Aug. 2, 1938.

H. WEINACKER

2,125,759

METALWORKING MACHINE

Filed Sept. 10, 1935

4 Sheets-Sheet 1

FIG. 1.

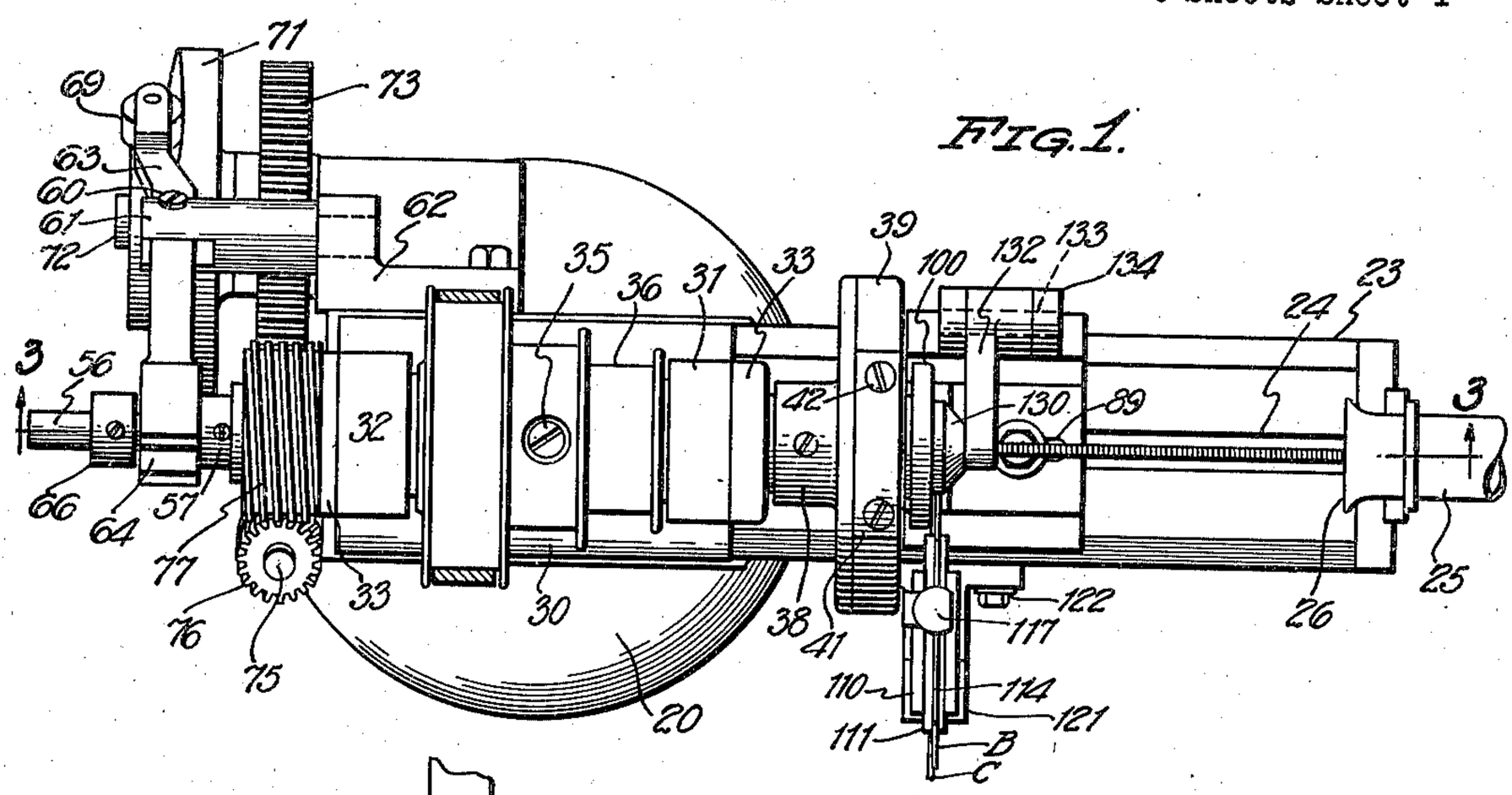
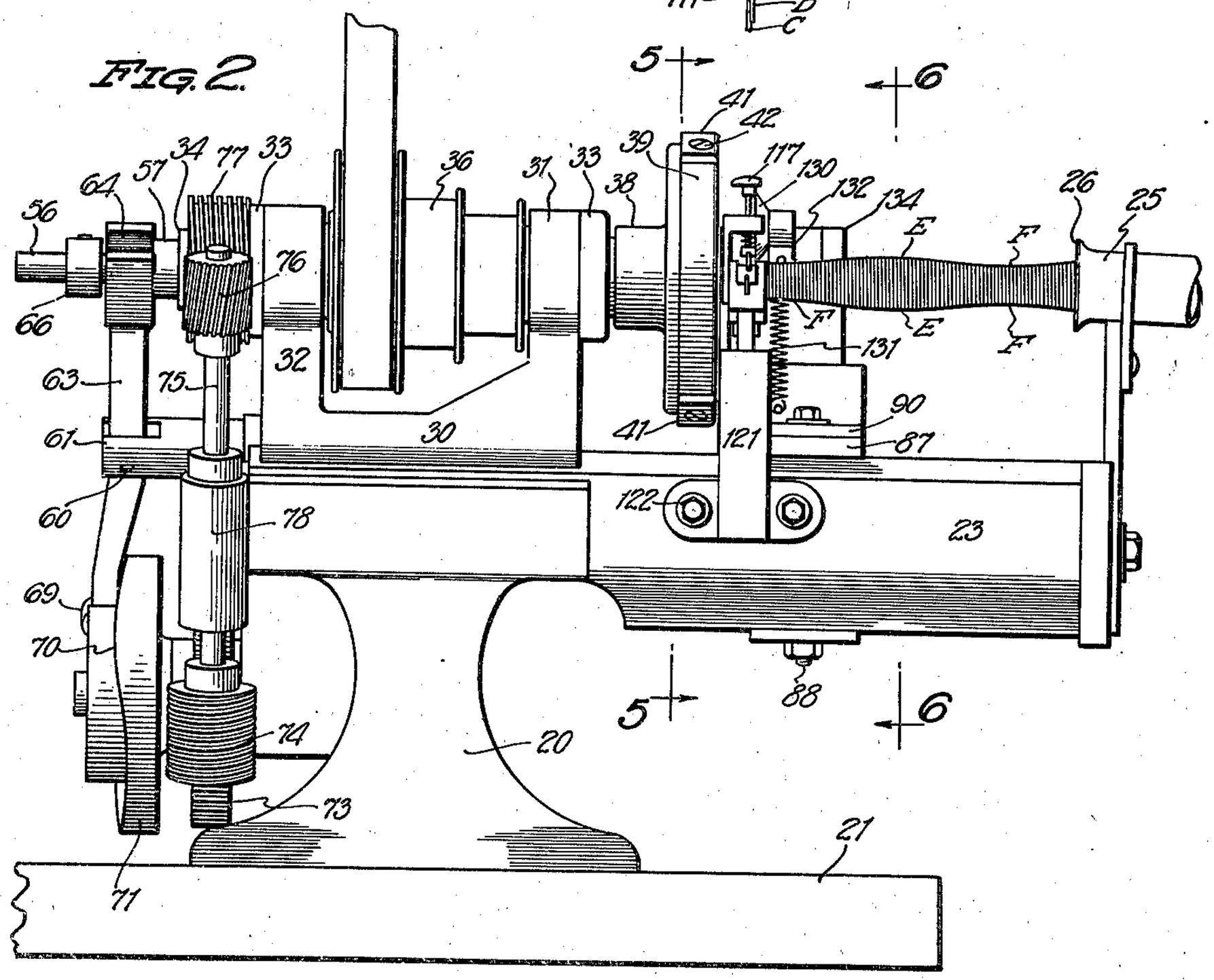


FIG. 2.



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WITNESS:

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ATTORNEYS.

Aug. 2, 1938. H. WEINACKER 2,125,759

METALWORKING MACHINE

Filed Sept. 10, 1935

4 Sheets-Sheet 2

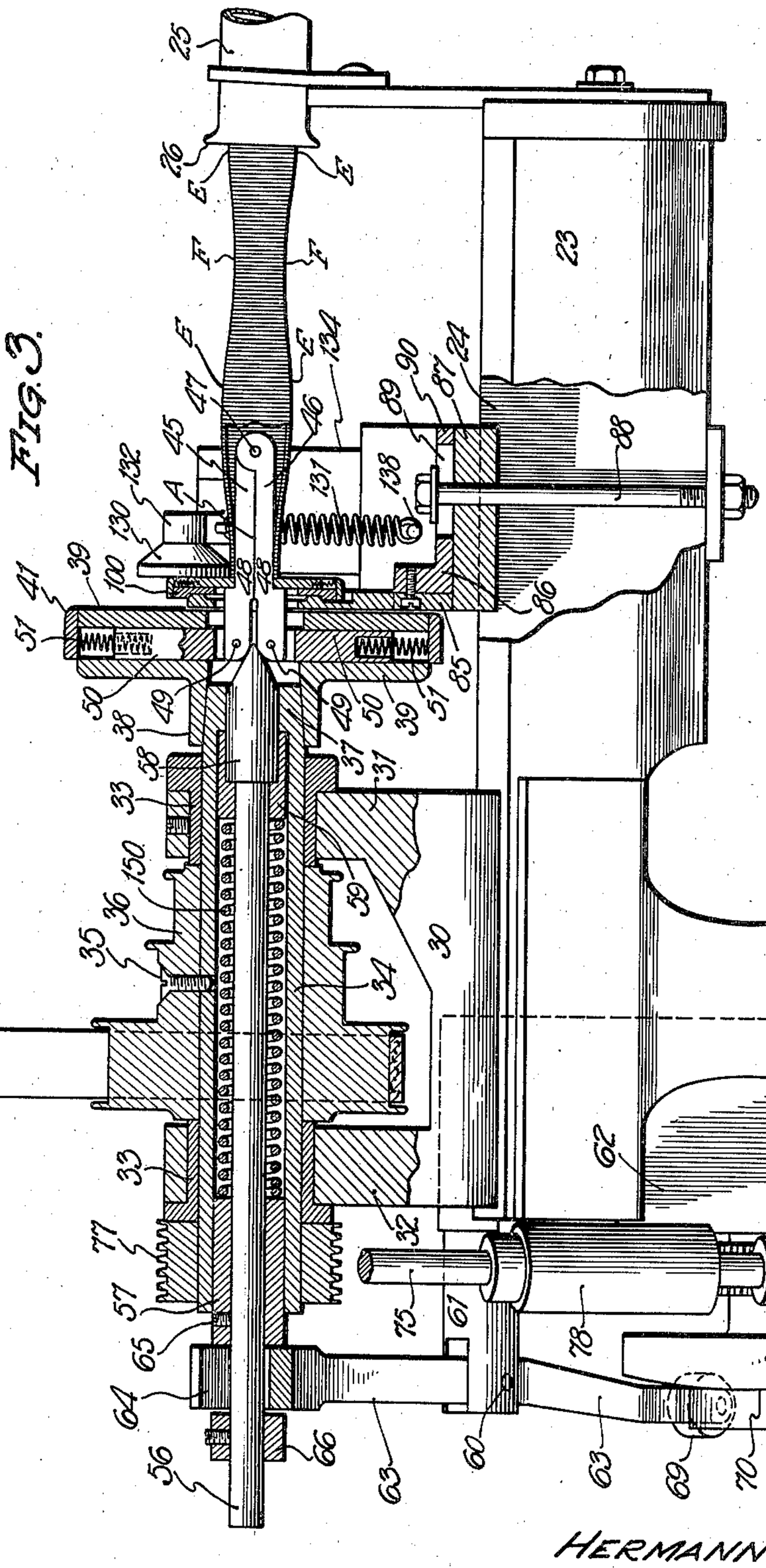

FIG. 3.

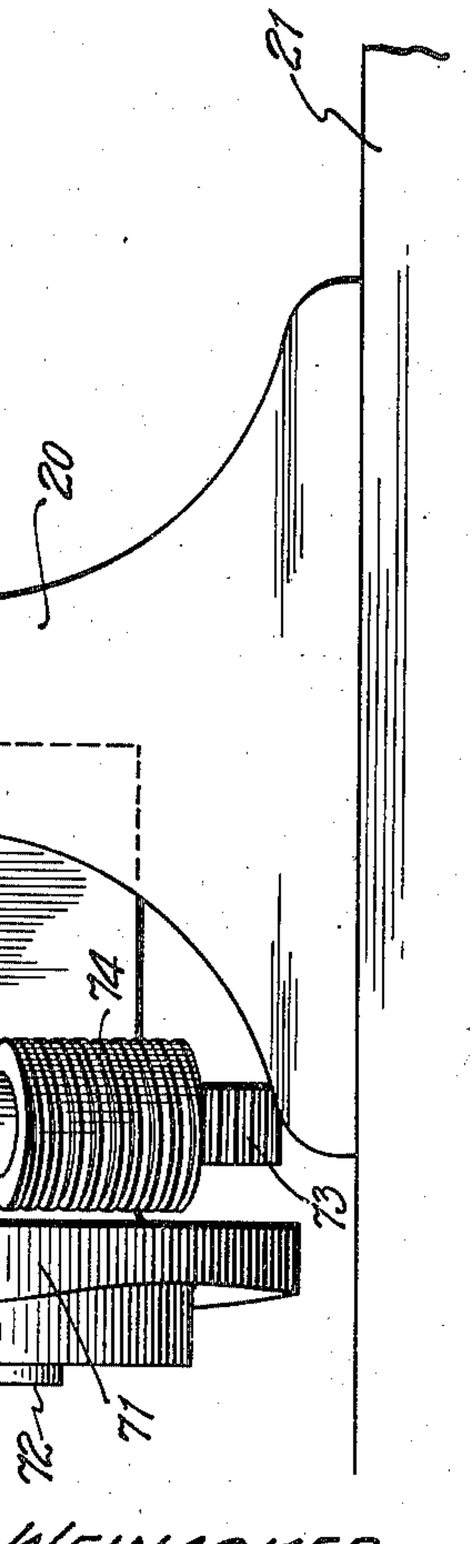

FIG. 4.

WITNESS:

[illegible]

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METALWORKING MACHINE

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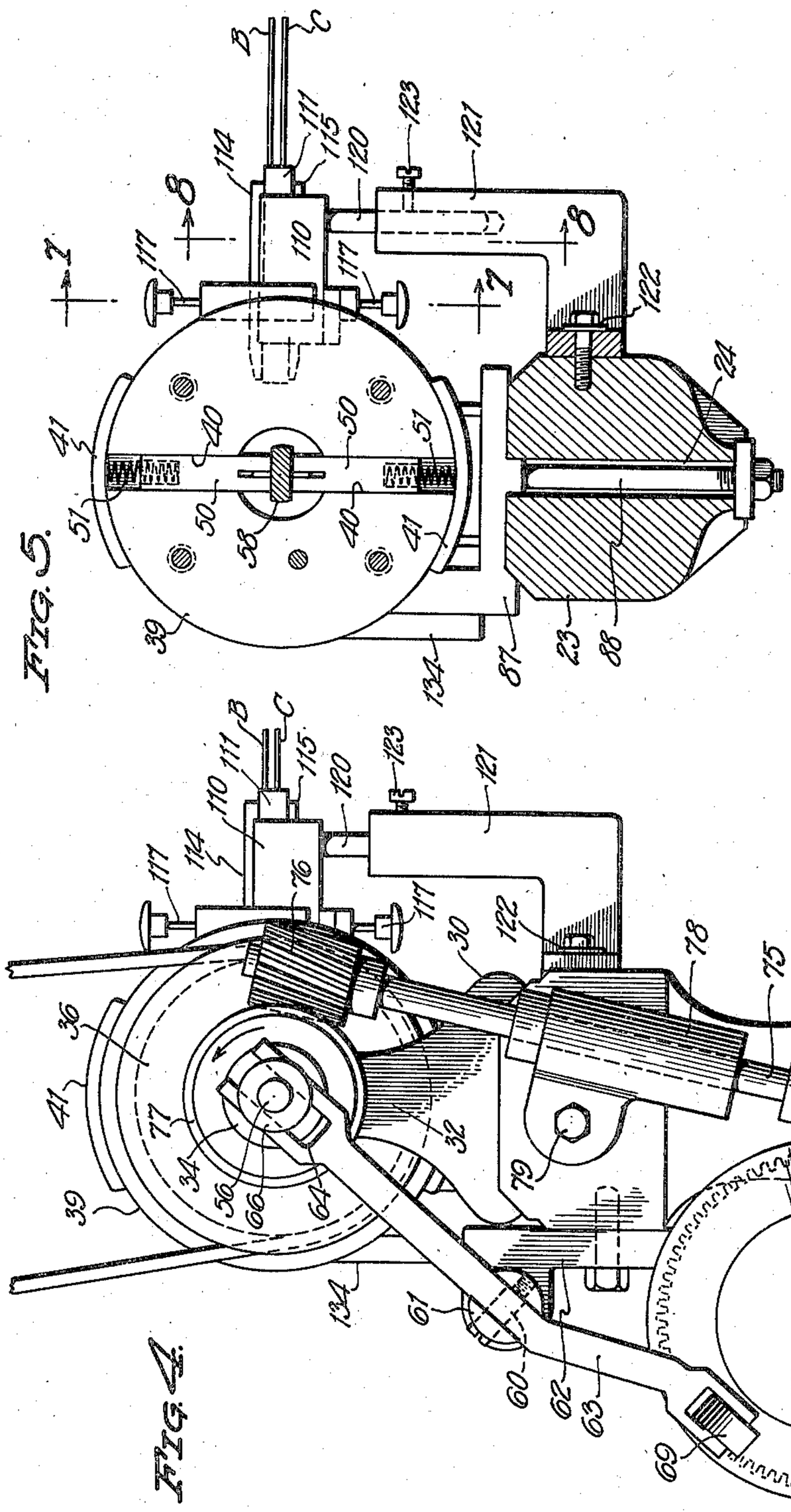

FIG. 5.

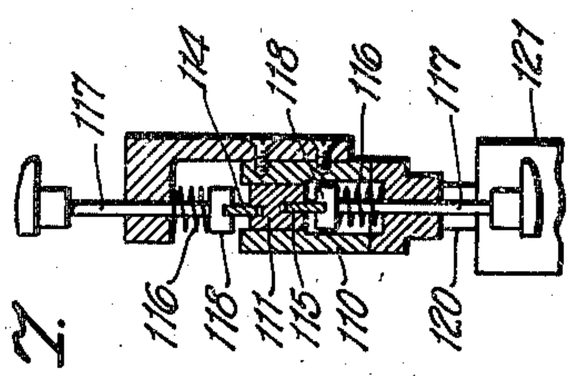

FIG. 7.

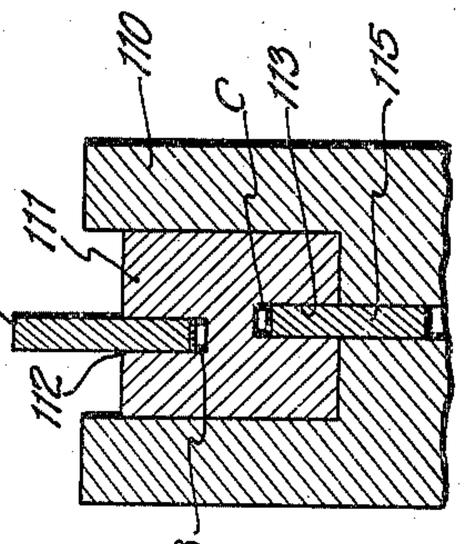

FIG. 8.

FIG. 4.

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METALWORKING MACHINE

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FIG. 6.

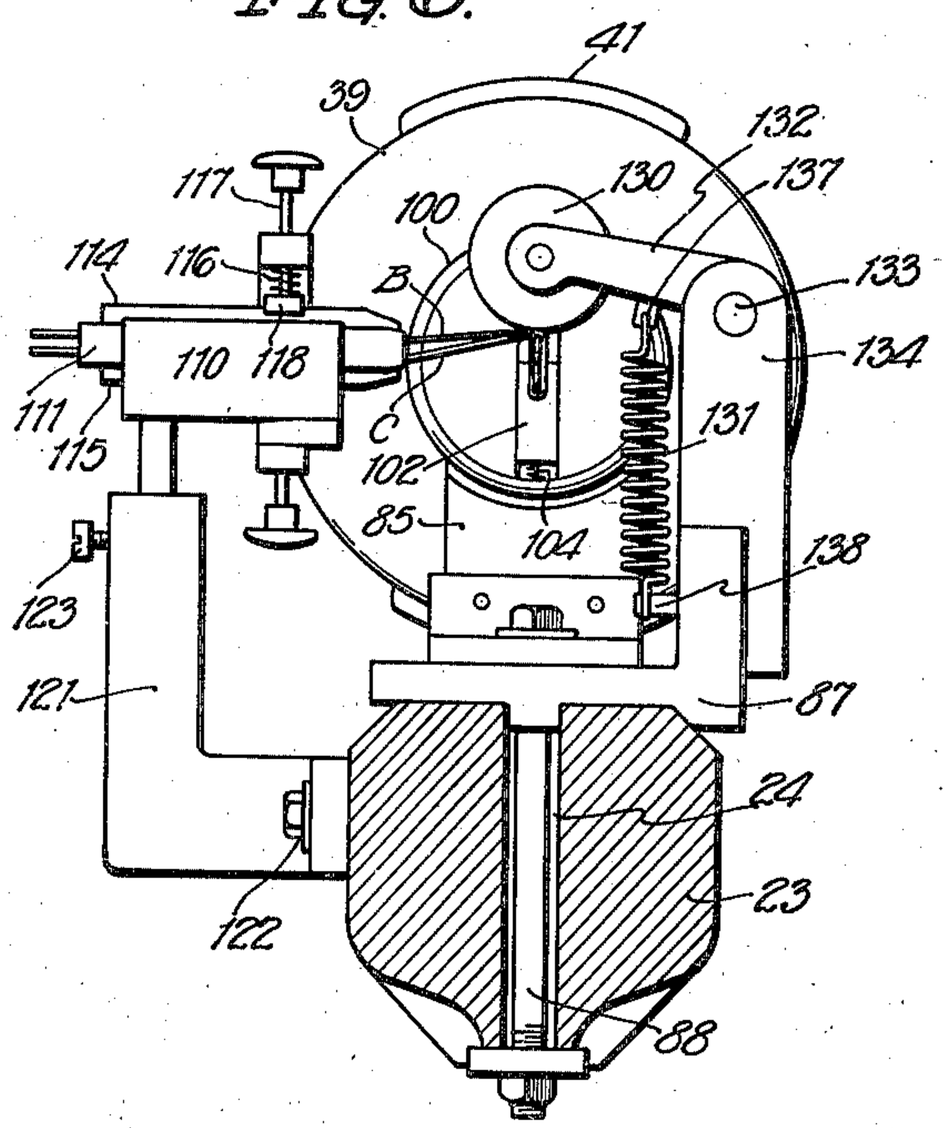


FIG. 11.

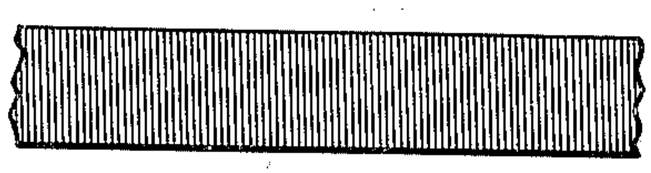


FIG. 12.

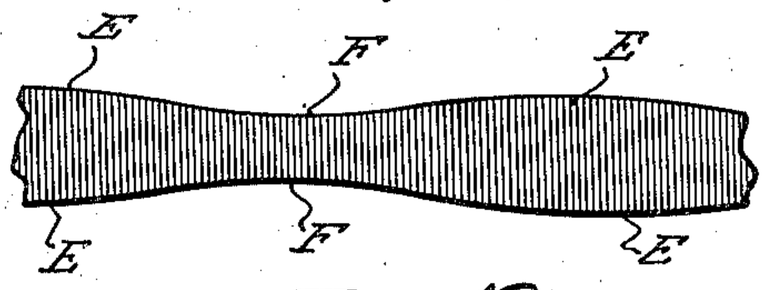


FIG. 13.

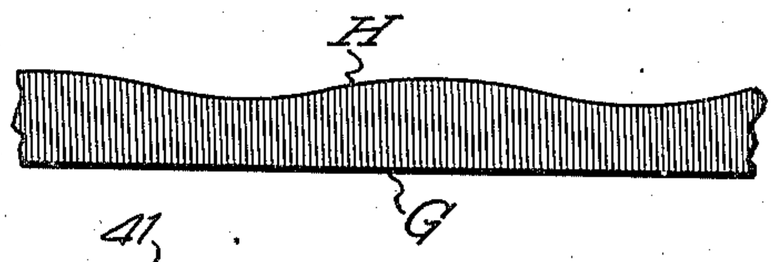


FIG. 10.

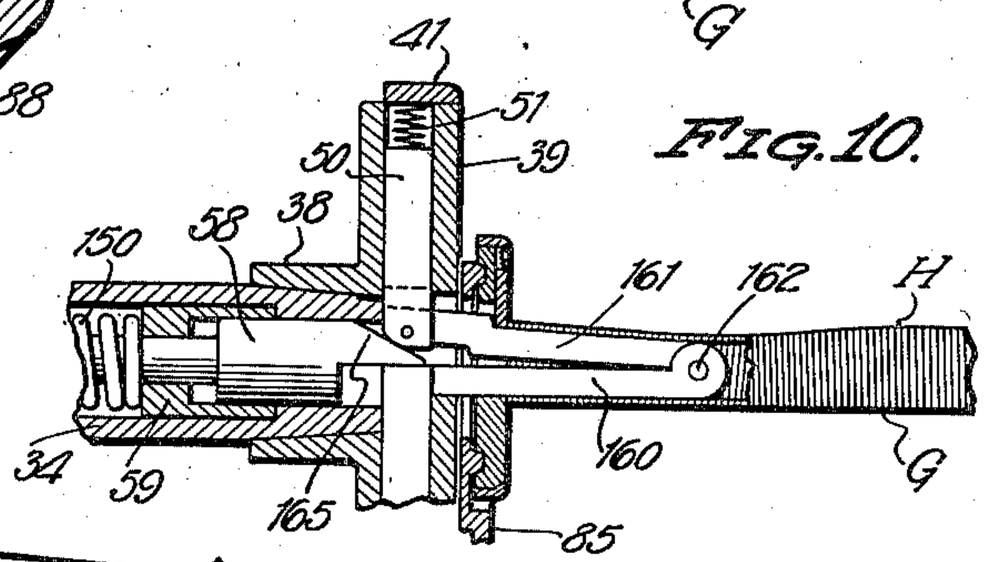
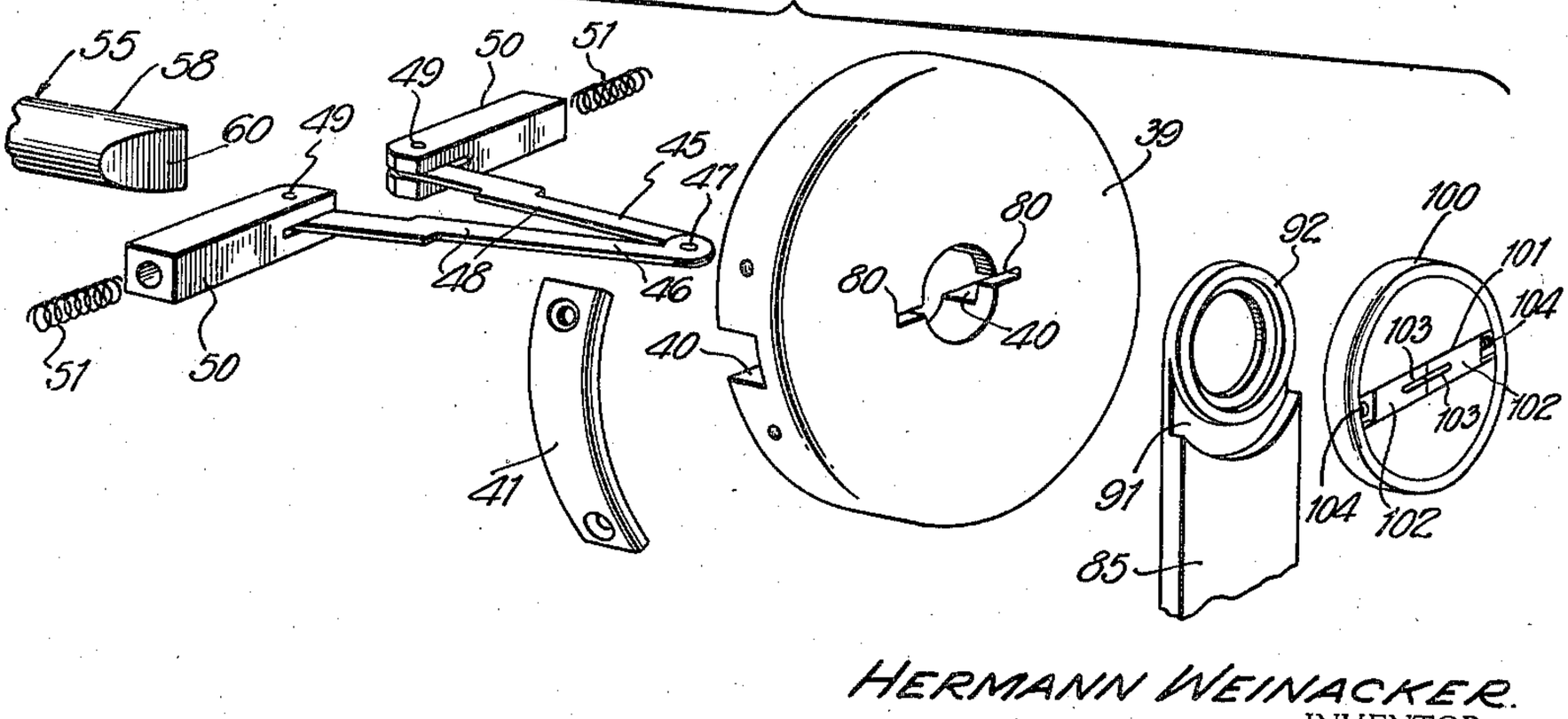


FIG. 9.



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Patented Aug. 2, 1938 2,125,759

UNITED STATES PATENT OFFICE

2,125,759

METALWORKING MACHINE

Hermann Weinacker, Maplewood, N. J., assignor to Universal Chain Co. Inc., Maplewood, N. J., a corporation of New Jersey

Application September 10, 1935, Serial No. 39,883

10 Claims. (Cl. 153—64)

This invention relates to new and novel improvements in metalworking machines, and more particularly it pertains to machines for making metallic ribbon.

The metallic ribbon above referred to is of relatively thin, flat tubular form constructed from what is known in the art as channeled wire, there being two such wires spirally wound together in reversed superimposed relation around a suitable forming mandrel.

This product has been heretofore manufactured in two forms, namely, the non-expansible type and the expansible type. The non-expansible type is clearly illustrated in Patent Number 222,176, December 2, 1879, the expansible type being illustrated in Patent Number 1,279,852, September 24, 1918.

It is to be noted that in each of the above noted instances, the product has its side edges defined by a straight line and in so far as I am aware, this is the only manner in which these so-called flat metallic ribbons have heretofore been formed.

These metallic ribbons so-called are intended for personal wear as article of jewelry, and I have found by actual experience that their appearance may be greatly enhanced if one or both side edges of the finished product be of irregular form instead of straight, as heretofore mentioned.

It is, therefore, one of the objects of the present invention to provide a new and novel article of manufacture in the form of a metallic ribbon of relatively thin, flat tubular form, which also may be of either the non-expansible or expansible type.

It is a further object of the invention to provide a new and novel machine upon which an article such as described may be automatically formed.

It is a further object of the invention so to construct the machine that various designs for either one, or both of the side edges of the finished product may be obtained.

Other objects of the invention reside in certain novel and improved constructions, arrangements and combinations of parts hereinafter described and particularly pointed out in the claims, the advantages of which will be readily understood and appreciated by those skilled in the art.

The invention will be clearly understood from the accompanying drawings illustrating the invention in its preferred form and the following detailed description of the constructions therein shown.

In the drawings,

Figure 1 is a top plan view of a machine constructed in accordance with the present invention,

Figure 2 is a view thereof in front elevation,

Figure 3 is a view partly broken away and partly in section, the view being on an enlarged scale,

Figure 4 is a view in end elevation,

Figure 5 is a detail vertical sectional view on an enlarged scale taken substantially on the line **5—5** of Figure 2,

Figure 6 is a detail sectional view taken substantially on the line **6—6** of Figure 2,

Figure 7 is a detail sectional view of the wire feeding mechanism, the view being taken substantially on the line **7—7** of Figure 5,

Figure 8 is a detail sectional view on an enlarged scale, the view being taken substantially on the line **8—8** of Figure 5,

Figure 9 is a distended perspective view of the improved mandrel and its operating mechanism,

Figure 10 is a detail sectional view illustrating a modified form of the invention,

Figures 11, 12 and 13 are plan views illustrating various types of relatively thin, flat, tubular metallic ribbons which may be formed upon the machine herein illustrated, and

Figure 14 is a detail sectional view of a modified form of the invention.

Referring to the accompanying drawings wherein is illustrated a machine which has in actual practice proven capable of constructing a relatively thin, flat, hollow tubular metallic ribbon of the general type heretofore mentioned, the numeral **20** designates a suitable supporting standard by which the machine may be mounted upon a bench or other suitable support **21**. Extending laterally from the standard **20** there is an arm **23** having a slot **24** extending longitudinally thereof, and carried by the outer end of this arm there is a tubular member **25** which receives the finished product as it comes from the machine. This tubular member **25** preferably has a flared end **26**, as illustrated.

A bracket like member **30** having arms **31** and **32** is mounted upon the standard **20**, and in their upper ends these arms carry bearings **33** to provide for mounting of a shaft **34**, which shaft is hollow as shown, and operatively connected to this shaft as by a screw **35** there is a cone pulley **36**. The shaft **34** projects beyond the arm **31**, as at **37**, and suitably fixed to this projecting portion **37** as by means of a flange **38** there is a disk like member **39**.

The disk like member **39** has two channels **40** in its outer face. These channels extend to the peripheral edge of the disk like member **39**, and

their outer ends may be closed by closure plates 41 held in place by means of screws or the like 42.

The reference character A designates a mandrel upon which the product of the machine is formed. This mandrel consists of two parts 45 and 46, pivotally connected together at their outer ends as at 47. The inner ends of the parts 45 and 46 are enlarged as at 48, and each is pivotally connected as at 49 to a sliding block 50, the sliding blocks being mounted in the channels 40, heretofore described.

Mounted within the hollow shaft 34, there is a member 55, which I will term a mandrel spreading element. This mandrel spreading element comprises a shank portion 56 mounted in a bearing 57 projecting from the interior of the hollow shaft 34 at the rear end thereof. At its forward end, the member 55 is provided with a head 58 mounted in a bearing 59 at the forward end of the hollow shaft 34. The head 58 of the member 55 has two angular faces 60, which in effect constitute an entering wedge adapted to pass between the two parts 45 and 46 of the mandrel A to move them relatively to each other about their pivotal point 47 and in opposition to the tension of the springs 51 to effect an expansion of the mandrel A, when the mandrel spreading element is moved forwardly of the machine.

This forward movement of the mandrel spreading element is occasioned at predetermined intervals, and this is accomplished by the mechanism now to be described.

Pivotally mounted as at 60 in an arm 61, which may be secured to the machine by a bracket 62, there is a rocking lever 63. The upper end of this lever 63 is forked as at 64 to straddle the shank 56 of the mandrel spreading element 55 and to engage the bearing 57, which is fixed to said shank by a set screw 65. The shank 56 also carries a collar 66 which is adapted for engagement by the forked end 64 of the rocking lever 63. The lower end of the rocking lever 63 carries a roller 69, which in turn engages the cam face 70 of a cam 71, mounted on a shaft 72 which may be suitably mounted in the afore-mentioned bracket 62. This shaft 72 carries a gear 73, preferably of the spiral bevel type, and this gear meshes with a complementary gear 74 carried by a shaft 75, mounted in a suitable bracket 78 secured as at 79 to the machine. Upon the upper end of the shaft 75, there is a gear 76, preferably of the spiral bevel type, and this gear meshes with a complementary gear 77 fixed to the shaft 34. Thus, it will be apparent that upon rotation of the shaft 34, which is driven by the cone pulley 36, through the medium of the gear 77, shaft 75, gears 74 and 73, and the shaft 72, the cam 71 will be rotated and will rock the lever 63 about its pivotal point in accordance with the contour of the cam face of the cam 71, and cause the forward movement of the mandrel spreading element 55. The rearward movement of the mandrel spreading element is effected by a coil spring 150 which surrounds the shank 56 of the mandrel spreading element 55, and has its forward end in engagement with the bearing 59, and its rear end in engagement with the bearing 57. As the cam 71 moves the mandrel spreading element forwardly, this spring is placed under sufficient tension to move the mandrel spreading element rearwardly as the roller 69 on the rocking arm 63 passes over the low portions of the cam, and it will also be understood that the tension of the spring 150 will be sufficient to cause the roller 69 to at all times follow the contour of the cam face 70 of the cam 71.

By reference to Figure 9 it will be noted that the disk like member 39 is provided with diametrically opposed slots 80 in which the parts of the mandrel are mounted, and through which the parts move as the mandrel is expanded. When the mandrel is expanded to its fullest extent, these slots will be completely filled or closed. However, when the mandrel is in its contracted position, these slots are partially open, and unless some means is provided to prevent it, the wires in their laying might enter either of these slots and result in improper formation of the finished product. In order to obviate this possibility, I provide an upstanding arm or standard 85 carried by a block 86 which is mounted upon a base 87. The base 87 is mounted upon the arm 23 and is adjustably secured thereto by a bolt 88 which passes through the slot 24 of the arm 23. This bolt also passes through a slot 89 in a base flange 90, projecting from the block 86, and thus provides means for adjustably mounting the block relatively to the base 87.

The upper end of this arm or standard is cut away as at 91 to provide a circular bead 92 which is formed on the outer face of the standard or arm 85. A disk like member 100 is provided with a slot or groove 101, and slidably mounted therein there are two blocks 102, the adjacent ends of which are provided with slots 103 to receive the parts of the expanding mandrel. These blocks are forced inwardly of the disk like member by coil springs 104, and thus the closed end of each of the slots will at all times follow its respective part of the expanding mandrel to insure perfect contact of the wires with the disk like member 100 at the point where the product is being formed.

As heretofore stated, the ribbon is formed from two channeled wires disposed in inverted superimposed relation with the flanges of each wire disposed between or within the flanges of the other wire.

This is accomplished by feeding the wires to the mandrel and pressing them into wrapping engagement with the mandrel as the same is rotated.

The wire feeding mechanism is illustrated in Figures 5 to 8, inclusive, and it consists of a housing 110, in which there is a block 111 having a groove 112 in its upper face and a groove 113 in its lower face. In the groove 112 there is a bar 114, and in the groove 113 there is a bar 115, and these bars are forced inwardly of their respective slots by springs 116, which surround plungers 117 suitably mounted in the housing 110. Each plunger 117 has a head 118 which is slotted to receive its respective bar, and the springs are positioned on their respective plunger between its head 118 and the adjacent wall of the housing. The wires are fed through the slots 112 and 113 merely by the pull thereon as they are being wrapped or formed around the mandrel, and the springs 116 will be of sufficient strength to exert sufficient friction to permit of free sliding of the wires and yet prevent buckling thereof between the wire feeding mechanism and the mandrel. It will be noted that the grooves 112 and 113 are off-set with respect to each other so that the wires, which are designated B and C, will be received upon the mandrel in such manner that the flanges of each wire will be received between the flanges of the other wire. The housing 110 of the wire feeding mechanism has a leg 120 de-

pending therefrom which is received in a bracket 121, which in turn is secured to the machine as at 122. A screw 123 provides for vertical adjustment of the wire feeding mechanism.

The wires are formed about the mandrel by a laying roller 130 which is forced into engagement with the wires as they are wrapped around the mandrel, by a spring 131. The laying roller is mounted in an arm 132, pivotally mounted as at 133 in the upper end of a bracket or arm 134. The bracket or arm 134 projects vertically from the base 87, heretofore described. The spring 131, heretofore mentioned, is connected at its upper end as at 137 to the arm 132, and at its lower end to a projecting arm 138, and the tension of this spring maintains the laying roller at all times in engagement with the wires as they are being wrapped around the mandrel, thus insuring proper formation of the wires upon the mandrel.

In Figure 11 there is illustrated a ribbon of the type wherein both of the side edges are straight or parallel, which is the only manner, in so far as I am aware, that this product has been heretofore formed.

The machine of the present invention is adapted to construct this form of metallic ribbon, and when it is so operating, the mandrel will be maintained in its contracted position in which it is illustrated in Figure 3. This is readily accomplished either by removing the arm 63 from the machine or by removing the cam 71. With the parts in this position, it will be obvious that the mandrel will at all times remain in its contracted condition and the product formed thereon will have straight parallel side edges.

The ribbon illustrated in Figure 12 has side edges which are not parallel to each other, the ribbon being formed with alternate wide and narrow portions E and F, respectively.

This form of ribbon illustrated in Figure 12 is formed in the following manner. A cam 71 of the proper pattern is attached to the shaft 72, and the rocking arm attached to the machine with its roller 69 in engagement with the cam face 70 of the cam 71. Now it will be obvious that, as the machine is placed in operation, that, under the influence of the cam 71, the arm 63 will be rocked and the mandrel spreading member will be operated to expand and contract the mandrel in accordance with the cam pattern. It will also be obvious that when the mandrel is expanded, the wider portions E of the ribbon will be formed, that when the mandrel is contracted, the narrower portions F will be formed, and that during the expansion and contraction of the mandrel, the angular portions between the portions E and F will be formed. It will also be obvious that variations of the form illustrated in Figure 12 may be obtained either by changing the cams or by variations in the rate of speed at which the machine is operated or both, as desired.

The type of ribbon illustrated in Figure 13 has one straight side G, and one irregular side H, and this general type of ribbon may be formed on a mandrel such as is illustrated in Figure 10 of the drawings.

The mandrel illustrated in Figure 10 is of substantially the same construction and operation as the mandrel heretofore described. It does differ slightly, however, in that while it has two parts 160 and 161, the part 160 is a rigid part and the member 161 is pivotally attached thereto as at 162. Also, in this form the head 58 of the mandrel spreading element has but a single inclined face 165 so that only the part 161 of the mandrel is operated. Thus it will be apparent that the part 161 which is under control of the cam 71 will form the irregular side edge of the finished ribbon, while the part 160, which at all times remains rigid and straight, will form the straight side edge of the finished ribbon. As in the previously described form of the invention, the character of the irregular side edge of the finished ribbon may be varied merely by changing cams, variations in speed of operation of the machine, or both.

From the foregoing it will be apparent that the present invention provides a new and improved machine which will form relatively thin, flat tubular metallic ribbons, the side edges of which may be formed either straight and parallel, or of irregular form, and that the machine is so constructed that the irregularity of the side edges may be determined merely by slight changes in certain elements of the machine.

As thus far illustrated and described, the invention has been limited to the formation of ribbons of relatively thin, flat, tubular form, but as will now be described, the invention is capable of use to manufacture tubular structures with irregular walls and of other than relatively thin, flat form.

In Figure 14, I show a mechanism by which I can form a tubular structure which will be circular in cross-sectional form and in which the walls will be irregular.

In said Figure 14, the mandrel, which is designated 200, is tapered and is removably carried by the head 58, of the shank 56, by means of a clamping plate 201, suitably secured in position by screws as shown in dotted lines in said figure. The shaft 34 is operatively connected with the head 58 of the shank 56, by means of a key 204, secured to the shaft 34 and sliding in an elongated keyway 205 in the shank head 58. A pin 206, carried by the head 58, is pressed forwardly by a spring 207 into engagement with a recess 208, in the disk-like member 100, thus forming the driving means for the disk-like member 100, and effecting its rotation with the mandrel 200.

In this form of the invention, as the mandrel is reciprocated, the diameter of the finished product produced thereon will vary in accordance with that portion of the mandrel upon which it is formed and thus by continuous reciprocation of the mandrel during the formation of the product, a tubular structure of circular cross-section but having irregular walls will result. I have also made numerous experiments and have found that the same generic type of finished product can be produced on mandrels which are oval, triangular, hexagonal and of other cross-sectional forms and I have also found that the several products so formed may be flattened out into ribbon like form by suitable methods already known in the art if desired.

While the machine has been herein illustrated in its preferred forms, it is to be understood that it is not to be limited to the specifically illustrated embodiments thereof, and that it may be embodied in other forms, and further, that this is particularly true as regards the contour or design of the side edges of the finished ribbon, since the forms in which these side edges may be constructed, are unlimited in scope, those forms herein illustrated being merely illustrative in character.

Having thus described the invention, what is claimed as new, is:

1. In a machine of the type described, an expansible and contractable forming mandrel, means for rotating said mandrel, means for expanding said mandrel, and resilient means for contracting said mandrel, said mandrel expanding and contracting means being automatically operated independently of each other during rotation of the mandrel.

2. In a machine of the type described, an expansible forming mandrel comprising two members pivotally connected together, means for rotating said mandrel means tending normally to maintain said mandrel in its contracted position during rotation thereof, and automatically operated means operative in opposition to said first mentioned means for operating said mandrel to progressively expand and permit of the progressive contraction of the mandrel.

3. In a machine of the type described, an expansible forming mandrel, means for rotating said mandrel resilient means for maintaining said mandrel normally in a closed position during rotation thereof and mechanical means for expanding said mandrel against the action of said resilient means during rotation thereof.

4. In a machine of the type described, a two part forming mandrel, means for rotating the mandrel means for pivotally connecting the two parts of said mandrel together at one end whereby said parts are capable of movement one relative to the other to provide an expansible and contractable mandrel, means movable between the parts of the mandrel to expand the same, said means being withdrawn from between the parts to permit of contraction of the mandrel during rotation thereof and means for moving the parts of the mandrel together upon withdrawal of the first mentioned means from between the parts.

5. In a machine of the type described, a two part rotatable forming mandrel, means for rotating said mandrel means for pivotally connecting the two parts of said mandrel together at one end whereby said parts are capable of movement one relative to the other to provide an expansible and contractable mandrel, power operated means movable between the parts of the mandrel to effect an expansion of the mandrel, during rotation thereof and separate means operable independently of the first mentioned means for effecting a contraction of the mandrel during rotation of the mandrel.

6. In a machine of the type described, a two part rotatable forming mandrel, means for rotating said mandrel means for pivotally connecting the two parts of said mandrel together at one end whereby said parts are capable of movement one relative to the other to provide an expansible and contractable mandrel, power operated means movable between the parts of the mandrel to effect an expansion of the mandrel, and resilient means for effecting a contraction of the mandrel, said expanding and contracting means being alternately operated during rotation of the mandrel.

7. In a machine of the type described, a two part rotary forming mandrel, means for rotating said mandrel means for pivotally connecting the two parts of said mandrel together at one end whereby said parts are capable of movement one relative to the other to provide an expansible and contractable mandrel, power operated means movable between the parts of the mandrel to spread the same and effect an expansion of the mandrel, separate means for withdrawing said first mentioned means from between the parts of the mandrel to permit of contraction of the mandrel, and resilient means for effecting a contraction of the mandrel after the first mentioned means has been withdrawn therefrom, said mandrel expanding means and contracting means being alternately operated during rotation of the mandrel.

8. In a machine of the type described, a two part mandrel, means for pivotally connecting the two parts of said mandrel together at one end whereby said parts are capable of movement one relative to the other to provide an expansible and contractable mandrel, a power operated spreading element movable between the parts of the mandrel to spread the same to effect an expansion of the mandrel, resilient means for withdrawing said power operated spreading element to permit of contraction of the mandrel, and resilient means for effecting a contraction of the mandrel when the power operated spreading element is withdrawn from between the parts of the mandrel.

9. In a machine of the type described, a two part mandrel, means for pivotally connecting the two parts of said mandrel together at one end whereby said parts are capable of movement one relative to the other to provide an expansible and contractable mandrel, a power operated spreading element movable between the parts of the mandrel to spread the same to effect an expansion of the mandrel, a rocking lever for moving said spreading element to position between the parts of the mandrel to spread the same, a cam for operating said rocking lever, a spring for withdrawing the spreading element from between the parts of the mandrel to permit of contraction of the mandrel, and resilient means for effecting a contraction of the mandrel, and means for contracting the mandrel as the spreading element is withdrawn from between the pivoted parts of the mandrel.

10. In a machine for forming tubular metallic bodies from two reversely positioned channeled members superimposed one upon the other, a tapering mandrel, means for forming said reversely positioned superimposed channeled members about said mandrel, and means for reciprocating said mandrel relative to the forming means to vary the diameter of the finished product.

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