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A. ZAHORANSKY

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BRUSH MAKING MACHINE

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2 Sheets-Sheet 2

Fig. 7.

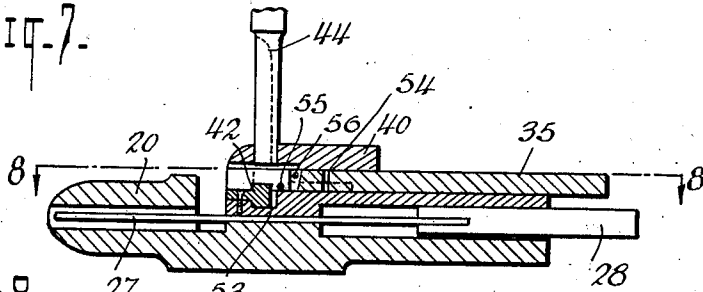


Fig. 8.

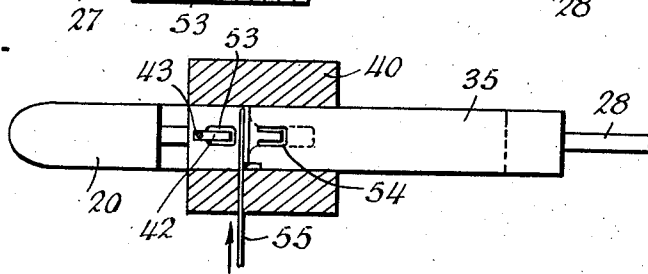


Fig. 9.

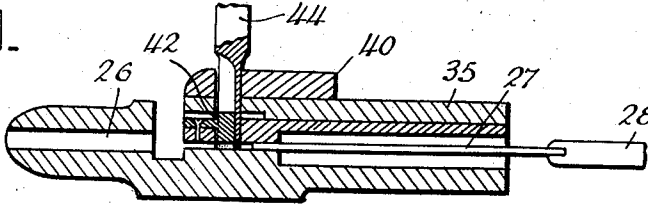
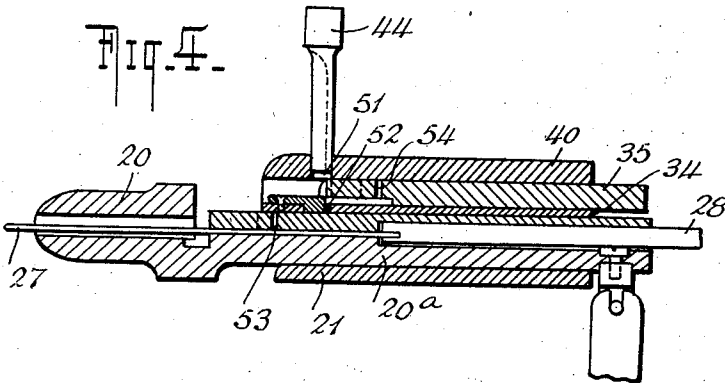


Fig. 4.



INVENTOR  
ANTON ZAHORANSKY  
BY *Richard Klein*  
ATTORNEYS

# UNITED STATES PATENT OFFICE

ANTON ZAHORANSKY, OF TODTNAU, GERMANY

## BRUSH MAKING MACHINE

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This invention relates to improvements in brush making machines. The invention refers more particularly to filling devices of such machines used for forming wire loops and for driving them, together with the bristles, into bores or recesses of the brush body.

Brush making machines are known wherein separate mechanisms are employed for forming wire loops used for holding the bristles within the brush body. Such mechanisms are usually connected by long channels with the filling device of the machine and their work is subjected to constant interruptions owing to the fact that the wire loops often do not follow the path prescribed for them in the machine. Furthermore, machines are known wherein the wire loops are formed within the filling device by means of a driving pounder subsequently employed for driving the wire loop into a bore of the brush body, the forming of the loop taking place during a part of the stroke of the pounder and within the path thereof. It has been found that owing to the fact that the movement of the pounder has to take place quickly, the amount of time left for forming the wire loop is not sufficient in such machines to ensure a proper working of the pounder. Furthermore, the action of the pounder being that of short and sharp blows, the wire is consequently subjected to rather high tensions due to which the material is often damaged prior to or during its insertion into the brush body.

An object of this invention is to eliminate the above-mentioned drawbacks by providing a filling device for brush making machines wherein the forming of the wire loops for holding the brush bristles is performed independently of the driving pounder used for inserting the bristles, together with the wire loops, into the brush body.

Another object of this invention is to increase the efficiency and the output of the machine by providing a filling device having separate means for forming wire loops working simultaneously with means for driving said loops together with the bristles into the brush body, and thus also eliminating concussions of the machine and interruptions in

work which are liable to occur if the above mentioned steps are performed by means of a single device.

A further object is to provide a filling device of the above-mentioned kind which does not necessitate considerable changes in the other parts of brush making machines used heretofore and considerably increases the efficiency of such machines.

Still another object of this invention is to provide a filling device wherein an adjustment of the movement of the wire feeding device and the substitution of a pounder of different dimensions is sufficient to produce brushes of different sizes.

Yet another object of this invention is to provide a filling device of a simple and efficient construction and having interchangeable parts.

The above-mentioned objects can be realized according to this invention by providing independently operated loop forming and pounding means, which are separated from each other by a rigid wall arranged between the same. Owing to this arrangement the feeding of the wire can take place during the forward or operative stroke of the pounder, the cutting off of a wire piece and the formation of a loop therefrom may take place during the time in which the pounder is fastening a previously formed loop in a bore of the brush body and the feeding movement of the first-mentioned wire loop into the path of the pounder may take place during the backward movement of the latter, which occurs after said previously formed loop has been secured in position.

The present device is especially advantageous for use in brush making machines having reciprocating nozzles or heads because in such machines as known heretofore the time for forming wire loops was exceedingly limited. The invention is also applicable however to immovable filling devices and to machines wherein the bristles are moved in a horizontal direction as well as to those in which the bristles are vertically moved.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying

drawings, which illustrate two preferred embodiments of the inventive idea.

In the drawings:

Fig. 1 shows diagrammatically a brush manufacturing machine with a movable filling device in side elevation.

Fig. 2 is a vertical cross-section through the filling device of this machine on a larger scale.

Fig. 3 is a section along the lines 3—3 of Fig. 2 looking in the direction of the arrows.

Fig. 4 is similar to Fig. 2 and shows a movable filling device in vertical cross-section during the movement of the pounder.

Fig. 5 is a vertical cross-section through another modification of this invention as applied to immovable filling devices.

Fig. 6 is a section along the lines 6—6 of Fig. 4 looking in the direction of the arrows.

Fig. 7 is similar to Fig. 4 and shows the position of the various parts during the movement of the wire in vertical cross-section.

Fig. 8 is a horizontal section along the lines 8—8 of Fig. 7.

Fig. 9 is similar to Fig. 4 and shows the position of the various parts at the beginning of the movement of the pounder.

Fig. 10 shows the arrangement of the wire loop within the brush body.

Fig. 11 is a diagram showing the working process of a filling device prior to this invention.

Fig. 12 is a diagram showing the working process of a filling device according to this invention.

The modification shown in Figs. 1, 2, 3 and 4 is a movable filling device having a nozzle 20 provided with a continuation body 20a and adapted to be reciprocated within a casing 21 by means of a lever 22 pivoted in 23 and adapted to be moved by a cam 24 rotated by the main shaft 25. The body 20a of the nozzle is provided with a channel 26 and a pounder 27 rigidly connected with an arm 28 is reciprocated within this channel by means of a lever 29 connected in 30 with a crank arm 31 adapted to be moved by an eccentric 32 rotated by means of the main shaft 25. The upper nozzle body 33 is connected with the lower body 20a by any suitable means (not shown) and is reciprocated together with the nozzle 20 by means of the lever 22. An immovable casing 34 separates the movable body 33 from a movable loop former 35 adapted to slide on said casing by means of a lever 36 pivoted in 37 to the frame 38 of the machine and engaging a cam 39 rotated by the main shaft 25. An upper casing 40 is connected with the intermediate casing 34 and the lower casing 21 by means of screws 41 and is attached to the frame 38 of the machine. An anvil 42 is firmly connected with the intermediate casing 34 by means of a screw 43 (Fig. 8) and is used for bending the

wire pieces. A hammer 44 is reciprocated in a direction perpendicular to the direction of movement of the other above-mentioned reciprocating parts by means of an arm 45 connected with an arm 46 pivoted in 47 and connected with an arm 48 carrying a roller 49 which slides on a cam surface 50 rotated by means of the main shaft 25. The lower end of the hammer 44 is U-shaped in cross-section (Fig. 9) and is adapted to pass through U-shaped slots 51 and 52 (Fig. 4) extending through the upper casing 40 and the intermediate casing 34. The upper nozzle body 33 has a corresponding slot 53 adapted to align with the slot 52 at a certain position of the body 33 (Fig. 2). The loop former 35 is provided with a slot 54 (Figs. 4 and 8) and the hammer 45 is adapted to pass through this slot.

A further modification of this invention is shown in Figs. 5, 6, 7, 8 and 9 of the drawings. Herein the nozzle 20 with its continuation body 20a and the upper part 33 are rigidly attached to the frame of the machine and are immovable, so that the brush body has to be moved towards the nozzle by any known means not shown in the drawings. The pounder 27 is reciprocated within the nozzle in a way similar to that described in connection with the device shown in Fig. 1. The loop former 35 is also similarly reciprocated between the fixed upper casing 40 and the immovable nozzle body 33, the screws 41 serving to connect the casing 40 with the lower part 20a of the nozzle. The hammer 44 is also moved in a similar way. The device shown in Figs. 1, 2, 3 and 4 of the drawings operates as follows:

A long strip of wire 55 (Figs. 2 and 8) is drawn sidewise either manually or by any automatic means (not shown) into the device. Thereupon the loop former 35 is moved forward (from right to left in the drawings) until a knife 56 (Figs. 2 and 7) carried by said holder comes into contact with the wire 55 and cuts off a piece of wire having a length equal to the width of the holder (Fig. 8). During the further movement of the holder the wire is pressed against the anvil 42 and bent owing to the action of the loop former into a U-shaped loop. Then the hammer 44 begins its downward stroke and passes through the slot 51 of the upper casing 40 and through the slot 54 of the loop former 35. The U-shaped end of the hammer 44 engages thereby the bent wire piece and pushes it through the slot 52 of the intermediate casing 34. In this moment the nozzle members 20, 20a and 33 are in such a position that the slot 53 of the upper nozzle body 33 is exactly underneath the slot 52 of the casing 34 so that the hammer 44 together with the piece of wire can pass through the slot 53. The hammer 44 pushes the wire into the channel 26 and in the path of the pounder 27. This

position is shown in Fig. 2 of the drawings. In this position the nozzle 20 and the pounder 27 are at the end of their backward stroke.

The hammer 44 begins then to move upward and withdraws from the slot 53 of the upper nozzle body 33 so that said body together with the nozzle 20 attached thereto can begin its forward stroke moving from right to left with respect to the position shown in the drawings. The pounder 27 also begins its forward stroke but moves from right to left with a velocity different from that of the nozzle. The nozzle 20 comes into contact with the brush body and the pounder 27 pushes the wire loop together with the bristles which can be fed into the channel 26 by any known means, not shown in the drawings, into one of the bores of the bristle body. This position is shown in Fig. 4 of the drawings. In this position the hammer 44 is at the end of its upward stroke and the nozzle 20 and the pounder 27 have terminated their forward stroke. The loop former 35 is at the end of its backward stroke. The nozzle 20 and the pounder 27 begin then to move backwards and the loop former 35 begins its forward movement, thereby cutting off another piece of wire. The hammer 44 begins then its downward stroke and the whole operation is repeated.

The device shown in Figs. 5, 6, 7, 8 and 9 operates in a way very similar to that described in the foregoing example with the sole exception that the nozzle does not execute any movement, being firmly attached to the machine frame, so that the brush body has to be moved into contact with the nozzle at an appropriate moment by any known means not shown in the drawings. In the position shown in Figs. 5 and 6 the hammer 44 is moving upwards whereas the pounder 27 is in the midst of its forward stroke. In the position shown in Figs. 7 and 8 the wire 54 is moved in the direction of the arrow so that the next piece of wire can be cut off by means of the knife 56. In the position shown in Fig. 9 the hammer 44 is pushing the wire loop through the slot 53 into the channel 26 and the pounder 27 is moving backwards.

Fig. 10 shows the arrangement of a wire loop 55 within the brush body 60, the sharp end of the loop being driven into the wood by the action of the pounder.

Figs. 11 and 12 show diagrammatically the advantages achieved by this invention. Fig. 11 is a diagram representing the general working process of a filling device prior to applicant's invention, wherein the wire loop is formed by the pounder itself. In the diagram the circle represents the stroke or the time of the stroke of the pounder, A and B being the two dead points wherein the movement of the pounder is reversed. At C the pounder comes in contact with the wire, which is cut off at D. The arc DE represents

the period of bending the wire, while the arc HB represents the driving of the wire together with the bristles by the pounder within the device. At B the wire and the bristles are inserted into the brush body. The total period of cutting and bending the wire is represented by an acute angle  $\alpha$ .

Fig. 12 shows a similar diagram representing the working process of a device according to this invention. The process of cutting off the wire takes place during a much longer time represented by the arc  $C_1 D_1$ , the length of the process of bending the wire being also considerably increased as represented by the arc  $D_1 E_1$ . The arc  $E_1 F_1$  represents the time necessary for driving the wire into the path of the pounder, which moves it along the nozzle channel during the time represented by the arc  $F_1 B_1$ . The total period of cutting and bending the wire is represented by an obtuse angle  $\alpha$ , which is much larger than the corresponding angle  $\alpha$  in Fig. 11.

I claim:—

1. A setting device for brush making machines comprising in combination, a frame, means at least partly surrounded by a part of said frame for driving wire loops into a brush body, separate means for cutting off and bending pieces of wire, said cutting and bending means being at least partly surrounded by a different part of said frame, and means for conveying said wire loops to said driving means, said conveying means being guided by said frame.

2. A setting device for brush making machines, comprising in combination, a nozzle, a pounder carried by said nozzle and situated within a channel formed in said nozzle, means connected with said pounder for reciprocating the same, a loop former for cutting off and bending wire pieces, means connected with said loop former for reciprocating the same independently of said pounder, a common frame for said nozzle and said loop former, and means guided by said frame for conveying wire pieces from said loop former into said channel.

3. A setting device for brush making machines, comprising in combination, a nozzle, a pounder carried by said nozzle and situated within a channel formed in said nozzle, means connected with said pounder for reciprocating the same, a loop former for cutting off and bending wire pieces, means connected with said loop former for reciprocating the same independently of said pounder, a common frame for said nozzle and said loop former, a hammer guided by said frame for conveying wire pieces into said channel, and means connected with said hammer for reciprocating the same.

4. A setting device for brush making machines, comprising a nozzle, a pounder carried by said nozzle and situated within a channel formed in said nozzle, means con-

- nected with said pounder for reciprocating the same, a loop former for cutting off and bending wire pieces, means connected with said loop former for reciprocating the same independently of said pounder, a common frame for said nozzle and said loop former, a knife attached to said loop former, an anvil for bending the wire pieces cooperating with said loop former, a hammer guided by said frame and said anvil for conveying wire pieces into said channel, and means connected with said hammer for reciprocating the same.
5. A setting device for brush making machines, comprising a nozzle, a casing carrying said nozzle, a pounder carried by said nozzle and situated within a channel formed in said nozzle, means connected with said pounder for reciprocating the same, a loop former for cutting off and bending wire pieces, a second casing connected with the first-mentioned casing and carrying said loop former, the second casing separating said loop former from said nozzle, a knife attached to said loop former, an anvil for bending the wire pieces cooperating with said loop former, a hammer guided by the walls of an opening formed in the second-mentioned casing and said anvil for conveying wire pieces into said channel, and means connected with said hammer for reciprocating the same.
6. A setting device for brush making machines comprising in combination a nozzle, a lower nozzle body forming a continuation of said nozzle, an upper nozzle body connected with said lower nozzle body, a casing carrying said nozzle body, means for reciprocating said nozzle body, a pounder within said nozzle body, means for reciprocating said pounder independently of said nozzle body, a loop former, a second casing separating said loop former from said nozzle and carrying said loop former, a knife attached to said loop former, an anvil for bending wire loops in said second casing, means for reciprocating said loop former independently of said pounder for the purpose of forming the wire loops during the movement of said nozzle body, a hammer adapted to convey said wire loops into the path of said pounder and means for reciprocating said hammer.
7. A setting device for brush making machines comprising in combination a nozzle, a lower nozzle body forming a continuation of said nozzle, an upper nozzle body connected with said lower nozzle body, a casing carrying said nozzle body, a machine frame carrying said casing, a main shaft mounted in said frame, means for rotating said shaft, a lever connected with said nozzle body and mounted on said frame, a pounder within said nozzle body, a lever connected with said pounder and mounted on said frame, a loop former, a second casing separating said loop former from said nozzle, a knife attached to said loop former, an anvil for bending wire loops, a lever connected with said loop former and mounted on said frame, a hammer adapted to convey wire loops into the path of said pounder, a lever connected with said loop former and mounted on said frame, and a plurality of cams on said shaft rotated to operate said levers for the purpose of reciprocating the parts connected therewith.
- In testimony whereof I have affixed my signature.
- ANTON ZAHORANSKY.

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