

No. 759,955.

PATENTED MAY 17, 1904.

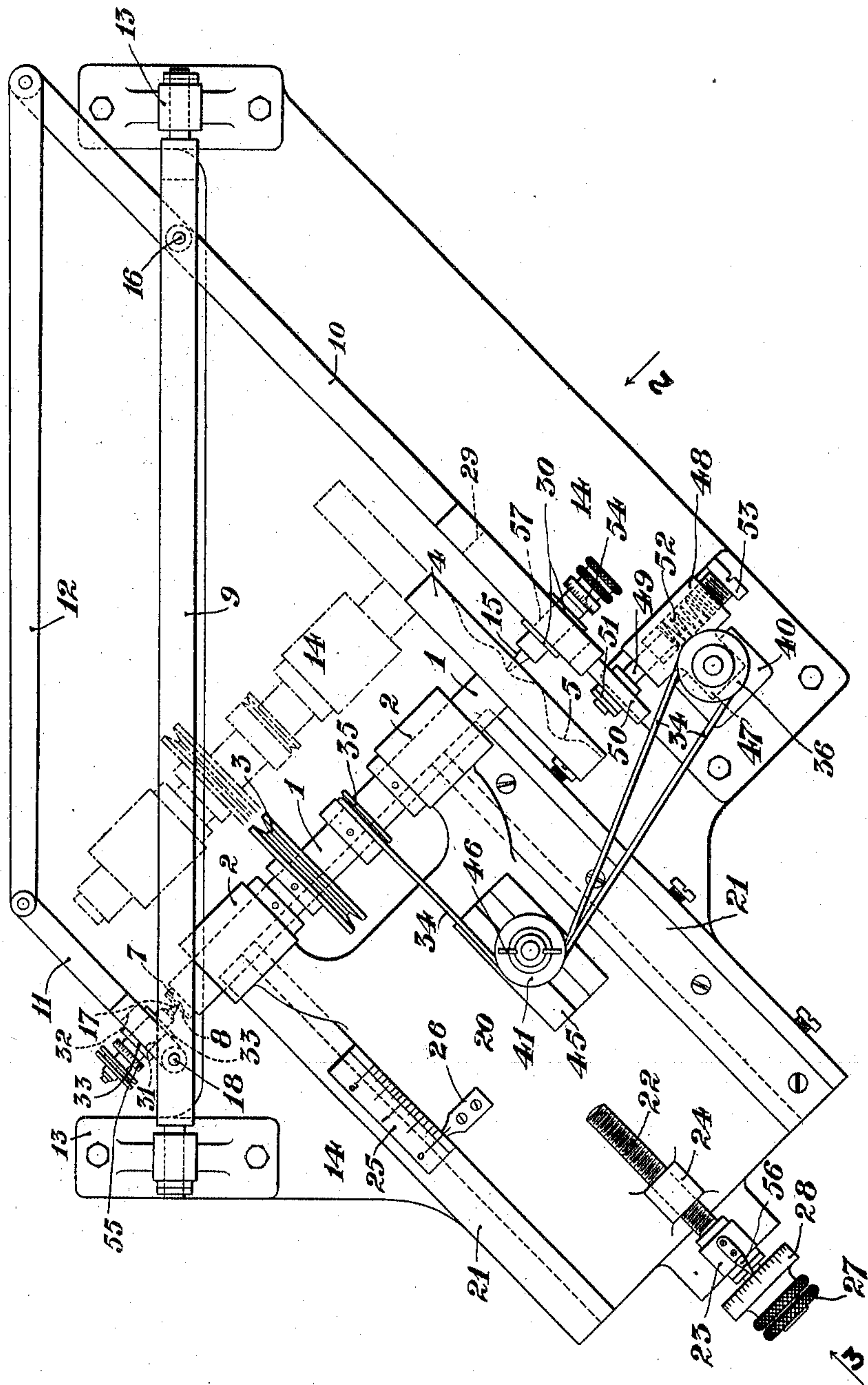
M. BARR.
AUTOMATIC ENGRAVING MACHINE.

APPLICATION FILED APR. 1, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
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Mark Barr.
per *Charles Woodruff*
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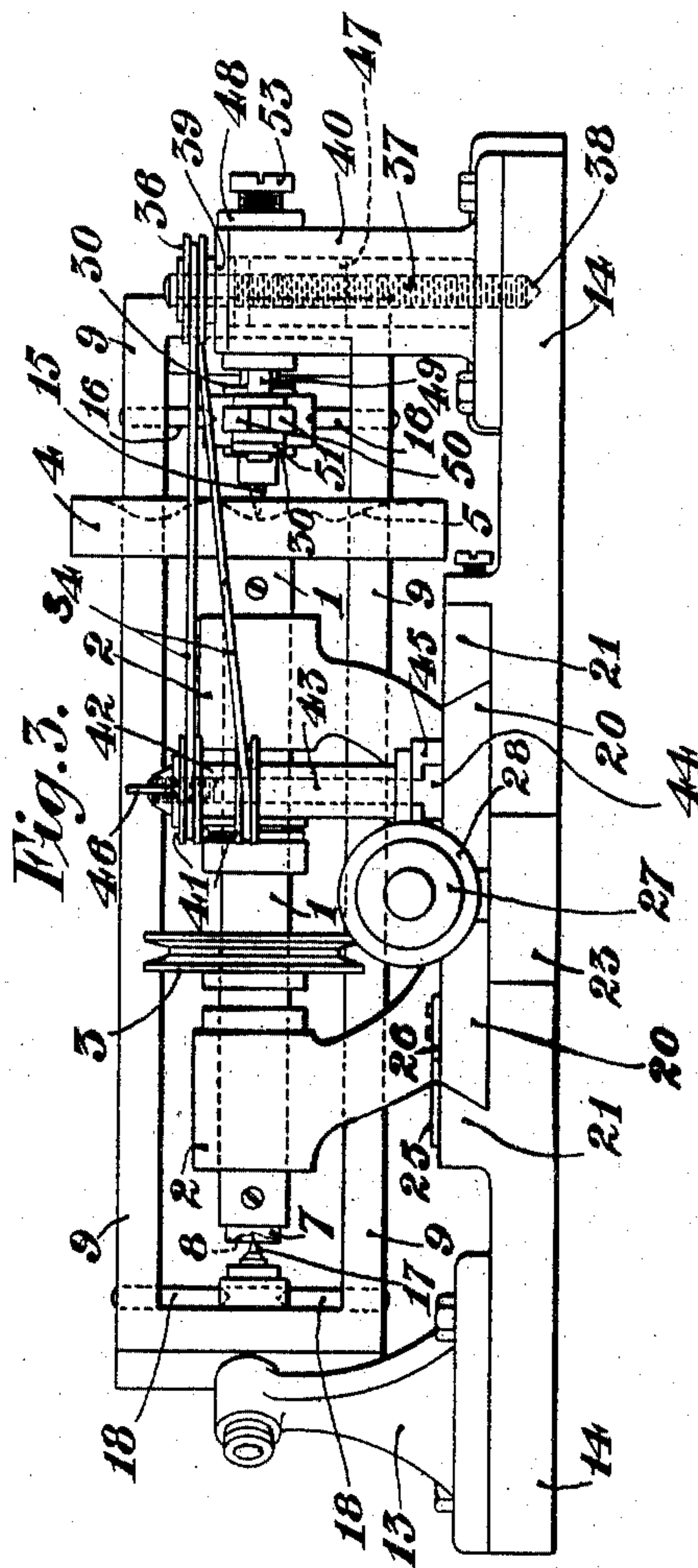
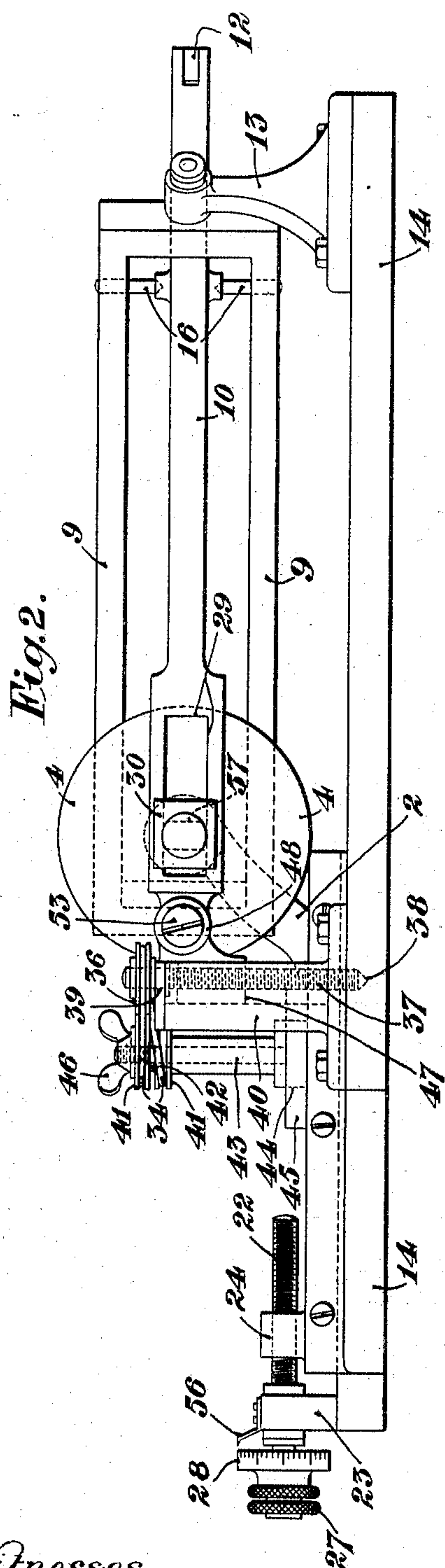
M. BARR.

AUTOMATIC ENGRAVING MACHINE.

APPLICATION FILED APR. 1, 1901.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

MARK BARR, OF KENSINGTON, ENGLAND, ASSIGNOR TO THE LINOTYPE COMPANY, LIMITED, OF LONDON, ENGLAND.

AUTOMATIC ENGRAVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 759,955, dated May 17, 1904.

Application filed April 1, 1901. Serial No. 53,911. (No model.)

To all whom it may concern:

Be it known that I, MARK BARR, residing at 50 Clarendon road, Holland Park avenue, Kensington, in the county of Middlesex, England, have invented certain new and useful Improvements in Automatic Engraving-Machines; 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.

The present invention relates to improvements in automatic engraving-machines, and is specially applicable to machines for engraving dies for striking coins, medals, and the like. Its distinctive feature is a single straight rotating shaft, one end of which carries the pattern and the other end the work in planes at right angles with the axis common to the three—shaft, pattern, and work. There are combined with the said shaft a novel linkage which carries the tracer or follower and the tool and communicates the motions of the former to the latter, means for adjusting the position of the shaft for ratio of reduction between the pattern and the work, means for alining the tracer and the tool axially with the shaft, means for the homologous adjustment of the tracer and the tool, and means for traversing the tracer and the tool radially over the pattern and the work, respectively.

Referring to the accompanying drawings, which are to be taken as part of this specification and read therewith, Figure 1 is a plan of the invention; Fig. 2, an elevation of Fig. 1 looking at it in the direction of the arrow 2, and Fig. 3 an elevation of Fig. 1 looking at it in the direction of the arrow 3.

1 is the single straight shaft above mentioned. 2 2 are its bearings, in which it can be rotated at the required speed.

3 is its driving-pulley. Means for driving the latter are not included in the drawings because they do not constitute any part of the present invention and are, besides, well known. Any motor that can be quickly reversed may be used.

4 is the pattern-block. It is mounted fast upon and to the respective end of the shaft 1

by any suitable means, having that face of it which carries the pattern (represented in Figs. 1 and 3 by the dotted line 5) outward, as shown.

7 is the work-block. It is likewise mounted fast upon and to the respective end of the shaft 1 by any suitable means, having the face to be engraved (represented by the dotted line 8 in Figs. 1 and 3) outward, as shown. Thus both pattern and work are carried by and rotate with the shaft, one at one end thereof and the other at the other end, the pattern and work being in planes parallel with each other and perpendicular to the axis of the shaft and both facing in opposite directions.

The linkage above mentioned consists of a rocker 9, a tracer arm or lever 10 of the first class, a tool arm or lever 11 of the second class, and a link 12. The rocker 9 is mounted to rock in bearings 13 13, carried by the base 14 and upon which they stand in positions proper for holding the axis of the rocker 9 at an acute angle with the shaft 1, the axis of the said rocker being in the same horizontal plane as the axis of the said shaft, the two axes intersecting each other in the center of the work 8.

15 is the tracer or follower. It is carried by one end of the lever 10, the axis of the tracer being preferably at right angles with the length of the lever. This latter has its fulcrum 16 in the rocker 9, near the respective end of it, as shown in Fig. 1, this fulcrum intersecting the axis of the said rocker.

17 is the tool. It is carried by the lever 11, near one end of it, at the same angle with that lever as the tracer 16 with the respective lever 10. The lever 11 likewise has its fulcrum 18 in the rocker 9, near the respective end of it, as shown in Fig. 1, this fulcrum intersecting the axis of the said rocker. The lever 10 extends beyond its fulcrum 16 for a length equal to that of the lever 11, and the outer ends of both are linked together by a link 12 of the proper length to maintain them parallel with each other, the link 12 being necessarily parallel with the axis of the rocker 9.

The dimensional proportions between the pattern 5 and the work 8 are as those between the distances of the fulcra 16 and 18

from the axis of the shaft 1. For adjusting those distances, or, in other words, for adjusting the ratio of reduction between the pattern and the work, the shaft 1 must be moved
 5 at right angles with its own axis to or from the linkage just described. Its bearings 2 2 are accordingly carried by a slide 20, capable of a reciprocating motion between a pair of guide-strips 21 21 upon the base 14. This
 10 motion is imparted to it by a traversing screw 22, turning without axial motion in a bracket-piece 23, standing up from the base 14 and engaging in a nut 24, fast on the slide 20.

25 is a scale on one of the strips 21, and 26
 15 its index on the slide 20.

27 is a milled head for turning the screw 22, 28 a micrometer-disk on it reading subdivisions of the scale 25, and 56 its index on the bracket-piece 23.

20 Let t equal minimum length of tool-arm, L equal maximum length of tracer-arm, P equal the radius of the pattern 5, d equal the radius of the work 8, and S equal the reading on the scale 25 to which the slide 20 must be set,
 25 and when the machine stands set with the above lengths let the slide 20 be at its zero, whence S equals 0 at this position—i. e., the above length relationship is always coincident with the zero position of the slide. Now,

30 therefore, ratio of reduction equals $\frac{t+S}{L-S}$, also

ratio of reduction equals $\frac{d}{p}$. Therefore

$$35 \quad \frac{t+S}{L-S} = \frac{d}{p}$$

$$dL - dS = Pt + PS$$

$$dL - Pt = PS + dS$$

$$40 \quad dL - Pt = S(P + d)$$

$$\frac{dL - Pt}{P + d} = S$$

45 If t equals 1 and L equals 15,

$$S = \frac{15d - P}{P + d}$$

After the shaft 1 has been adjusted the tracer
 50 15 and the tool 17 must both be moved along their respective levers 10 and 11 to aline their axes with that of the said shaft. To make such adjustments practicable, the tracer 15 is mounted in a tracer-block 57, adapted to slide in a slot 29 in the lever 10 and to be locked to the
 55 latter in the adjusted position by any suitable means, such as locking-nuts 30 30, the tool 17 also being mounted in a tool-block 31, adapted to slide in a slot 32 in the lever 11 and to
 60 be locked to the latter in the adjusted position by locking-nuts 33 33. It is very probable that different pattern-blocks 4 will be of different thicknesses, so that any one may after it has been mounted upon the respective
 65 end of the shaft 1 hold the pattern 5 at a

greater distance from the end of the said shaft than would another pattern-block hold its pattern. Hence it becomes necessary that both the tracer 15 and the tool 17 should be
 70 adjustable in the direction of their axes. For that purpose each one is capable of sliding through its blocks 57 31 and is fitted with a micrometer-adjustment 54 55. The axial adjustments of the tool 17 are in all cases homologous with those of the tracer 15. 75

The tracer may be moved over the pattern 5 either from the center to the circumference or vice versa. It is so moved by the following means:

34 is an endless belt passed round a driving- 80 pulley 35, fast on the shaft 1, and a driven pulley 36, fast on the end of a vertical screw 37, adapted to turn only about its axis in a bearing 38 in the base 14 and one, 39, in the top of a vertical slotted guide 40, fast on the 85 said base.

41 41 are a pair of pulleys about which the belt 24 is led to be kept tight thereby. This tightening is effected by moving them away 90 from the shaft 1. Accordingly they are mounted to run loose upon a sleeve 42, which fits over a standard 43, having a foot 44 adjustable in a guide 45, fast on the slide 20. They are locked in their adjusted position by a screw-threaded wing-nut 46, engaging the 95 upstanding and screw-threaded end of the standard 43, and which when it is screwed down the said standard pinches the sleeve 42 between it and the guide 45.

47 is a screw-threaded nut on the screw 37 100 and capable of only one motion—a reciprocating vertical one in the guide 40. The length of this motion in either direction is equal to the radius of the pattern 5.

48 is a horizontal cylinder incorporated 105 along one of its sides with the nut in the way shown in Fig. 1. 49 is a rod working through the closed end of it in the direction of the lever 10. The end of the latter is forked, the two prongs 50 50 embracing the rod 49 be- 110 tween two collars 51 51 fast thereon.

52 is a spring resilient between the inner end of the rod 49 and the nose of a set-screw 53, that works through the respective closed end of the cylinder 48. The function of the 115 spring 52 is to keep the tracer 15 and the tool 17 in working touch with the pattern 5 and the work 8, respectively, by rocking the levers 10 11 on their fulcrum 16 18, while that of the set-screw 53 is to regulate the strength of the 120 said spring.

Referring to the part of the machine called the "rocker" 9, it must be understood that the invention does not limit me, on the one hand, to the rectangular open-frame shape shown in 125 the figures and that, on the other hand, some special conformation of this rocker 9 is necessary. It has already been explained clearly that the only function of this rocker 9 is to have the two levers 10 11 fulcrumed in it and 130

to rock about an axis parallel with and in the same horizontal plane as the axis of the shaft 1. It must now be further explained that the tool 17, the work-block 7, and the respective end 5 of the shaft 1, even when the slide 20 is at its greatest distance from the rocker 9, surround the axis of the latter, as shown by the full lines of Fig. 1, which they could not do if the said rocker were not open or framed. The 10 farthest forward position of the shaft 1 is indicated by the dot-and-dash lines in Fig. 1, and the rocker 9 must obviously be shaped so as to make room for it.

The function of the linkage described above 15 is to communicate the motion of the tracer homologously to the tool. Linkages for such a purpose are well-known, the particular linkage shown is not claimed *per se* and may be replaced by any other which is functionally 20 the equivalent thereof. That being the case, the term "linkage" is to be understood in each of the following claims which does not enumerate the several parts thereto as meaning any linkage which is functionally the 25 equivalent of the one described in connection with the accompanying drawings, although its construction may be different. So with the means for traversing the tracer and the tool radially over the pattern and the work, re- 30 spectively. Traversers for a similar purpose are not new, and the particular one shown may be replaced by any other which is functionally the equivalent thereof. That being the case, the means for traversing mentioned 35 in each of the following claims which does not enumerate the several parts thereof are to be understood as meaning any means for traversing which is functionally the equivalent of the one described in connection with the 40 accompanying drawings, although its construction may be different.

I claim—

1. The combination of a single straight rotating shaft one end carrying the pattern and 45 the other end the work, in planes at right angles with the axis common to the three, with a linkage carrying the tracer and the tool communicating the motions of the former homologously to the latter.

50 2. The combination of a single straight rotating shaft one end carrying the pattern and the other end the work in planes at right angles with the axis common to the three; a linkage carrying the tracer and the tool communicating the motions of the former homologously to the latter and means for adjusting 55 the position of the said shaft in a direction at right angles with its own axis to or from the linkage.

60 3. The combination of a single straight rotating shaft one end carrying the pattern and the other end the work in planes at right angles with the axis common to the three; a linkage carrying the tracer and the tool communicating the motions of the former homolo- 65

gously to the latter and means for adjusting the position of the said shaft in a direction at right angles with its own axis to or from the linkage; and means for traversing the tracer 70 and the tool respectively over the pattern and the work between the center and the circumference thereof.

4. The combination of a single rotating shaft one end carrying the pattern and the other end 75 the work in planes at right angles with the axis common to the three; a linkage carrying the tracer and the tool communicating the motions of the former homologously to the latter; tracer and tool adjustable on the respec- 80 tive parts of the linkage; and means for adjusting the position of the said shaft in a direction at right angles with its own axis to or from the linkage.

5. The combination of a single rotating shaft one end carrying the pattern and the other end 85 the work in planes at right angles with the axis common to the three; a linkage carrying the tracer and the tool communicating the motions of the former homologously to the latter; tracer and tool adjustable on the respec- 90 tive parts of the linkage; means for adjusting the position of the said shaft in a direction at right angles with its own axis to or from the linkage; and means for traversing the tracer 95 and the tool respectively over the pattern and the work between the respective center and circumference thereof.

6. The combination of a single rotating shaft one end carrying the pattern and the other end 100 the work in planes at right angles with the axis common to the three; a linkage carrying the tracer and the tool communicating the motions of the former homologously to the latter; means for adjusting the position of the 105 said shaft in a direction at right angles with its own axis to or from the linkage; independent means for axially alining the tracer and the tool with the shaft; each of the said means consisting of a slot in the respective lever of 110 the linkage, a block adapted to slide therein lengthwise of the respective lever, and a locking device for holding the block in its adjusted position; and means for traversing the 115 tracer and the tool respectively over the pattern and the work between the respective center and circumference thereof.

7. The combination of base; slide; single shaft carrying the pattern on one end of it and the work on the other end in planes at right 120 angles with the axis common to the three; bearings on the slide for the said shaft; a linkage consisting of a rocker, a lever of the first class fulcrumed therein and carrying the tracer at one end in contact with the pattern, a lever 125 of the second class fulcrumed likewise in the said rocker and carrying the tool near its fulcrum in contact with the work and a link parallel with the rocker and connecting the outer ends of the levers; tracer and tool ad- 130 justable on the respective parts of the link-

age; bearings on the base to carry the rocker with its axis parallel with and in the same horizontal plane as the axis of the single shaft; means for adjusting the position of the said shaft in a direction at right angles with its own axis to or from the linkage; and means for traversing the tracer and the tool respectively over the pattern and the work between the respective center and circumference thereof.

8. The combination of base; slide; single shaft carrying the pattern on one end of it and the work on the other end in planes at right angles with the axis common to the three; bearings on the slide for the said shaft; a linkage consisting of a rocker, a lever of the first class fulcrumed therein and carrying the tracer at one end in contact with the pattern, a lever of the second class fulcrumed in the said rocker likewise and carrying the tool near its fulcrum and in contact with the work, and a link parallel with the rocker and linking the outer ends of the said levers together; bearings on the base to carry the rocker with its axis parallel with and in the same horizontal plane as the axis of the shaft; and means consisting of a micrometer-screw turning in a bracket on the base and engaging in a nut on the slide, a scale on the guide for the slide and an index on the latter reading with the said scale, for adjusting the position of the said shaft in a direction at right angles with its own axis to and from the rocker of the linkage.

9. The combination of base; slide; single shaft carrying the pattern on one end of it and the work on the other end in planes at right angles with the axis common to the three; bearings on the slide for the said shaft; a linkage consisting of a rocker, a lever of the first class fulcrumed therein and carrying the tracer at one end in contact with the pattern, a lever of the second class fulcrumed in the said rocker likewise and carrying the tool near its fulcrum and in contact with the work, and a link parallel with the rocker and linking the outer ends of the said levers together; bearings on the base to carry the rocker with its axis parallel with and in the same horizontal plane as the axis of the shaft; means consisting of a micrometer-screw turning in a bracket on the base and engaging in a nut on the slide, a scale on the guide for the slide and an index on the latter reading with the said scale, for adjusting the position of the said shaft in a direction at right angles with its own axis to and from the rocker of the linkage; and means for traversing the tracer and the tool respectively over the pattern and the work between the respective center and

the circumference thereof, consisting of a driving-pulley on the said shaft, a screw turning in fixed bearings on the base; a pulley fast on the said screw and driven from the said driving-pulley, a traversing nut on the said screw, a cylinder incorporated with the said nut, a spring-protruded rod projecting from the said cylinder to engage with the linkage at the end of the lever that carries the tracer.

10. The combination of base; single shaft carrying the pattern on one end of it and the work on the other end in planes at right angles with the axis common to the three; bearings in the slide for the shaft; a linkage consisting of a rocker, a lever of the first class fulcrumed therein and carrying the tracer at one end in contact with the pattern, a lever of the second class fulcrumed in the said rocker likewise and carrying the tool near its fulcrum and in contact with the work, and a link parallel with the rocker and linking the outer ends of the said levers together; bearings on the base to carry the rocker with its axis parallel with and in the same horizontal plane as the axis of the shaft; means consisting of a micrometer-screw turning in a bracket on the base and engaging in a nut on the slide, a scale on the guide of the slide and an index on the latter reading with the said scale, for adjusting the position of the said shaft in a direction at right angles with its own axis to and from the rocker of the linkage; means for traversing the tracer and the tool respectively over the pattern and the work between the respective center and the circumference thereof consisting of a driving-pulley in the said shaft, a screw turning in fixed bearings on the base; a pulley fast on the said screw and driven from the said driving-pulley, a traversing nut on the said screw, a cylinder incorporated with the said nut, a spring-protruded rod projecting beyond the said cylinder to engage with the linkage at the end of the lever that carries the tracer; and independent means for axially alining the tracer and the tool respectively with the axis of the shaft each of said means consisting of a slot in the respective lever of the linkage, a block adapted to slide therein lengthwise of the respective lever and a locking device for holding the block in its adjusted position.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

MARK BARR.

Witnesses:

ROBERT E. McLAREN,
CHAS. S. WOODROFFE.