W. STEERS.

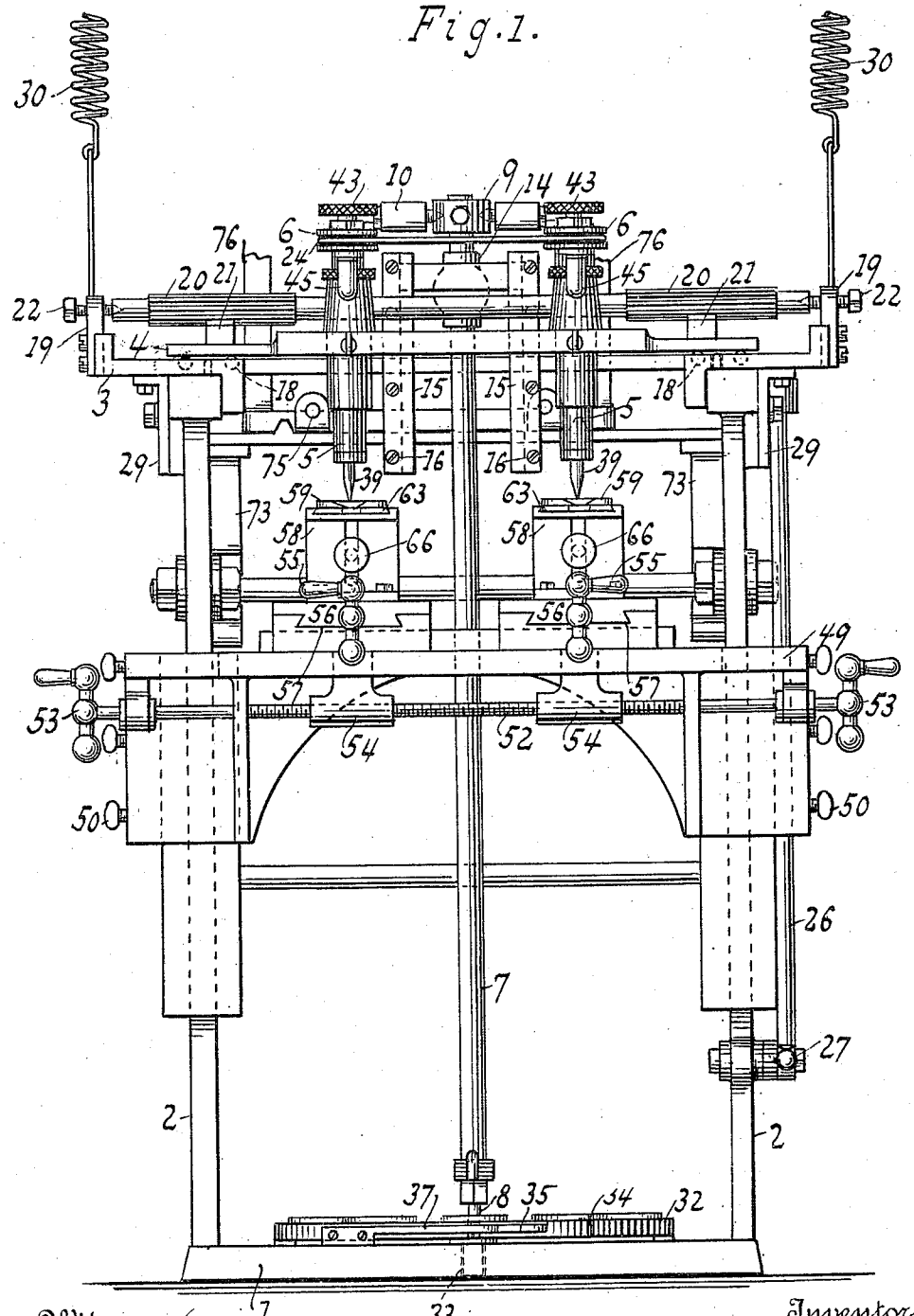
ENGRAVING MACHINE.

APPLICATION FILED SEPT. 8, 1909.

**972,033.** **Patented Oct. 4, 1910.**

4 SHEETS—SHEET 1.

Fig. 1.




Witnesses:
William Miller
Christian Almstaedt

Inventor
Walter Steers
By his Attorneys
Hauff & Haviland

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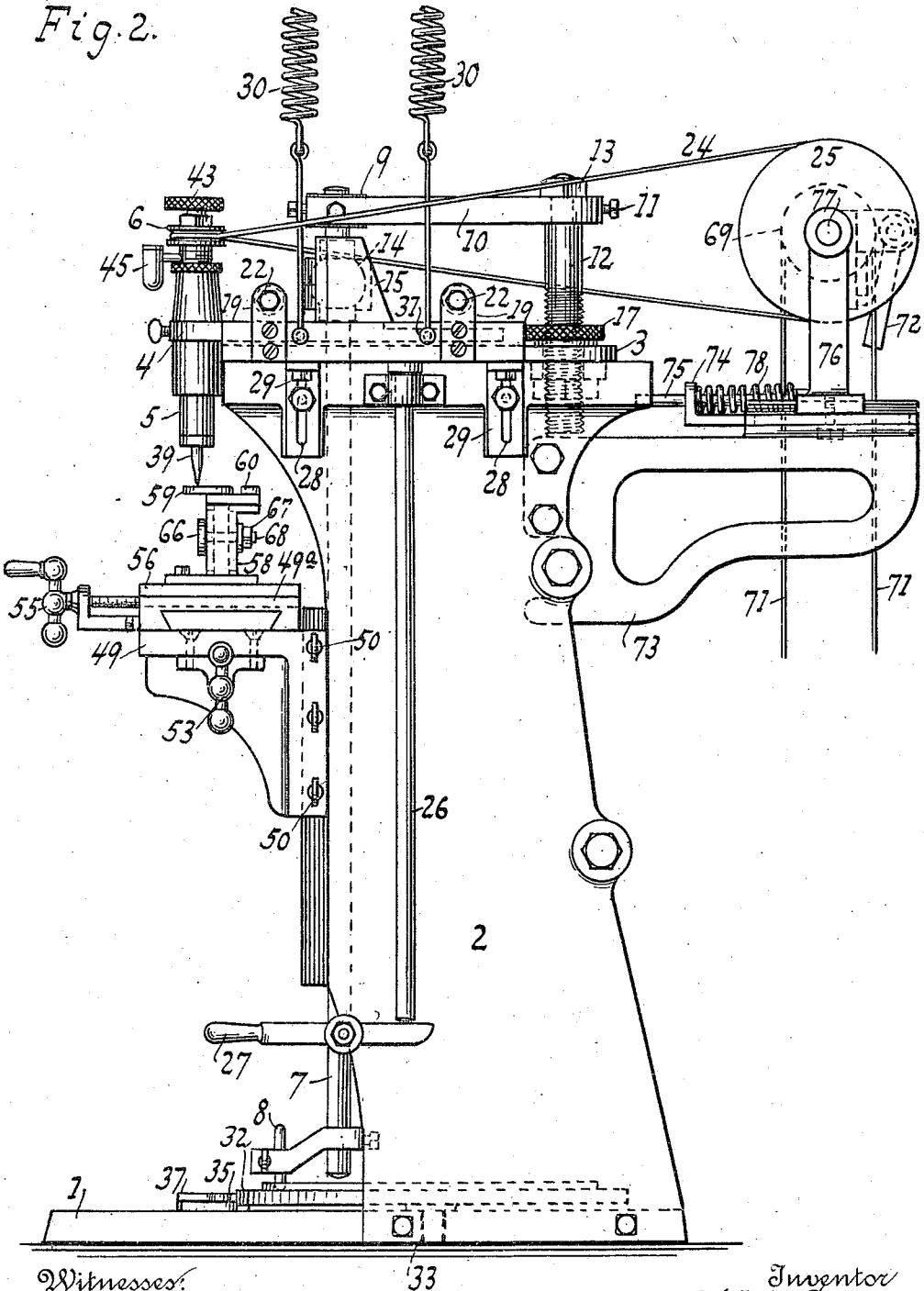
4 SHEETS—SHEET 2.

Fig. 2.

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Inventor
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By his Attorneys
Hauff & Warland

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4 SHEETS—SHEET 3.

Fig. 3.

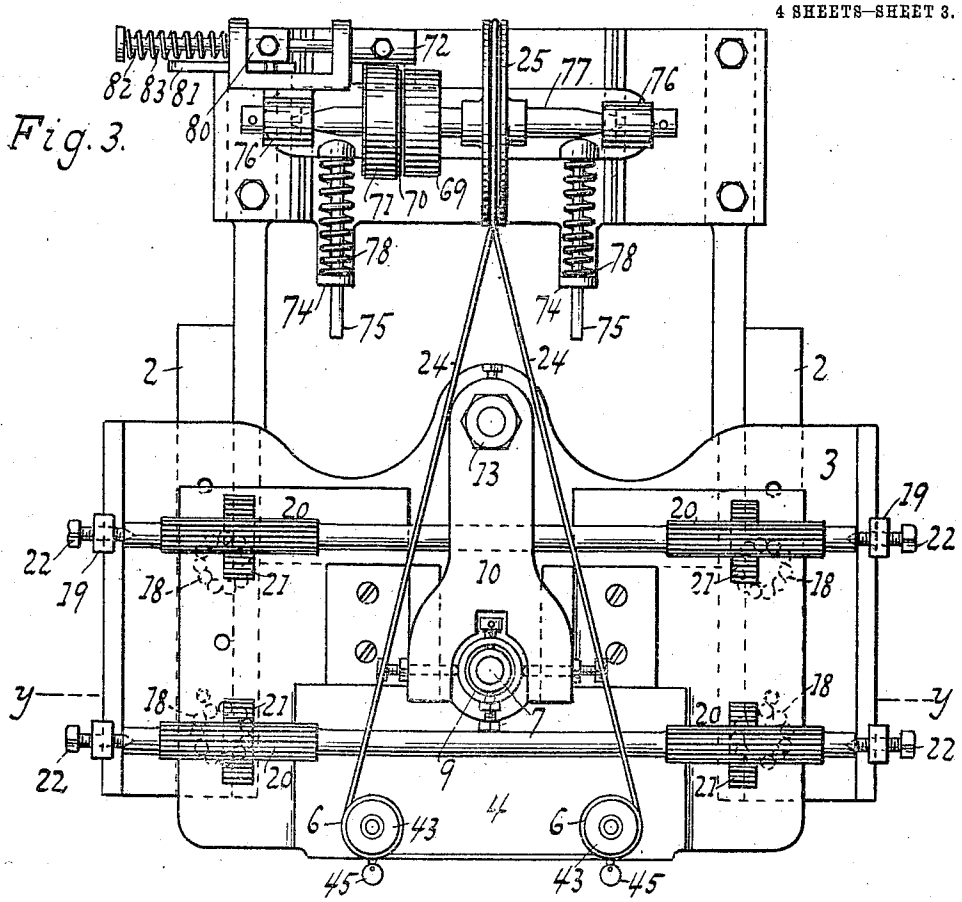


Fig. 4.

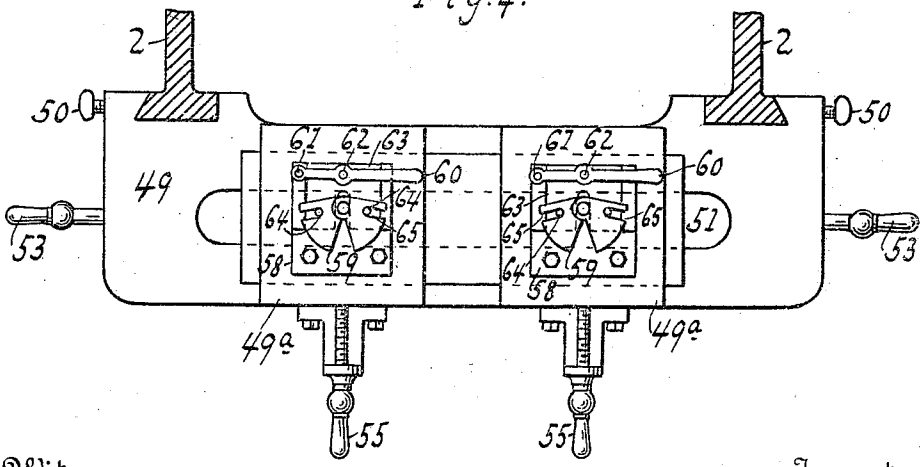


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Fig. 5.

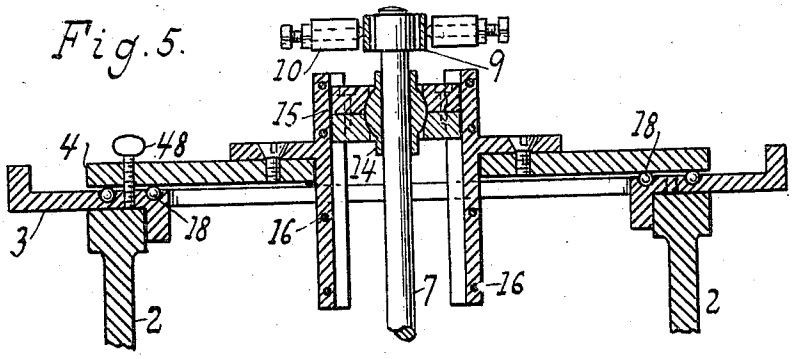



Fig. 6.

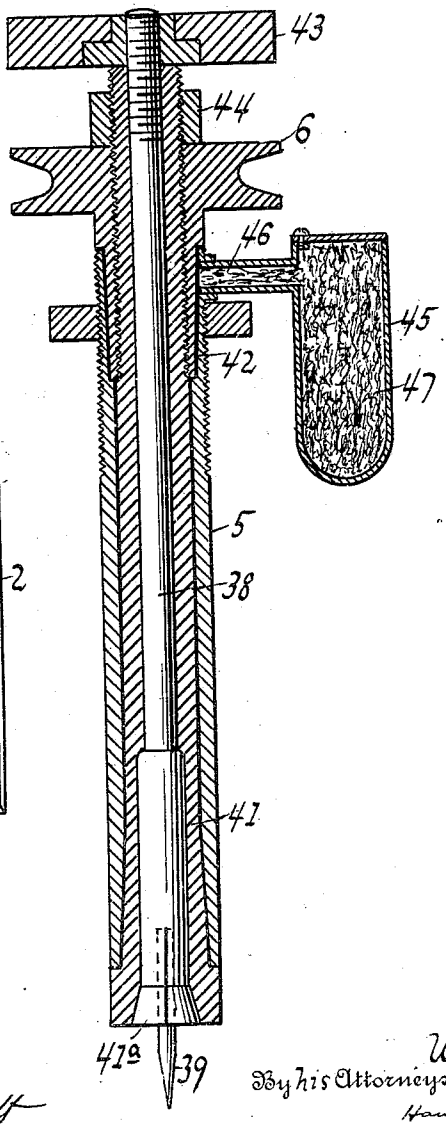
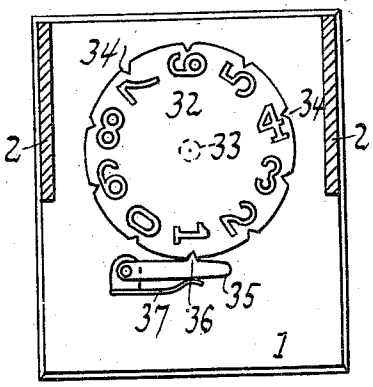



Fig. 7.




Witnesses:
William Miller
Christian Almstaedt

Inventor
Walter Steers
By his Attorneys
Hauff & Norland

# UNITED STATES PATENT OFFICE.

WALTER STEERS, OF BROOKLYN, NEW YORK, ASSIGNOR TO WALTER STEERS & CO., OF BROOKLYN, NEW YORK.

## ENGRAVING-MACHINE.

972,033. Specification of Letters Patent. Patented Oct. 4, 1910.

Application filed September 8, 1909. Serial No. 516,787.

*To all whom it may concern:*

Be it known that I, WALTER STEERS, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Engraving-Machines, of which the following is a specification.

My invention consists of a new and improved engraving and routing machine by which letters or figures may be cut from metal or other hard material and also in using a machine as an engraving machine.

Heretofore machines have been made for engraving alone or for routing alone, but my machine is so constructed that it can be readily changed from one class of work to the other.

My invention also contains improved means of accomplishing these results in a simpler and also a more accurate way than heretofore, and in numerous details of construction which will be hereinafter pointed out.

One of the important features is an improved work holder and an improved spindle with an automatic oiling device and also an improved means for changing the characters to be cut or engraved by means of a revolving index dial; also improved means for lifting the cutters from the work and improved driving mechanism and connections between the driving mechanism and spindle.

The results attained by my invention are increased facilities for work, and the machine will also do better and more accurate work than heretofore has been accomplished by machines of this character.

In the accompanying drawings Figure 1 is a front elevation of an engraving and routing machine containing my improvements. Fig. 2 is a side elevation of the same. Fig. 3 is a top plan view of the same. Fig. 4 is a top plan view of the mechanism employed for holding the work to be done. Fig. 5 is a section view taken on the line *y y*, Fig. 3. Fig. 6 is a sectional view of a spindle with oil cup attached. Fig. 7 is a plan view of the work blank dial.

The machine consists of a bed plate 1 having up-right sides 2 and a vertically removable head plate 3 and a removable spindle carrier 4 carrying spindle holders 5 with driving pulleys 6. The spindle carrying plate 4 has an aperture in the center thereof through which passes a tracer arm 7. This tracer arm 7 has a pointer 8 at its lower end and the upper end is fastened in a universal joint 9 which universal joint 9 is hung in a crutch 10 which crutch 10 is adjustably secured by means of a set screw 11 to the up-right 12 having a jam nut 13 over the crutch 10. Tracer arm 7 also passes through an adjusting ball and socket joint 14. This ball and socket joint slides up and down in ways 15 having clamping bolts 16 so that the ball and socket joint may be raised or lowered to any desired position in the ways 15. The purpose of this is to increase or decrease the size of the figures or characters to be cut without changing the size of the former or pattern plate. The tracer arm 7 is by means of the universal joint 9, ball and socket joint 14, crutch 10, and up-right 12, rigidly secured to the spindle-carrying plate 4. By means of an adjustment collar 17 another adjustment may also be made if desired for varying the size of work by moving the crutch 10 up and down on the up-right 12. This up-right 12 passes into the head plate 3 but is not rigidly secured thereto so that it may be lifted up with the spindle carrier 4 as will be hereinafter pointed out. The up-right 12 is secured to the spindle carrier 4 by adjustment collar 17. The head plate 3 has recesses therein in which are placed ball bearings 18. Head plate 3 has an up-right 19 at each side. In these up-rights 19 are mounted corrugated rollers 20 extending the entire width of the top of the machines and these corrugated rollers 20 mesh with corresponding corrugations in plate rack beds 21. The rollers 20 are fastened in the up-rights 19 by means of set screws 22. It will thus be seen that as the tracer arm 7 which is connected to the spindle carrier 4 by means of the universal joint 9, crutch 10, and up-rights 12 as has been heretofore pointed out, is moved to follow the configuration of the pattern or former, the spindle bearing plate 4 moves in unison with the arm 7. By means of the ball bearings 18 the spindle carrying plate 4 has a perfect and even motion and cannot rise or

jump up because of the rollers 20 and rack 21 which controls the spindle carrying plate 4 while in motion. The spindle holders 5 carrying the cutting tool 39 may be one or more in number and are driven by a belt 24 running over the power driven wheel 25.

In routing machines, it is necessary to lift the cutter from the work blank frequently as for instance, in cutting the figure 8, it is necessary to lift from the inside of the figure to the outside. To accomplish this result the top plate 3 and spindle carrier 4 can be moved vertically to the desired distance together with the spindle and the cutting tool 39. This is done by means of a lever 26 with a handle 27 placed near the follower which the operator grasps. As shown in Figs. 1, 2, 3 and 5 the top plate 3 has angle-irons fitting closely against the side up-rights 2. In Fig. 1 guides 28 are shown fitting into grooves 29 so that when the handle 27 is pressed down the lever 26 raises both plates 3 and 4 and removes the spindles from the work. Of course, only a short uplifting is necessary or in other words, the distance lifted corresponds with the depth of the character to be engraved. To facilitate the lifting of the entire top of the machine from the side up-rights, helical springs 30 having a strength which corresponds to a little less than the weight of the combined plates 3 and 4 and the arm are attached to the spindle carrying plate 3 at 31 so that as the operator presses on the lever the springs assist in lifting the plates from the top of the machine.

Another improved feature of my machine is an adjustable pattern or former dial shown in Fig. 7. Heretofore in machines of this class, when it has been found necessary to change from one figure to another, it has been necessary to unscrew the figure which has been cut and screw down the new one, which takes a great deal of time and the pattern has to be fastened on very accurately and firmly. I obviate this difficulty by having a circular dial 32 pivoted at 33 to the bed plate of the machine. This dial in the illustration shows characters and numerals from one to zero, but of course, any desired design or figure may be placed on this dial. Opposite each character or figure on the dial 32 is a recess or indentation 34. In front of the character which is to be engraved in a spring pressed pawl 35 having a projection 36 which fits into a corresponding projection 34 and securely clamps the dial in the required position. The pawl 35 is held against the dial by a spring 37.

Another new and important feature of my invention consists in the spindle holder 5. The spindle holder 5 carries the rotary spindle 41, passing through the rotary spindle 41 is a stem 38 to the bottom of which is attached a clutch 41ª, which carries the engraving tool 39. The inner spindle 41 is tapered at the bottom as shown at Fig. 6 and also tapered at the upper part of the spindle as shown at 42. Of course, in a rapidly revolving spindle there is a great deal of friction and wear. The adjusting nut 44 is placed at the top of the spindle for the purpose of adjusting the spindle to the desired position. Of course, a spindle being driven as rapidly as these are, wears more or less and when it wears there is a looseness imparted to the cutting tool so that it will not cut as accurately or as cleanly as it will when the spindle is held perfectly steady. By means of the tapered inner spindle 42 and the nut 44 this play is taken up as the spindle wears and thus any jar or inaccuracy caused by looseness of the inner sleeve of the spindle is done away with.

Another feature of my invention is an improved means of keeping the spindle oiled. This is accomplished as shown in Fig. 6 by means of an oil cup 45 attached to the spindle. This oil cup contains a cotton wick or wick of other absorbent material, 46, which passes down into the oil cup 47, the rapid rotation of the spindle rubbing against the wick 46 by reason of the capillary action of the wick 46 sucks the oil up to the spindle and the spindle is kept constantly oiled.

Another and by far the most important feature of my invention is a means for changing from a routing to an engraving machine. This is accomplished by making the spindle carrying plate 4 and cutters contained therein stationary, and by moving the work blank or table instead of the cutter. To accomplish this result I provide set screws 48 which may be inserted through the movable spindle carrying plate 4 into the top plate 3 as shown in Fig. 5. When the plates 3 and 4 are fastened together, of course, the spindle cannot move and revolves in a fixed position.

The engraving bed 49 shown in Fig. 4 is of course, vertically adjustable on the up-rights 2 by means of set screws 50 as shown in Fig. 2. The engraving bed 49 has a recess 51 and this recess 51 holds the block or blocks in which the work to be engraved or cut, is clamped.

As shown in Fig. 1 there is a threaded bar 52 extending the entire width of the machine having handles 53. The work holding blank 49ª has a depending screw-threaded arm 54 through which the threaded bar 52 passes so that when the handle 53 is turned, the work block 49ª is moved in obedience to the motion imparted by the thread on the bar 52 corresponding with the thread on the arm 54. By turning the handle 53 the threaded bar 52 thus imparts a sidewise movement to the work carrying block. In order to get a back and forth movement, a similar device is used as shown in Fig. 1

wherein there is a handle 55 threaded into the upper work holding block 56 which slides in dove-tailed grooves 57 and thus a backward and forward motion is imparted to the work holding block.

As has been pointed out the cutting tool remains in a stationary position and the work is moved by turning the handles 53 and 55 either backward or forward or right or left to any desired extent.

Another feature of my invention is the means for holding the work which is held in a combination fixture 58 while the machine is used as a routing machine as well as when used as an engraving machine. Fig. 2 shows a side view of this device 58 and the same numeral designates a top view of this same in Fig. 4. The work is held in position by securely clamped jaws 59. These jaws are actuated and controlled by a lever 60 fulcrumed at 61 and pivoted at 62 to the arm 63 carrying a point 64 working in a slot 65 so that when the lever is in the position shown in Fig. 4 the work is clamped into the holder 58 and when the lever 60 is pushed back the jaws 59 are opened and the work released.

In Figs. 1 and 2 is shown a bushing 66 which is fastened on to a pin 67 either by a thread or a key or any well known means. This bushing 66 may be made in any form. In the drawing it is shown circular for the reason that a great part of the work done on these machines consists of engraving the characters on numbering wheels which of course have a circular opening for the shaft to pass through. In the construction shown in the drawing, the bushing 66 is made a trifle smaller than the shaft opening in the wheel so that the wheel to be engraved just fits on by frictional contact to the bushing 66 and can be moved up or down according to the size of the article to be engraved until it comes to the desired position to be clamped by the jaws 59 and operated on by the cutting tool 39. The set screw 68 shown in Fig. 2 is then tightened and the work held firmly in place. Various size bushings are of course used for the different sizes of openings that may occur in different sizes of wheels to be engraved.

The operation of the machine is as follows: If it is desired to cut or rout a character having for instance the figure 1, the piece of metal which is to be cut is placed in the clamped jaws 59 which are shown in detail in Fig. 4 and are held closed by lever 60, hereinbefore described. The operator then throws on the power, grasps the pointer 8 shown in Fig. 1 and moves it around the out-line of the character 1 which is to be engraved. The tracer arm 7 by means of the universal joint 9 and the ball and socket joint 14 may be moved in any direction and this movement of the tracer arm is imparted to the crutch 10 which by reason of its connection with the upright 12 to the spindle carrying-plate 3 gives a corresponding motion to the spindle holders 5 carrying spindles and cutting tools. As has been pointed out by reason of the corrugated rollers 20 meshing with corresponding rack-beds 21 and by reason of the ball-bearings 18, a firm even all-around movement in any direction is attained by the spindle holder or holders carrying the cutting tools. If it is desired to change the size of the character to be cut the range of the cutting tool can be adjusted by moving the ball and socket joint 14 up or down on the ways 15 as may be required and clamping it at the desired point. This adjustment may also be attained by turning the adjustment collar 17 which acts through the upright 12 and crutch 10 on the tracer arm 7. If it is now desired to engrave, say a name plate, then the plates 3 and 4 are made stationary by means of set screws 48 shown in Fig. 5. This of course causes the spindle carrier 5 to remain in a permanent or fixed position and the work to be engraved by means of handles 53 and 55 can be given a backward and forward and sidewise movement under the tool as may be desired.

Another important feature of my device is the driving mechanism, a top view of which is shown at Fig. 3 over which the belt 24 passes and around the pulleys 6 of the spindle holders 5.

69 designates a fast pulley and 70 a loose pulley over which the belt 71, shown in Fig. 2, passes from the engines or motor furnishing the power. The belt may be thrown from the fast to the loose pulley by means of a belt shifter 72.

Of course, it is necessary inasmuch as the spindle carrying plate 4 moves back and forth and in a sidewise direction to have the pulley driving belt 24 always tight and also to move in unison with the plate 4. In order to accomplish this we have attached to the rear of the frame 2 a bracket 73 having a slotted bracket 74 through which passes the plungers 75 attached to an upright 76 carrying a shaft 77 on which are the pulleys 69 and 70. The plungers 75 have helical springs 78 between the bracket 74 and up-right 76, which springs 78 tend to push the upright 76 away from the spindle carrying plate 4, thus keeping a proper tension on the belt 24. To shift from a fast to a loose pulley clutch 80 attached to the lever on the front of the machine, which lever is not shown, is also attached to a shifting arm 81 so when the clutch 80 is pulled the shifting arm 81 throws the rod 82 with the belt shifter 72 from the tight to the loose pulley. On the arm 82 is a helical spring 83 which is used as a means to keep the belt shifter 72 automatically on the loose pulley so that the ma-

chine is not in operation until the clutch 80 which is attached to the lever, which is not shown, is pulled by the operator.

Having described my invention what I claim and desire to secure by U. S. Letters Patent is:—

1. In combination a routing and engraving machine a vertically removable head plate, ball bearings in said head plate, corrugated rollers mounted in brackets on said head plate, a vertically removable spindle carrying plate, corrugated rack beds on the upper side of said spindle carrying plate, means for causing the spindle carrying plate to move in any direction, rotating spindles in said spindle carrying plate, cutting tools in said spindles, a tracer arm connected to and passing through the spindle carrying plate, a pointer on the lower end of the said tracer arm, an adjustable universal joint attached to the upper end of said tracer arm and to the spindle carrying plate, an adjustable ball and socket joint through which the tracer arm passes, means for increasing and decreasing the size of the character to be cut without changing the size of the pattern or former, means for obviating loose motion in the spindle, means for automatically oiling the spindle, means for changing from one pattern to another without removing the pattern plate, and a work holding block having jaws for clamping the work to be engraved, a lever for opening and closing said jaws, and vertically adjustable means on the work holding block for holding the work to be engraved.

2. In combination a routing and engraving machine containing a vertically removable head plate, a movable and vertically removable spindle carrying plate, a tracer arm having a pointer at its lower end and secured at its upper end to the movable carrier plate, means for having the driving belt move in the same plane and in unison with the spindle carrying plate, and means for exerting the proper tension on the spindle driving belt.

3. In combination an engraving and routing machine having a vertically removable head plate, a movable and vertically removable spindle carrying plate, ball bearings for said spindle carrying plate, and a tracer arm attached to the said spindle carrying plate, a tapered inner sleeve on the spindle or spindles, an automatic oiling cup attached to the said spindle, said cup consisting of a receptacle attached to the spindle having a wick for drawing the oil from the cup to the spindle, a rotatable pattern dial having various figures or characters thereon by which the character or figure to be engraved may be changed without removing the character from the dial and means for fastening the dial in any desired position.

4. In combination an engraving and routing machine having a vertically removable spindle carrying plate, a tracer arm attached thereto, driving mechanism for the spindles, a pattern dial, means for varying the size of the work to be done without varying the size of the pattern, an engraving bed, work holders in said engraving bed, jaws for holding the article to be engraved, a lever for operating said jaws, slots in said jaws and pins operated by the lever and working in said jaws.

5. In combination an engraving and routing machine having a vertically movable head plate, and a movable and vertically movable spindle carrying plate, a lever for vertically lifting the head plate and spindle carrying plate from the machine, ball bearings for said spindle carrying plate a tracer arm secured to the movable spindle carrying plate, having a pointer at its lower end.

6. In combination an engraving and routing machine having a base plate, vertical side plates, a movable head plate, means for moving said head plate, means for lifting the tool off the character to be engraved, a movable spindle carrying plate, ball bearings for said spindle carrying plate, driving mechanism, an automatic belt shifter, mechanism for shifting the belt from a fast to a loose pulley, a spring for normally keeping the belt shifting mechanism on the loose pulley.

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

WALTER STEERS.

Witnesses:
WILLIAM MILLER,
HENRY HERZ.