreat therefrom. Provided the adjustment effected by the change in the length of the travel of the tool-stock by ad-
15 justment in the length of the shaft 75 is not exact, a further alteration can be effected by means of the screw-nut 78 secured to the post 79 upon the bar 23 together with the rod 80. See Figs. 1 and 2.

20 Since the carriages 6 6' are vertically mounted counter balance springs 81, 81', are supplied, the tension of which is regulated by aid of the nuts upon the posts. In addition to these counterpoise springs, lateral springs
25 82, 82' are provided and affixed to two vertical plates 83, 83', the tension of said springs being exerted to press the pivotal standards 5, 5', away from each other. Furthermore upon the plate 83 I have affixed an adjustable
30 templet 84, while a finger 85 is fastened upon the carriage 5 and adapted to wipe across the templet during the rise and fall of the carriage. These parts are secured to the grinder-head which is stationary, so to speak, with re-
35 spect to the razor. By this arrangement any form of contour in the concaving of a razor can be produced, since the spring 82 maintains the finger against the templet, while the grinder in its reciprocations and carried
40 by the head 8 will follow its contour. Moreover the opposite grinder held against the razor and pressing the latter against the grinder in the head 8 must necessarily follow the movements of the said head 8. Hence
45 similar curves will be reproduced upon opposite sides of the razor.

The grinding stones are driven by belts 86, 86' to counter shafts 87, 87' carrying counter belts 89, 89', and pulleys to the main shaft
50 (not shown). This is necessary in order to create opposite rotation of the grinders which are in contact with the razor. Said counter-shaft 87', as shown in Figs. 1, 3 and 4 is journaled in lateral castings which constitute a
55 part of a movable portion of the frame.

The operation of the machine is as follows: The razor is often first dismounted from the handle, a small pin 32 entered through the rear part, and said pin passed down between
60 the split guide-plates 31. The support 35 is properly adjusted and the binding screw 30 turned home after which the rear clamping disks 37 are employed to longitudinally align the razor. The forward support is likewise
65 changed to afford a proper bed for the razor back. The table 13 is now pushed transversely of the frame until the razor rests

against the grinder 10² then in position for active use. The feed screw 41 is now oper-
ated to advance the standard 5 with the
70 grinder head 8', until the pressure from said screw forces the said grinder against the razor which in turn is pressed against the op-
posing grinder. Grinding then begins. It is
75 to be understood, however, that previously the grinder-shafts 9, 9³, are now revolving, while the pulley 46 is likewise in motion. As
a consequence the grinders now rise and fall, while at the same time the razor is made to
80 travel longitudinally between the grinders until the latter have traversed the entire side surface. The feed movement or right line travel of the razor is reversed and this act is repeated until the desired amount has been
85 removed.

It is to be explained that to compensate for varying curvatures in the razor, the entire as-
semblage of parts, including the standards, the carriages therefrom, the cylindrical shells, the grinder-heads, the grinders together with
90 their shafts and pulleys are pivotally hung upon and about the transverse bolts in the brackets 3, 3', 4, 4'.

It is evident that in lieu of removing the handle of the razor and inserting the pin, as
95 before premised, the razor with its handle may be inserted in the tool-stock in the manner described and shown in my patent referred to.

The tool-stock shown in my patented inven-
100 tion is more particularly adapted for razors in the rough, so termed, and which have not as yet been fitted with handles.

What I claim is—

1. The combination with two oppositely ro-
105 tating shafts suitably mounted, and their grinding disks, of a self-centering or automatically adjustable table movable freely at right angles to the longitudinal axis of said shafts, a tool-holder mounted on said table
110 and adapted to have right line reciprocations in parallelism with said shafts, and means for causing rise and fall of the grinder-carrying shafts, substantially as stated.

2. In combination with two movable stand-
115 ards, one being fixed in position relatively to the article to be ground, the other movable with respect to said article, two axially adjustable heads affixed to said standards, each standard to move transversely of the article,
120 one or more parallel rotary shafts, grinding tools upon the shafts, a table movable freely transversely of the longitudinal axis of the shafts, a tool holder adapted to reciprocate in parallelism with said shafts, and a support
125 for the article to be ground and automatically adjustable between the grinding tools, substantially as and for purposes explained.

3. In machines for grinding tools, a fixed standard, a movable standard, actuating feed
130 mechanism for the latter, vertically moving carriages in said standards, means for reciprocating said carriages, grinder-carrying heads revoluble axially for adjustment, a series of

shafts armed with grinders rotating independently in said heads, the active grinders to rotate oppositely and co-operate, substantially as specified.

5 4. In mechanism for grinding tools, the combination with two oppositely rotating grinders, a movable table, a tool stock thereon for a tool which is free to adjust itself between
10 said grinders, of rocking standards, adjustable grinder heads, carriages which support said heads and are attached to the standards, and mechanism for causing the grinders to rise and fall while in rotation, substantially as stated.

15 5. In mechanism for grinding tools, a rocking standard thereupon, a reciprocating carriage on the standard, a cylindrical shell, a grinder therein, and a series of shafts adapted for independent rotation in said head and
20 carrying grinders, combined with a continuous rotary shaft, rocking levers and connecting rods to said carriage, and a variable connecting rod which unites the rocking levers and the rotary shaft, substantially as set forth.

25 6. In a machine for grinding tools, the combination with a rocking standard, a movable carriage counterpoised therein and carrying a series of rotating shafts with grinders, of a fixed post, a removable templet thereon, a finger
30 affixed to the movable carriage, and a spring which interconnects the carriage and post in order to cause the templet and finger to co-operate, substantially as described.

7. In machines for grinding tools, a tool-
35 stock comprising an arbor, a transverse guide pin at one end, two parallel plates adapted to slide upon said pin, a clamping screw which controls said plates, the two vertically grooved guide plates, an adjustable post to support the
40 tool, and rear holding clamps, all operating substantially as explained.

8. In combination with two oppositely rotat-

ing grinding disks, and a tool held therebetween, a table freely movable to allow automatic change in the tool to compensate for loss
45 in material, a series of balls which support said table and play in grooves, a removable gib fitted with anti-friction rolls and interposed between the machine frame and the standard, together with means by which lost
50 motion is obviated while the table is free to move, substantially as set forth.

9. In mechanism for grinding tools, two oppositely rotating grinders adapted to rise and fall while in rotation, a freely movable table
55 fitted with a tool-stock adapted to reciprocate in a direction normal to the plane of rotation of the cutters, combined with a rocking feed lever carried by the table, and means for causing the feed lever to rock, comprising a con-
60 tinuously moving worm, and worm gear, a revolving pin-plate, an oscillating finger, together with connections from the feed-lever to the finger, and from the finger to the pin-plate, substantially as explained. 65

10. In mechanism for grinding tools, a freely movable table carrying a tool rest, a reciprocating tool-stock, and an oscillating feed lever, with means for operating said lever, combined with two oppositely rotating grind-
70 er-heads and grinders mounted on independently revolving shafts, mechanism for reciprocating the grinder-heads comprising connecting rods, oscillating levers, a continuously rotary main shaft, and a variable con-
75 necting rod, composed of jointed arms having horizontal and vertical screw adjustment, substantially as stated.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES J. FIFIELD.

Witnesses:

H. E. LODGE,

E. K. BOYNTON.