

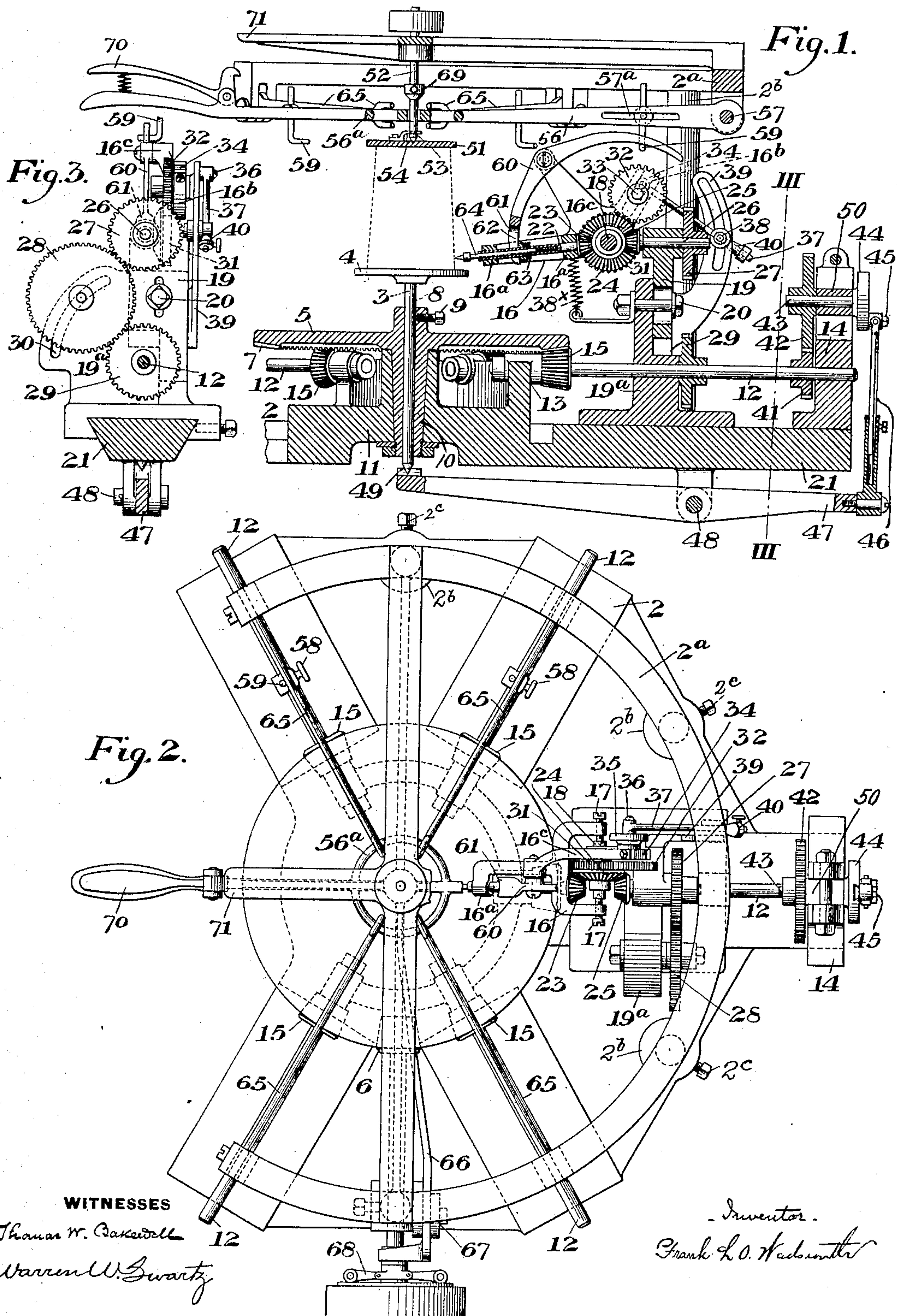
No. 887,553.

PATENTED MAY 12, 1908.

F. L. O. WADSWORTH.
ETCHING OR ENGRAVING MACHINE.

APPLICATION FILED NOV. 24, 1905.

2 SHEETS—SHEET 1.



WITNESSES
Thomas W. Baskin
Warren W. Swartz

Inventor.
Frank L. O. Wadsworth

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2 SHEETS—SHEET 2.

Fig. 4.

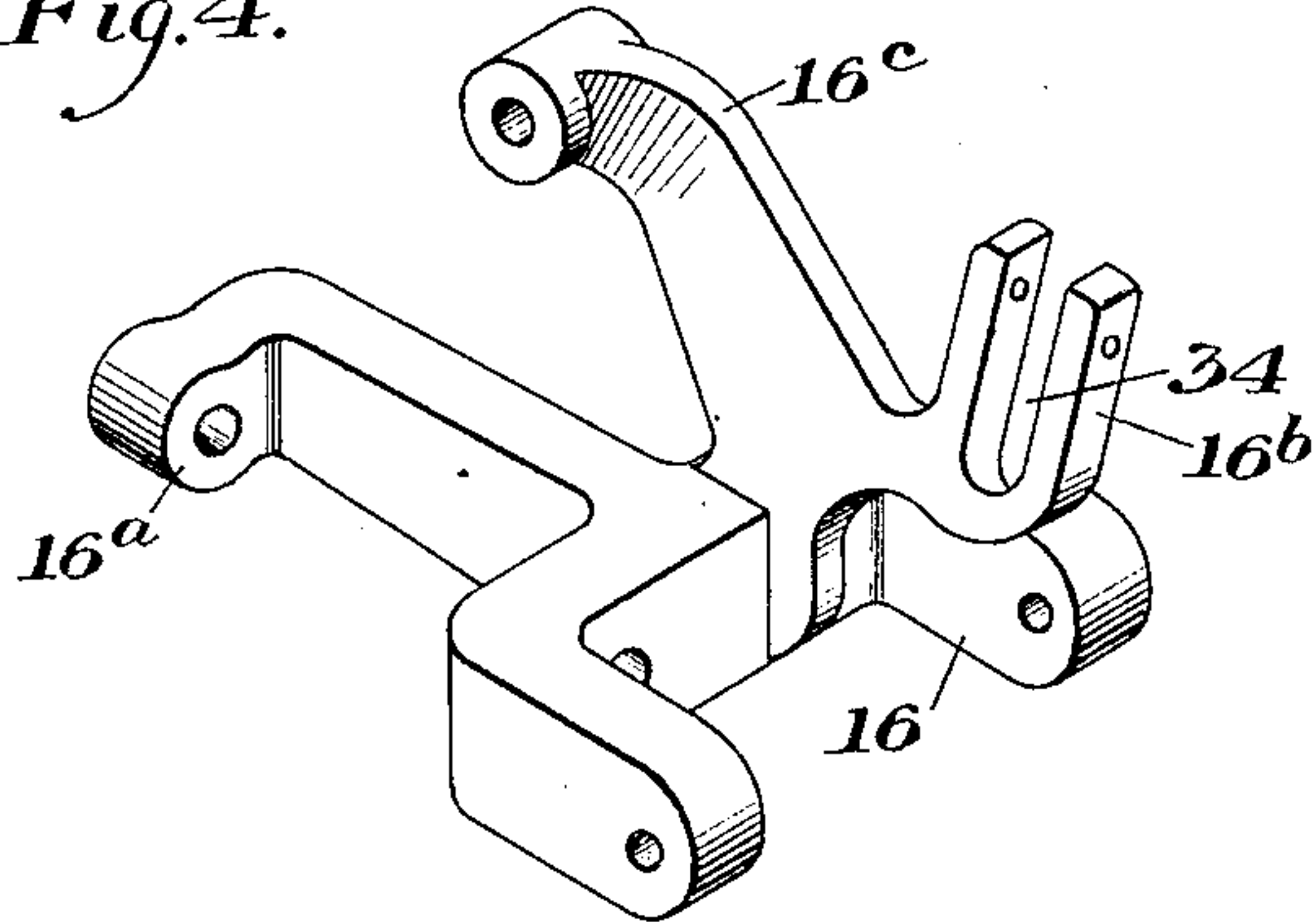


Fig. 5.

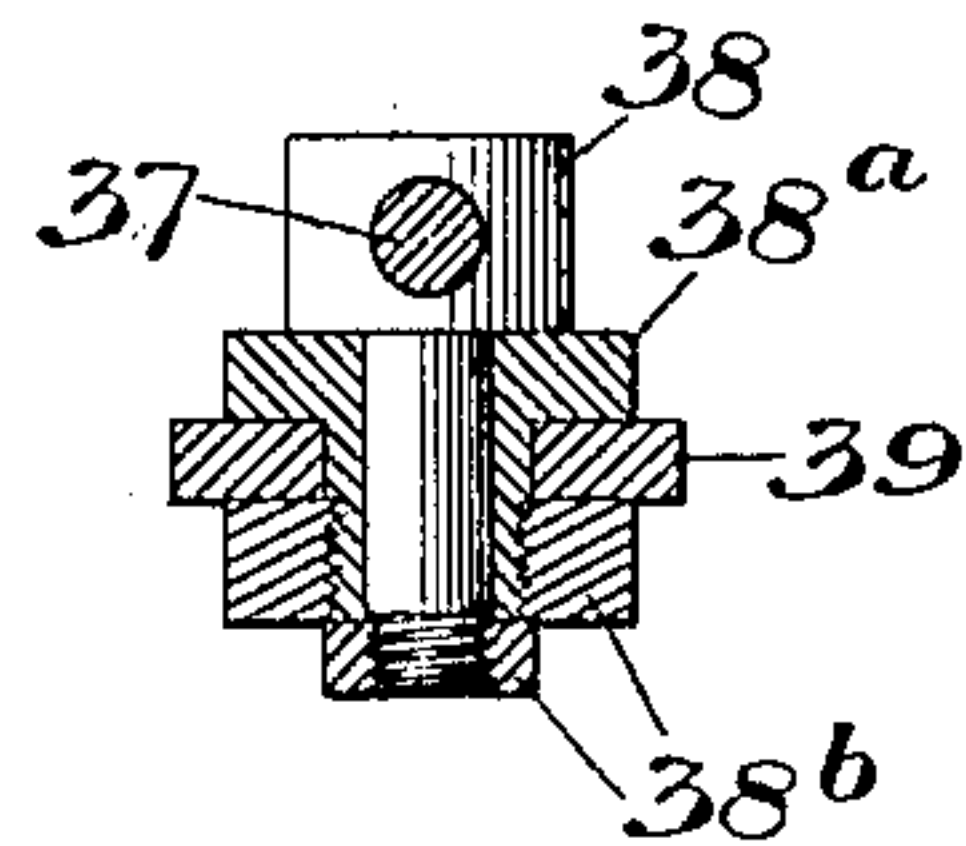


Fig. 6.

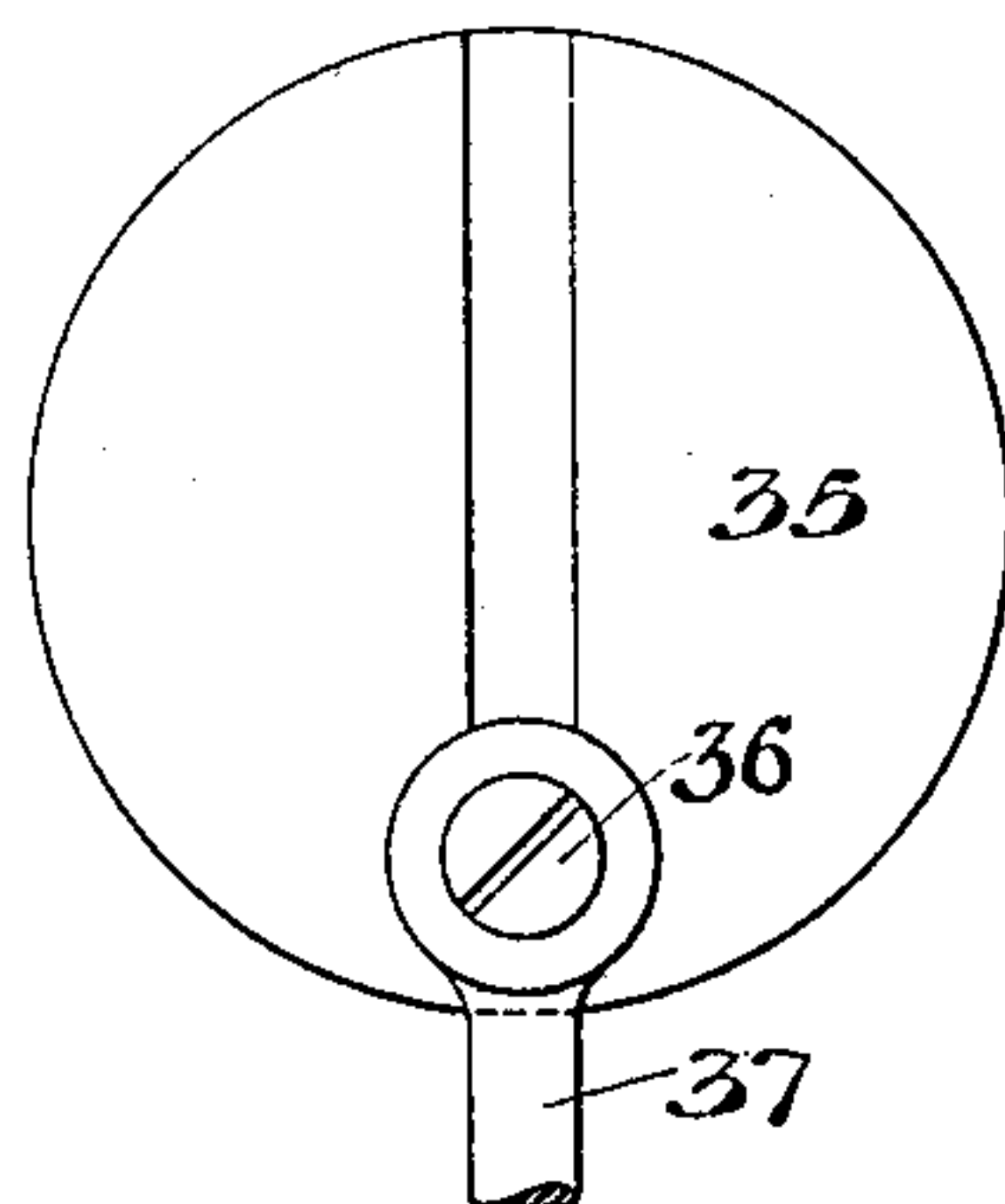


Fig. 8.

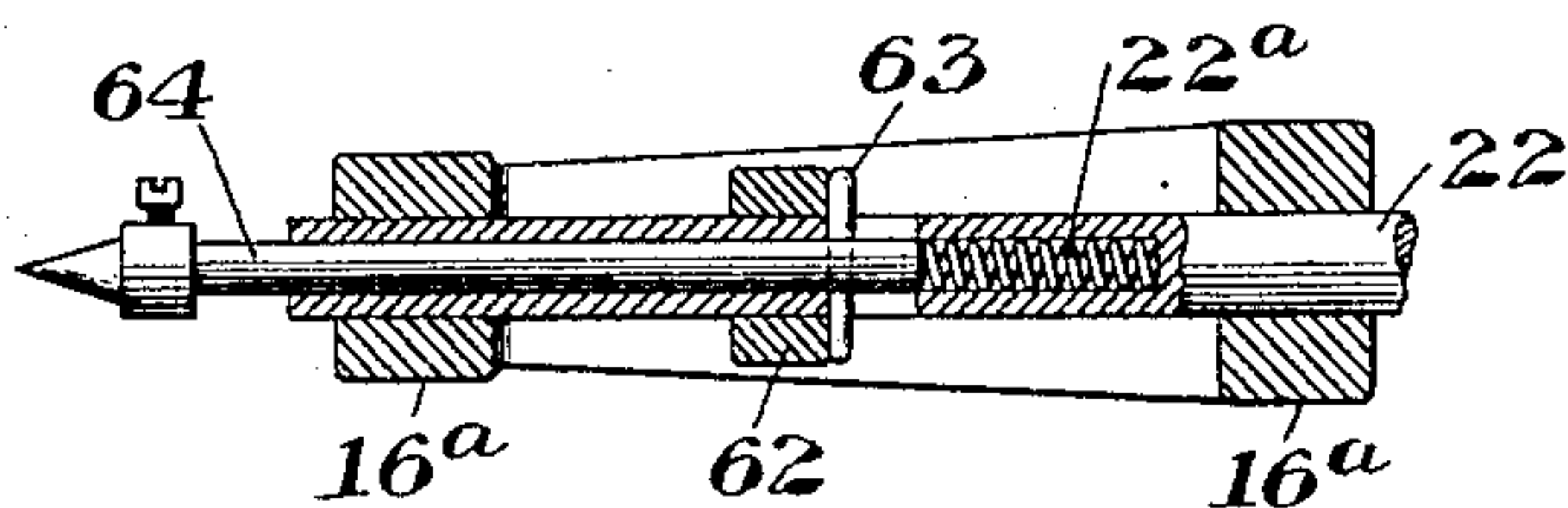


Fig. 7.

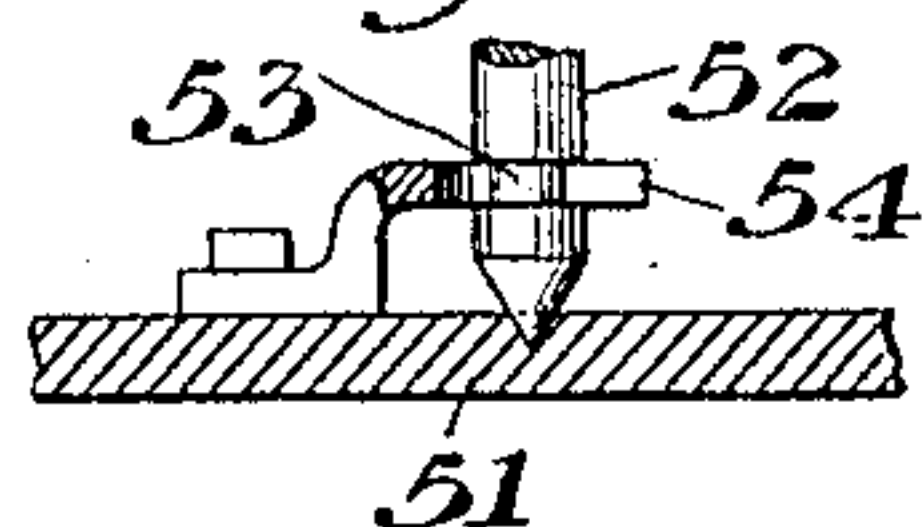
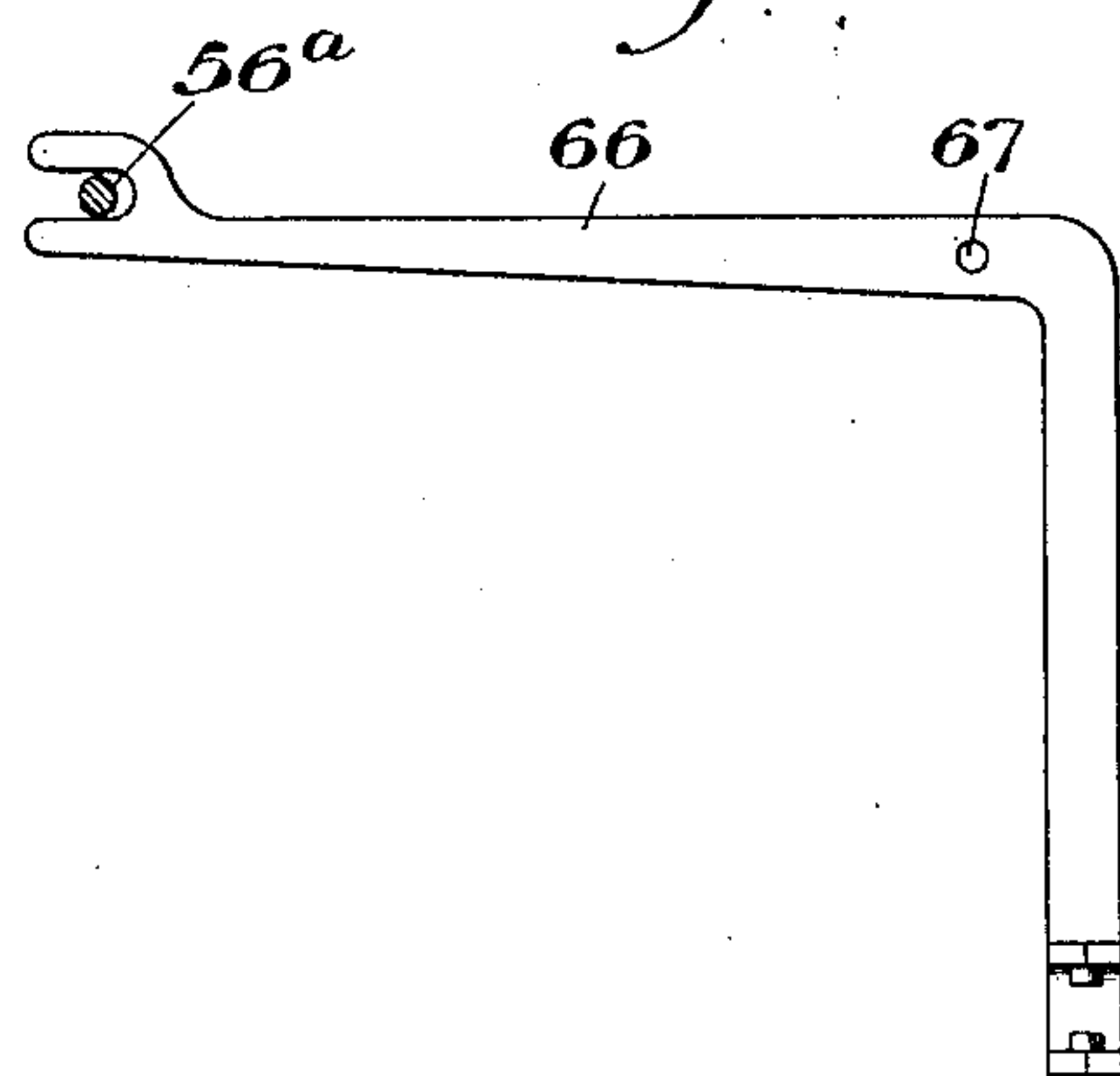


Fig. 9.



WITNESSES

Thomas W. Baxendell

Warren W. Swartz

INVENTOR

Frank L. O. Wadsworth

UNITED STATES PATENT OFFICE.

FRANK L. O. WADSWORTH, OF MORGANTOWN, WEST VIRGINIA.

ETCHING OR ENGRAVING MACHINE.

No. 887,553.

Specification of Letters Patent.

Patented May 12, 1908.

Application filed November 24, 1905. Serial No. 288,979.

To all whom it may concern:

Be it known that I, FRANK L. O. WADSWORTH, of Morgantown, Monongalia county, West Virginia, have invented a new and useful Etching or Engraving Machine, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central vertical section of a machine embodying my invention, with but one etching head shown; Fig. 2 is a plan view of the same; Fig. 3 is a section on the line III—III of Fig. 1, and showing the etching head and its operating gears and connections; and Figs. 4, 5, 6, 7, 8, and 9 are detail views of parts of the machine hereinafter referred to.

My invention relates to machines for etching or engraving upon glass and other objects, of that class in which a plurality of etching heads are arranged around a central revolving support or carrier for the article to be etched, each of the said heads having an etching point or needle to which may be imparted a combined rotating and vertically oscillating motion.

My invention is designed to provide a machine of this character in which an increased number of etching heads may be employed without interfering with the free access of the operator to insert and remove the articles being worked upon, and also to provide a simplified arrangement of gearing and connections for rotating and oscillating the etching points or needles whereby lost motion and back-lash is reduced to a minimum.

My invention also provides means whereby the operator can, by a single operating movement, start or stop the rotary carrier or support for the object being etched, set or release the holding devices for such article, and also simultaneously advance or retract all the etching points or needles. In this manner I avoid the necessity for a considerable number of manual operations which has heretofore been necessary in placing and removing successive articles to and from the machine.

My invention is also designed to provide means whereby the carrier or supports for the article may be reciprocated during its rotation, whereby the pattern effect produced by the combined rotary and oscillating movement at the etching point may be varied and extended to produce a zig-zag or wave de-

sign. By this means, and also by the provision of means for varying the periods of rotation and oscillation of the needle point, I am able to produce by the same machine a larger number of varying designs than heretofore possible.

I also provide for the quick and convenient removal of each of the etching heads so that in case any head becomes inoperative for any cause it can be quickly removed for repairs and a substitute head placed on the machine.

Other objects and advantages of my invention will hereinafter appear.

I attain the foregoing objects by the novel construction, arrangement and combination of parts, all substantially as hereinafter described and pointed out in the appended claims.

In the drawings, 2 designates the base frame of the machine in which is centrally mounted a vertical spindle 3 carrying a table or support 4 upon which the object to be etched (shown in dotted lines in Fig. 1) is placed and held during the etching operation. The spindle 3 is rotated by gear wheel 5, driven by a bevel pinion 6 engaging the rack 7 on the under side of said wheel. In order to permit the table 4 to be vertically adjusted, and also to be reciprocated vertically in the manner hereinafter described, while it is being rotated, I provide the spindle 3 with a slot 8 which receives the end of a screw 9 which secures the gear 5 thereto. The gear 5 is shown as having an extended tapered hub portion 10 which is seated in a bearing 11 of the base frame 2.

12 designates a series of radially arranged etcher actuating shafts supported at their inner ends in suitable bearings 13 at the central portion of the frame 2, and at their outer ends in bearings 14. Each of these shafts has a bevel pinion 15 which meshes with the rack teeth 7 of the gear 5, whereby the entire series of shafts are actuated simultaneously by the rotation of the table. Each of these shafts 12 operates an etching head and needle. As these heads and needles are all alike, and as they are all operated in the same manner from the respective shafts 12, I have shown but one of them in the drawings.

Each of the heads consists of a frame such as shown in detail in Fig. 4. This frame has a forked portion 16, carrying centers 17, 110

which oscillate upon the ends of a short fixed shaft 18. This shaft 18 is supported in a frame 19, 19^a, the upper portion 19 being connected to the portion 19^a for vertical adjustment as shown at 20, and the lower portion 19^a being slidably mounted upon guides 21 whereby it may be moved toward and away from the center table 4. The forked frame 16 has the bearings 16^a in which is rotatably mounted the needle shaft 22, said shaft being driven by a bevel pinion 23 which meshes with a bevel toothed wheel 24 loosely mounted on the shaft 18 above referred to and which is driven by a pinion 25 on a shaft 26 journaled in the frame portion 19 and itself driven by a spur wheel 27, which is connected to the shaft 12 through an idle gear wheel 28 and gear wheel 29. In order to change the speed of rotation of the needle shaft 22, the wheel 27 is adapted to be readily removed from the shaft 26, and a larger or smaller wheel substituted therefor, the wheel 28 being given a corresponding adjustment which is permitted by reason of the fact that its bearings are adjustably secured in an arcuate slot 30 on the frame portion 19^a, as best shown in Fig. 3.

To oscillate the frame 16 upon the centers 17, and thereby oscillate the needle shaft and needle, I provide the following means:—On the shaft 18 is loosely mounted a spur-wheel 31, which is attached to the bevel wheel 24 and which is engaged by a spur wheel 32 fixed on a shaft 33 whose bearing is adjustably mounted in a slot 34 of an arm 16^b of the frame 16. Said shaft also carries a crank-wheel 35, whose crank-pin 36 engages one end of a connecting rod 37. The other end of this rod passes loosely through a sleeve 38, which is adjustably clamped in the slot of an arm 39, by means of a bushing 38^a and nuts 38^b, as shown in Fig. 5. Adjustably secured on the free end of the rod 37 is a collar 40 which limits the sliding movement of the rod through the sleeve 38. A spring 38^x connected to the arm 16^a of the oscillating head 16, keeps the collar 40 normally in engagement with the sleeve 38.

In operation, the needle shaft 22 is driven through the pinion 25, bevel wheel 24, and pinion 23, and the spur wheel 31 rotates with the wheel 24. This rotates the wheel 32 and the crank wheel 35. Inasmuch, however, as the latter is connected to a relatively fixed portion of the frame, it will be seen that with each revolution of the crank-wheel, the entire frame 16, together with the etching point, will be oscillated upon the centers 17. The period of this oscillation may be varied by using wheels 32 of different diameters, and for this purpose, the wheel 32 should be made readily removable from its shaft. The amplitude of the oscillation may be varied by moving the crank-pin 36 towards or away from the center of

the crank wheel 35, said pin being adjustable for this purpose, as shown in Fig. 6.

It will be noted that by changing the point of connection of the relatively fixed end of the connecting rod 37, which can be done by moving the sleeve 38 in its slot, the oscillating movement of the head may be widely varied. That is to say, such movement may be made either symmetrical or non-symmetrical with respect to an intermediate plane. This is due to the fact that the wheel 32 and shaft 33 are mounted in the oscillating frame 16 so that the movement of said frame is limited by the connecting rod 37; and by changing the point of connection of the fixed end of the rod, the stroke of oscillation of said frame is correspondingly varied so as to begin and end at a higher or lower point. This permits large variation in the pattern produced.

The construction and arrangement of the head is such that it can be readily adjusted to direct the needle point at any desired angle to the work, which is a feature of importance in etching articles of different shapes. The points may also be readily moved back from the work to permit them to escape handles or other projections on the article.

By removing or freeing one of the centers 17, the entire head can be quickly removed for repairs, or other purposes, and another head substituted.

In order to reciprocate the support 4 vertically, as it is rotated, I provide the following means:—One of the shafts 12 has a pinion 41 which drives a spur wheel 42 on a shaft 43, which also carries a crank disk 44 having a radially adjustable crank pin 45. Connected to this crank pin is a two-part rod 46, the other end of which is connected to a lever 47 pivoted at 48 underneath the frame 2, and which has at its free end a support or bearing 49 on which rests the lower end of the spindle 3. The rotation of the shaft 12 will, through the gearing and connections described, cause an oscillating movement of the lever 47 and a corresponding vertically reciprocating movement of the spindle 3 and support 4. The extent of this reciprocating movement is controlled by the position of the crank pin 45, with a corresponding adjustment of the connecting rods 46, while the period of reciprocation is controlled by using gear wheels 42 of different sizes, to permit which the shaft 43 of said wheels is mounted in vertically adjustable bearings 50.

The article to be etched is held between the support 4 and an upper holding plate 51, which is pressed upon by a vertically movable weighted shaft or rod 52 whose lower end rests in the bearing in said plate whereby the latter may be rotated with the article upon such bearing as a center. In order to enable the plate 51 to be raised and lowered with the shaft 52, without interfering with the rotary

movement of said plate, the shaft 52 has the groove 53 which is engaged by a forked clip or lug 54 secured to the plate (Fig. 7). To provide for raising and lowering this plate, for starting and stopping the machine, and for advancing and retracting all the etching points of the needles in unison, I provide the following means:—56 is a lever pivoted at 57 to the upper or overhanging circle frame 2^a. Adjustably secured to this lever by means of a slot 57^a and clamping screw 58, is a depending hook 59, the hook portion of which engages underneath one arm of a lever 60 which is fulcrumed upon an arm 16^c of the frame 16 before described. The other arm of this lever 60 has a fork portion 61 which bears against the collar 62 which is in turn seated against pins or projections 63 of the shank or stem 64 of the etching point or needle. The lever 56 has an intermediate ring portion 56^a which is engaged by the forked ends of a series of levers 65, each of which is provided with one of the depending hooks 59 for engagement with a lever 60 of each etching head. Connected to this ring portion 56^a is one arm of a bell-crank lever 66 which is fulcrumed at 67 and whose other arm is connected to the movable member 68 of a driving clutch for the table-driving shaft 5. When the lever 56 is raised from the position shown in Fig. 1, it first actuates this bell-crank lever 66 to disengage the driving clutch 68 and thereby stop the rotation of the support 4 and the operation of the etcher heads. Further upward movement of the lever 56 actuates all the levers 65 and through the hooks 59 moves the levers 60 against the collars 62 and thereby simultaneously retracts all the etching needle points from the work. Continued movement of the lever causes it to engage the collar 69 on the weight shaft 52 and thereby raises said shaft and the plate 51 away from the work. To catch and hold the lever 56 in its raised position, I provide the latch lever 70 which is arranged to engage an arm 71 of the frame. In starting the machine this latch is disengaged and the lever 56 lowered, thereby lowering the plate 51 upon the work, the springs 22^a then advancing simultaneously the series of etching points or needles, and finally actuating the clutch 68 to start the machine in motion. In this manner and by this one operating movement, I am able to perform all the operations necessary for the removal of a finished article from the machine and the commencement of operations upon the successive article.

The manner in which the etcher actuating shafts 12 are arranged permits the use of a considerable number of them in the same machine, five of such shafts being shown in the machine illustrated in the drawings. At the left-hand side of the machine shown in the drawing, the frame 2, 2^a is cut away and

there is no etching head or etcher actuating shaft, this being for the purpose of providing free room and access for the operator.

The top frame 2^a is preferably made vertically adjustable on the supporting posts or columns 2^b, the adjustment being secured by means of the set-screws and collars 2^c.

It will be seen that throughout the machine, I have reduced the number of gears to a minimum, and that I have provided for the oscillation of the etching points or needles by a very simple actuating connection which does away with the long train of gears, or other complex means which have usually been employed for this purpose. It will also be seen that I have provided for varying the periods of movement of the oscillating head and the reciprocating table, and also for varying the amplitude of these movements by the change of one gear for each movement involved, and that I have further provided for the use of any or all of these gears interchangeably, all of the gears having the same bore for this purpose, whereby the same machine may be used in the production of a variety of patterns or designs without the necessity of providing a great number of expensive gears. My invention is susceptible to modifications in various ways without departing from its spirit and scope, since

What I claim is:—

1. In an etching or engraving machine, the combination with a rotary table or support, and driving gear thereon, of a plurality of radial actuating shafts each of which has a driving gear directly engaging and driven by the table-driving gear, and a plurality of etching heads actuated by said shafts; substantially as described.

2. In an etching or engraving machine, a centrally arranged rotary table or support having driving gear thereon, a plurality of etching heads, a plurality of actuating shafts therefor, and gears on each shaft engaged with the driving gear on the table for simultaneously actuating the shafts from the central table; substantially as described.

3. In an etching or engraving machine, the combination with a centrally arranged table or support, a gear wheel for rotating the same, and a plurality of etcher-actuating shafts directed towards the table or support and simultaneously driven by said gear wheel; substantially as described.

4. An etching or engraving machine, having a plurality of etcher-actuating shafts, arranged at an angle to each other less than a right angle and an etching device geared to each of said shafts; substantially as described.

5. In an etching or engraving machine, an oscillating etching head, a needle shaft journaled therein, gearing for rotating the said shaft, a moving rotary member carried by the head at one side of its center of oscillation and driven by said gearing, and a loose

connection between the said member and a relatively fixed portion of the machine; substantially as described.

6. In an etching or engraving machine, the combination of an oscillating etching head, a needle shaft carried thereby, gearing for actuating the said shaft, a crank wheel carried by the head and driven by said gearing, a connecting rod connected to said crank wheel and to a relatively fixed portion of the machine, and means for changing the stroke of said rod; substantially as described.

7. In an etching or engraving machine, the combination of an oscillating etching head, a needle shaft carried thereby, gearing for actuating the said shaft, a crank wheel mounted on the etching head driven by said gearing, a connecting rod connected to said crank wheel and to a relatively fixed portion of the machine, and means for changing the relatively fixed point of attachment of said rod; substantially as described.

8. In an etching or engraving machine, the combination of an oscillating etching head, a needle shaft carried thereby, gearing for actuating the said shaft, a crank wheel mounted on the etching head driven by said gearing, a connecting rod connected to said crank wheel and to a relatively fixed portion of the machine, and means for changing the throw of said rod; substantially as described.

9. In an etching or engraving machine, the combination of an oscillating etching head, a needle shaft carried thereby, gearing for actuating the said shaft, a crank wheel carried by the head and driven by said gearing, a connecting rod connected to said crank wheel and to a relatively fixed portion of the machine, and means in the crank-wheel actuating gearing for changing the speed of rotation of the crank wheel; substantially as described.

10. In an etching or engraving machine, the combination of an oscillating etching head, a needle shaft carried thereby, gearing for actuating the said shaft, a crank wheel driven by said gearing, and a connecting rod connected to said crank wheel and to a relatively fixed portion of the machine, means for changing the movement of said rod, the actuating gearing for the crank-wheel having a removable member; substantially as described.

11. An oscillating or reciprocating etching head carrying the needle point and gearing by which the head is moved to produce a definite pattern, said head and gearing being mounted detachably and adapted to be removed and reset as a unit to reproduce the same pattern; substantially as described.

12. An etching head having a forked oscillating frame, bearings upon which the said frame oscillates, gearing for oscillating the frame carried by the frame, said frame and bearings being constructed and arranged to

permit removal of the frame, substantially as described.

13. In an etching or engraving machine, the combination with an etching head, gearing for oscillating said head journaled on the head, a needle shaft journaled therein, and gearing for actuating the said shaft having one removable gear whereby the speed of rotation of said shaft may be changed; substantially as described.

14. In an etching or engraving machine, the combination of a table or support for the work, means for rotating the table or support, means for reciprocating it as it is rotated, means for varying both the period and amplitude of reciprocation, an oscillating etching head, and means for oscillating said head and for varying the period and amplitude of oscillation of the head independently of the period and amplitude of the oscillation of the table; substantially as described.

15. In an etching or engraving machine, the combination with a table or support for the work, means for rotating the same, means for reciprocating the table or support as it is rotated, and arranged to vary the period of reciprocation; substantially as described.

16. In an etching or engraving machine, the combination with a plurality of separately mounted and actuated etching heads and needles carried thereby, of lever mechanism for simultaneously advancing and retracting the needles; substantially as described.

17. In an etching or engraving machine, the combination with a plurality of etching heads, and needles carried thereby, of a lever, and connections whereby the movement of said lever effects the simultaneous advance or retraction of the needles; substantially as described.

18. In an etching or engraving machine, the combination with a table for the work, gearing for rotating the table including a clutch member, a plurality of etching heads having needles or points movable towards and away from the work, and means for controlling the said parts and for simultaneously advancing and retracting the needles by a single operation movement; substantially as described.

19. In an etching or engraving machine, the combination of a table for the work, gearing for rotating the table, a clutch controlling the gearing, a plurality of etching heads having needles or points movable towards and away from the work, top clamping or holding means for the work, a lever, and connections whereby the movement of said lever controls the clutch, the top clamping or holding means, and also simultaneously advances or retracts the points or needles; substantially as described.

20. In an etching or engraving machine, an etching head having a needle movable to-

wards and from the work, a lever for effecting such movement, a second lever for actuating the first named lever, and means controlled by the second lever for starting or stopping the machine; substantially as described.

21. In an etching or engraving machine, a centrally arranged table for the work, a plurality of etching heads adjacent to the table and having etching points movable towards and from the table, means for rotating and oscillating the points, and a lever for simultaneously moving all the points or needles towards and away from the work; substantially as described.

22. In an etching or engraving machine, a rotary table, a top-holding member for the work, a weight for the same, gearing for operating the machine, a clutch for controlling the gearing, an operating lever, and connections operated by the lever for shifting the clutch and for raising the top-holding member and weight; substantially as described.

23. In an etching or engraving machine, a table for the work, a plurality of etching heads adjacent to the table, and having needles or points movable towards and away from the same, gearing for rotating the table and for actuating the needles or points, a clutch controlling the gear, a top holding member or clamp for the work, a controlling lever, and connections whereby the movement of the lever actuates the clutch, simultaneously advances or retracts the needles, and also moves the top holding member towards or away from the work; substantially as described.

24. In an etching or engraving machine, the combination of a rotary table for the

work, an etching head having a needle shaft mounted therein, gearing for rotating the needle shaft and oscillating the head, and means for rotating the table and for reciprocating the same as it is rotated; substantially as described.

25. In an etching or engraving machine, the combination of a rotary table for the work, an etching head having a needle shaft mounted therein, gearing for rotating the needle shaft and oscillating the head, and means for rotating the table and for reciprocating the same as it is rotated, said gearing and means being arranged for changing the speed of rotation of the needle and also the period and extent of oscillation of the head, and for changing the period and extent of reciprocation of the table; substantially as described.

26. In an etching or engraving machine, a rotary table for the work, means for reciprocating the table as it is rotated, a vertically movable top member for holding the work arranged to reciprocate with the table and also to rotate therewith without changing the clamping pressure on the article; substantially as described.

27. In an etching or engraving machine, an oscillating etching head and actuating gearing carried thereby, centers upon which the head oscillates, said head and centers being constructed and arranged to permit the head to be disengaged with and removed from the centers; substantially as described.

In testimony whereof, I have hereunto set my hand.

FRANK L. O. WADSWORTH.

Witnesses:

GEO. B. BLEMING,

JOHN MILLER.