July 27, 1948. L. BENTZMAN 2,445,903

ENGRAVING MACHINE

Filed April 1, 1946 3 Sheets-Sheet 1

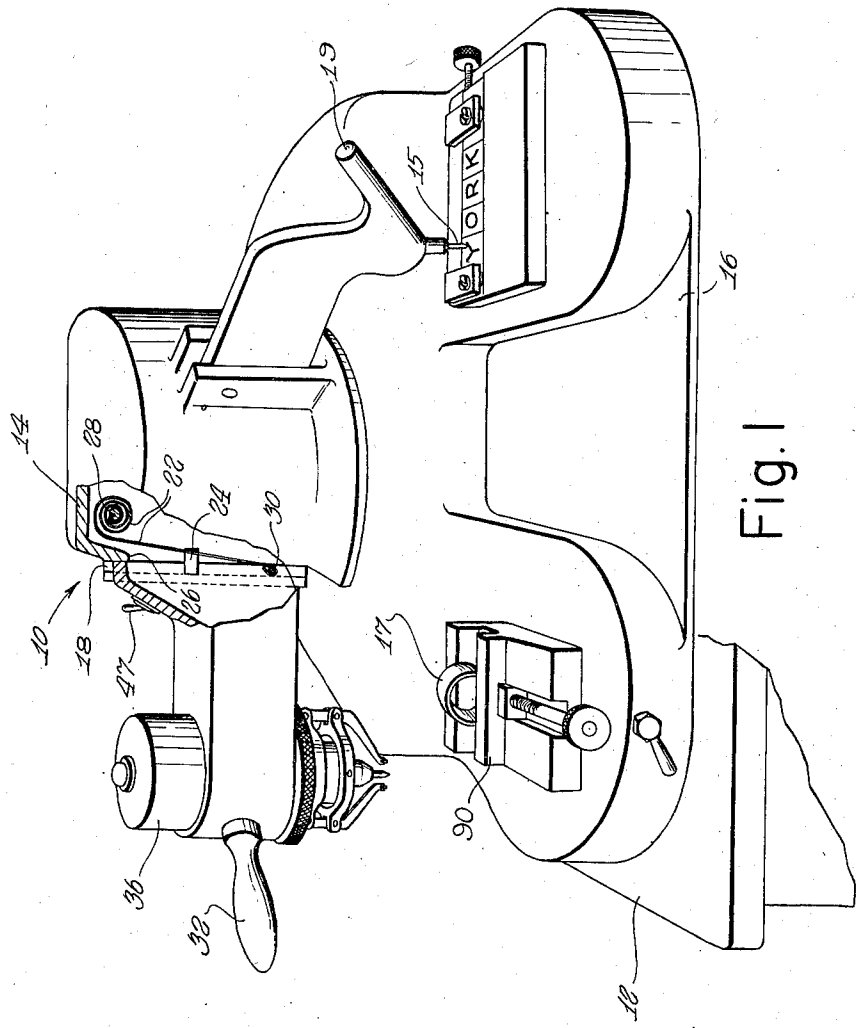


Fig. 1

INVENTOR.
LOUIS BENTZMAN
BY Edwin Leisola
ATTORNEY

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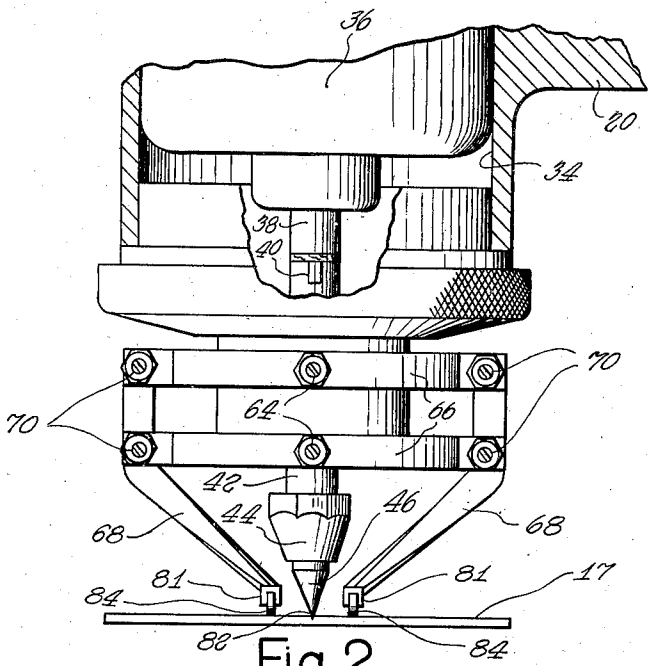


Fig.2

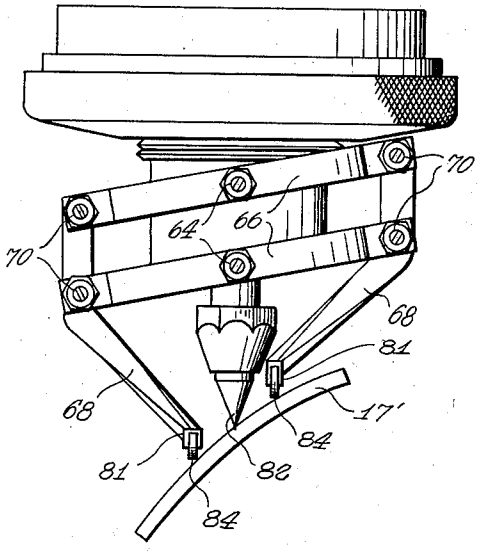


Fig.7

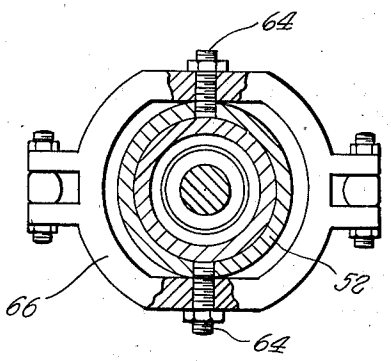


Fig.8

INVENTOR.
LOUIS BENTZMAN
BY Edwin Leitch
ATTORNEY

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ENGRAVING MACHINE

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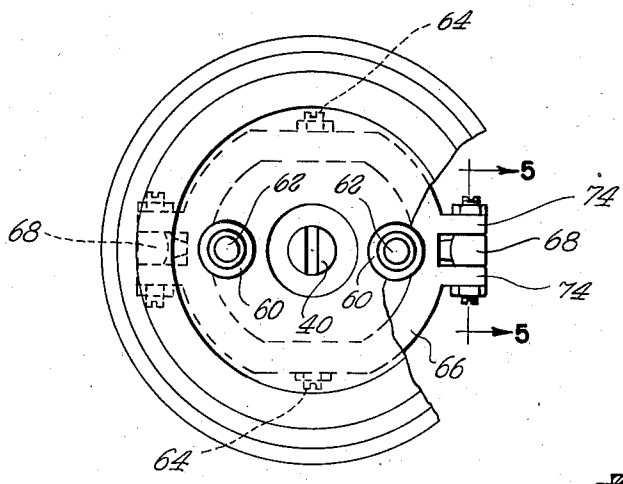


Fig. 4

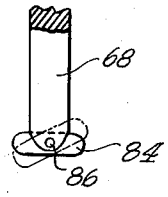


Fig. 6

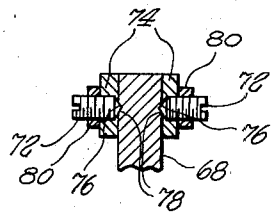


Fig. 5

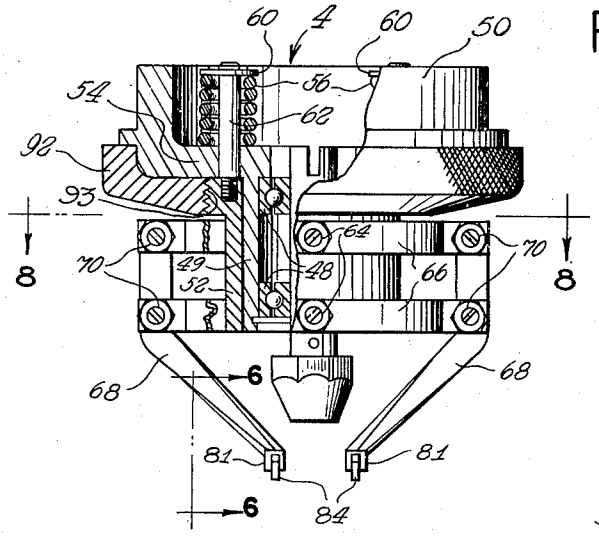


Fig. 3

INVENTOR.
LOUIS BENTZMAN
BY Edwin Leisohn
ATTORNEY

Patented July 27, 1948 2,445,903

UNITED STATES PATENT OFFICE

2,445,903

ENGRAVING MACHINE

Louis Bentzman, New York, N. Y., assignor to Accmatool Co., Inc., New York, N. Y., a corporation

Application April 1, 1946, Serial No. 658,675

5 Claims. (Cl. 90—62)

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This invention relates to engraving machines, and more particularly, though not exclusively, to machines having an engraving tool which cuts into a surface of an article in order to reproduce thereon any desired characters or design from a pattern.

In machines of this type, the tracing movement of a stylus on a pattern to be reproduced is transmitted to the tool holder, and the latter is usually depressible independently of its tracing movement in order to enable an operator to bring the engraving tool into cutting engagement with different articles of various sizes and shapes and to regulate the depth of the cut. Since even slight variation in the depth of the engraving results in an unsightly appearance of the same, and may even spoil the engraved article, the depth of the cut must be uniform throughout the engraving. Hence, the operator endeavors to depress the tool holder uniformly during the engraving operation. This is a very difficult task and requires considerable skill and patience on the part of the operator, considering that he not only has to pay utmost attention to the depth regulation of the cut in the article, but has to trace the pattern with the stylus at the same time. The task of depressing the tool holder uniformly during an engraving operation on an article is even more formidable when the engraving tool has to be raised from, and returned into contact with, the article a number of times to complete the engraving, and is particularly formidable when the surface to be engraved of an article is curved in one or more directions.

It is the primary object of the present invention to make provision in a machine of the above type for positively stopping the depression of the tool holder, through contact with the surface to be engraved of an article, when the engraving tool cuts to a required depth into said surface at any place thereon, thereby relieving the operator of the burden of attaining uniform depression of the tool holder during an engraving operation, and assuring that no portion of an engraving is cut deeper than required.

It is a further object of the present invention to make provision for positively stopping the depression of the tool holder when the engraving tool cuts to a required depth anywhere in a surface to be engraved of an article, regardless of whether the surface is plane or curved in one or more directions, or both.

The above and other objects of the present invention will be apparent from the following description taken in connection with the accompanying drawings, in which:

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Fig. 1 is a perspective view of an engraving machine embodying the present invention.

Fig. 2 is an enlarged, fragmentary vertical section through the cutter head of the machine, including the tool holder.

Fig. 3 is an elevational view, partly in section, of the tool holder and parts carried thereby.

Fig. 4 is a plan view of the tool holder as viewed in the direction of the arrow 4 in Fig. 3, certain parts thereof being shown partly broken away for better illustration of other parts therebelow.

Fig. 5 is a section taken on the line 5—5 of Fig. 4.

Fig. 6 is a section taken on the line 6—6 of Fig. 3.

Fig. 7 shows the tool holder and the parts carried thereby in a position of operation different from that shown in Fig. 2.

Fig. 8 is a section taken on the line 8—8 of Fig. 3.

Referring to the drawings, and particularly to Fig. 1 thereof, the reference numeral 10 designates an engraving machine of the type referred to, which may be supported on a table or bench 12. The engraving machine comprises a housing 14 which is suitably mounted on the bed 16 of the machine for movement in any direction in the plane of said bed. The machine is equipped with a stylus 15 which is carried by the handle 19 which is fixed rigidly to housing 14, the stylus being used to trace a pattern to be reproduced on an article 17 and the handle 19 serving to transmit the tracing movement of the stylus to the housing 14.

Mounted for movement in vertical guideways 18 on the housing 14 is a cutter head or bracket 20 which is normally urged by a spring 22 into an uppermost position in which a stop 24 on said cutter head engages a shoulder 26 on the housing 14. The spring 22, which is spirally wound in the present instance, is suitably anchored with one end on a stud 28 in the housing 14, and with the other end on a stud 30 in the cutter head 20. A handle 32 is carried by the cutter head 20 to depress the latter (Fig. 1).

Mounted in a cylindrical recess 34 in the cutter head 20 is an electric motor 36 (Fig. 2), the shaft 38 of which is suitably coupled at 40 to a spindle 42, carrying a chuck 44 which holds an engraving tool 46. The motor 36 is preferably of the type which will operate on ordinary lighting current of 110 volts, for instance, and has an electric cord (not shown) which may be plugged into any

conventional wall socket. A manual switch 47 on the cutter head 20 serves to start and stop the motor 36 when the electric cord is plugged in a socket. The spindle 42 is journalled in ball bearings 48 in a cylindrical extension 49 of a spindle housing 50 (Fig. 3) which is suitably secured in the lower end of the cylindrical recess 34 in the cutter head 20 (Fig. 2).

Axially slidable on a cylindrical extension 49 of the spindle housing 50 is a collar 52 (Fig. 3) which is normally urged against a web 54 of the spindle housing by means of springs 56. More particularly, each spring 56 is interposed between the web 54 and a spring retainer 60 on a post 62 which is carried by the collar 52 and slidably passes through the web 54. Suitably pivoted at 64 to the collar 52 are two follower rings 66 (see also Figs. 4 and 8), which are pivotally connected at 70 with follower legs 68 on opposite sides of the collar 52. Each pivot connection 70 between a follower ring 66 and a follower leg 68 is preferably of the type shown in Fig. 5, and comprises pivot screws 72 which are threaded into the adjacent forked end 74 of the follower ring and project with their conical ends 76 into correspondingly formed recesses 78 in the follower leg. Nuts 80 serve to lock the pivot screws 72.

The follower rings 66 and the portions of the follower legs 68 intermediate the pivots 70 form a parallelogram (Figs. 2, 3 and 7) of which the sides 66 are pivoted midway of the parallelogram to the collar 52 as at 64, so that the follower legs 68 move equal amounts in opposite directions when either one of these legs 68 is moved in either direction. Moreover, the axes of the pivots 64 extend at right angles to the longitudinal axis of the engraving tool 46, wherefore the follower legs 68 move longitudinally of the tool 46. The follower legs 68 are preferably shaped as shown in Figs. 2, 3 and 7, and extend with their ends 81 into close proximity to the cutting tip 82 of the engraving tool. The legs 68 preferably carry at their ends 81 follower feet or shoes 84 (see also Fig. 6) which are pivotally mounted thereon as at 86. The ends 81 of the follower legs 68 are equally spaced from the longitudinal axis x of the engraving tool 46 (Fig. 2), and their pivot connections 86 with the feet 84 are preferably in line with the tip 82 of the engraving tool.

In order to engrave the article 17 (Fig. 1) which may be a flat metal plate, for instance, or which may be a curved plate, the operator preferably secures the article in a work clamp 90 on the bed 16 of the machine and starts the electric motor 36. The operator then depresses the cutter head 20 by the handle 32 to start the engraving operation. While the tool 46 actually engraves the article, the operator depresses the cutter head 20 so as to keep the follower feet 84 in contact with the surface being engraved (Figs. 1 and 2) thereby obtaining a uniform depth of cut through the engraving, as will be readily understood.

The present stop means 84, 68, 66 is ideally suited for engraving curved surfaces of articles, such as the article 17' in Fig. 7, for instance, since the feet 84 follow the contour of the curved surface without permitting any variation in the depth of the cut therein by the engraving tool. This holds true even when the surface to be engraved of an article is curved in more than one direction. Thus, convex or concave surfaces may be engraved most uniformly in the present machine. The instant stop means is also of advantage in engraving surfaces of many other contours too numerous to describe, in that it controls the depth of the cut throughout an engraving in a surface of most any contour, with the result that the engraving appears most uniform to the eye.

In order to vary the depth of the cut of the engraving tool in a surface, the stop means 84, 68, 66 is made adjustable longitudinally of the engraving tool 46. To this end, an externally threaded portion 93 of the collar 52 is in threaded engagement with an adjustment nut 92 (Fig. 3) which normally bears against the web 54 of the spindle housing 50. On turning the adjustment nut 92 in a certain direction relative to the collar 52, the latter is moved away from the web 54 against the tendency of the springs 56 to move it thereagainst, whereby the stop means 84, 68, 66 is moved relative to the tool 46, with the result that the depth of the cut of the tool in a surface is reduced. The maximum depth of the cut of the tool 46 in a surface is obtained when the collar 52 is in engagement with the web 54 of the spindle housing (Fig. 3), as will be readily understood.

I claim:

1. In an engraving machine, the combination of a holder, an engraving tool having a cutting tip and being mounted for rotation about its longitudinal axis in said holder, two stop members on opposite sides of the cutting tip of said tool equally spaced from the longitudinal axis of the latter, and means carried by said holder for supporting said members for movement longitudinally of said tool and for drivingly connecting said members so that they move equal amounts in opposite directions on moving either member in either direction, said members being adapted to contact a surface to be engraved of an article when the tip of the rotating tool cuts into said surface to a predetermined depth.

2. The combination in an engraving machine as set forth in claim 1, in which said means is mounted on said holder for adjustment longitudinally of said tool to vary the depth of the cut of said tool in said surface.

3. In an engraving machine, the combination of a holder, an engraving tool having a cutting tip and being mounted for rotation about its longitudinal axis in said holder, and four arms pivotally connected to form the sides of a parallelogram of which two opposite arms are pivoted to said holder midway of said parallelogram about parallel axes at right angles to the longitudinal axis of said tool, and the other arms have stop surfaces on opposite sides of the cutting tip of said tool equally spaced from the longitudinal axis of the latter, said stop surfaces being adapted to contact a surface to be engraved of an article when the tip of the rotating tool cuts into said surface to a predetermined depth.

4. The combination in an engraving machine as set forth in claim 3, further comprising contact shoes pivoted to said other arms and providing said stop surfaces.

5. The combination in an engraving machine as set forth in claim 3, in which said holder comprises a cylindrical member which has a shoulder and in which said tool is rotatably mounted, an element, axially slidably on said member longitudinally of said tool and normally yieldingly urged toward said shoulder, said element having a threaded portion and pivotally carrying said opposite arms, and a nut in threaded en-

gagement with the threaded portion of said element and interposed between the latter and said shoulder.

LOUIS BENTZMAN.

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