Sept. 14, 1948. W. M. WELSFORD 2,449,263

MACHINE FOR MANUFACTURING HAIR SLIDES, HAIR PINS, OR THE LIKE

Filed Jan. 29, 1947 5 Sheets-Sheet 1

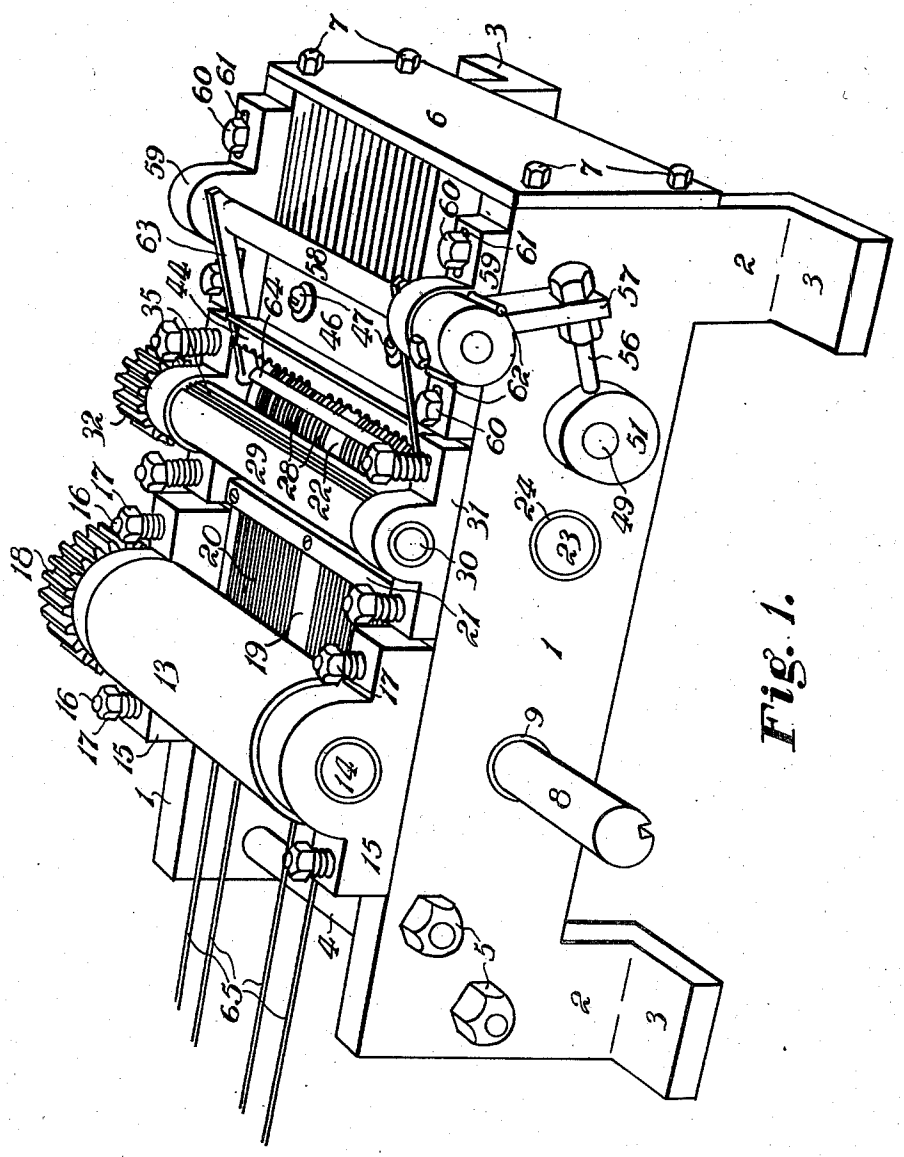


Fig. 1.

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Filed Jan. 29, 1947 5 Sheets-Sheet 2

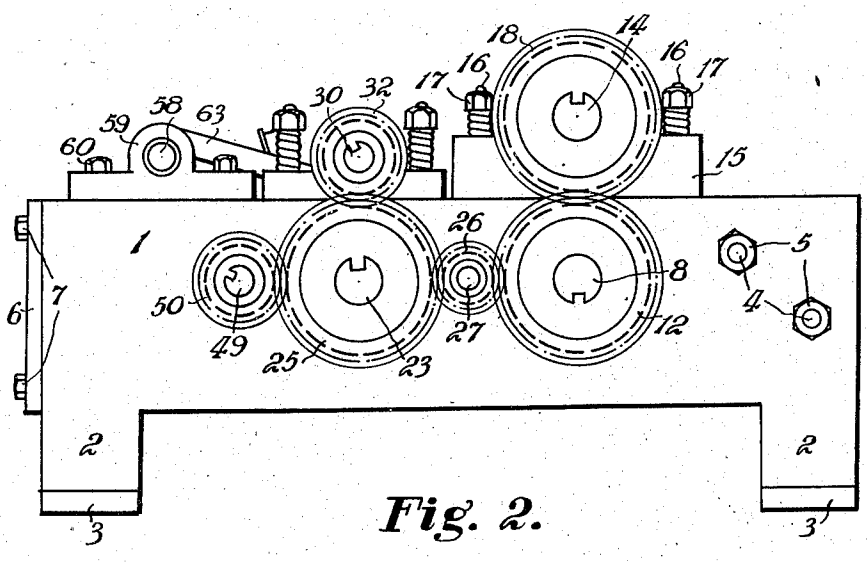


Fig. 2.

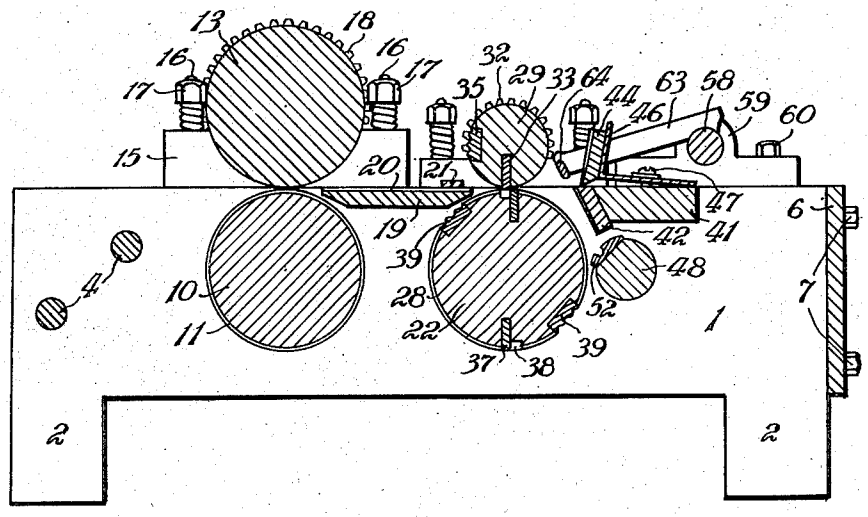


Fig. 3.

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Filed Jan. 29, 1947 5 Sheets-Sheet 3

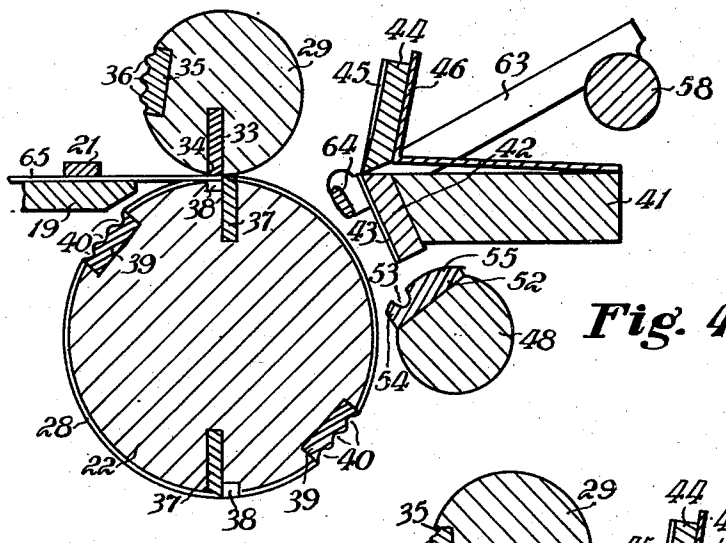


Fig. 4.

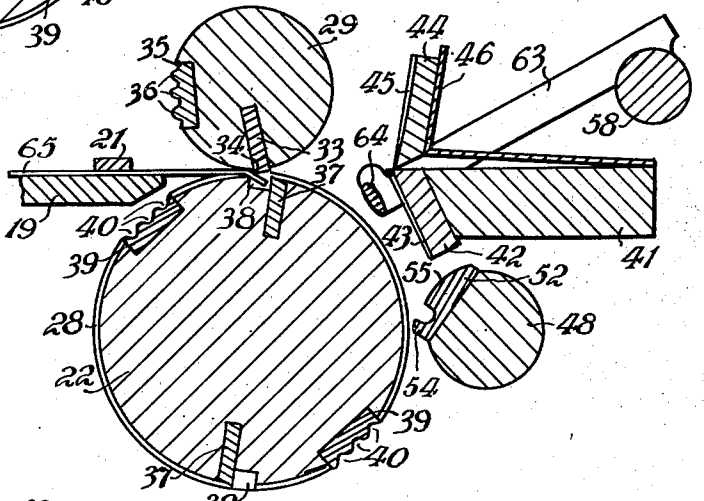


Fig. 5.

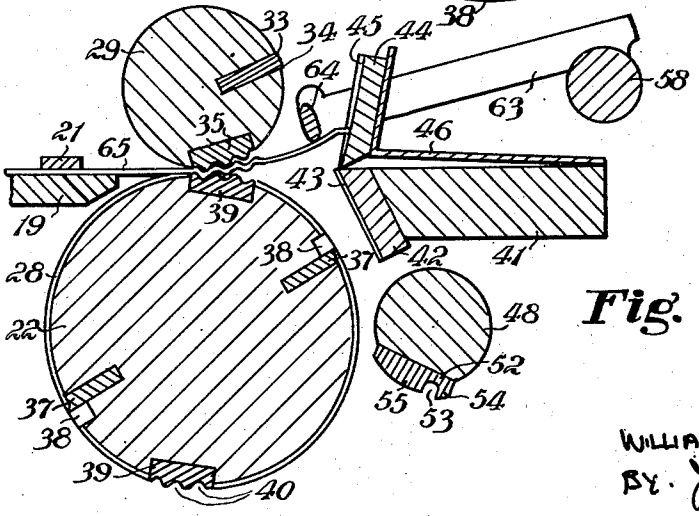


Fig. 6.

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Filed Jan. 29, 1947 5 Sheets-Sheet 4

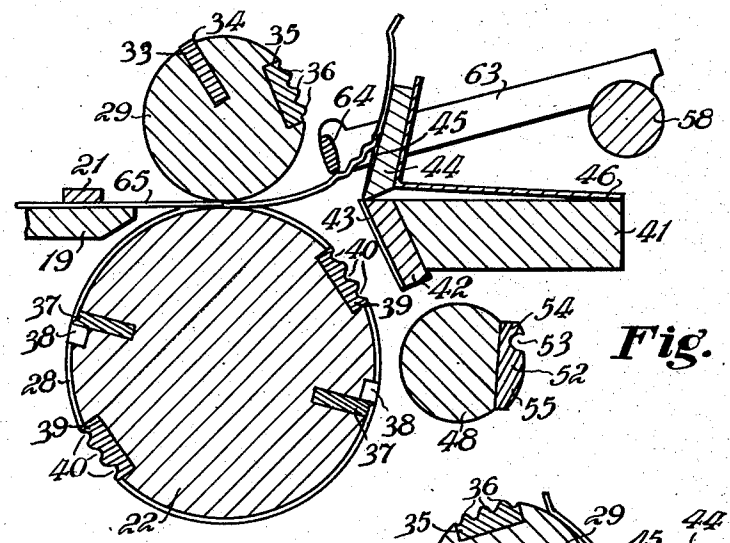


Fig. 7.

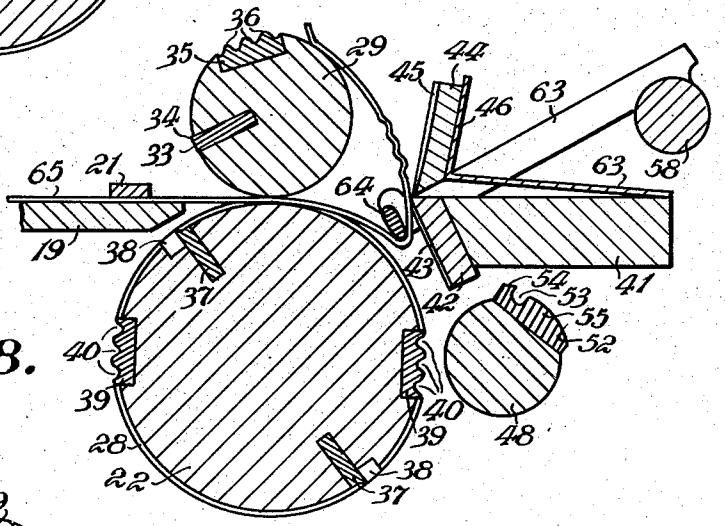


Fig. 8.

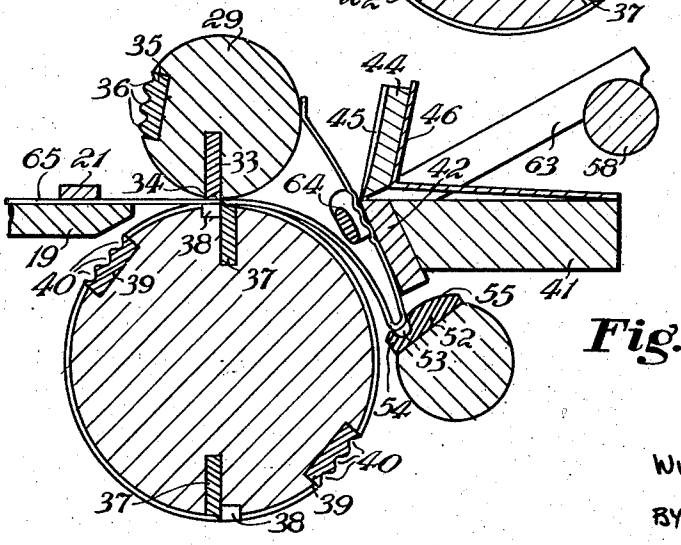


Fig. 9.

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Filed Jan. 29, 1947 5 Sheets-Sheet 5

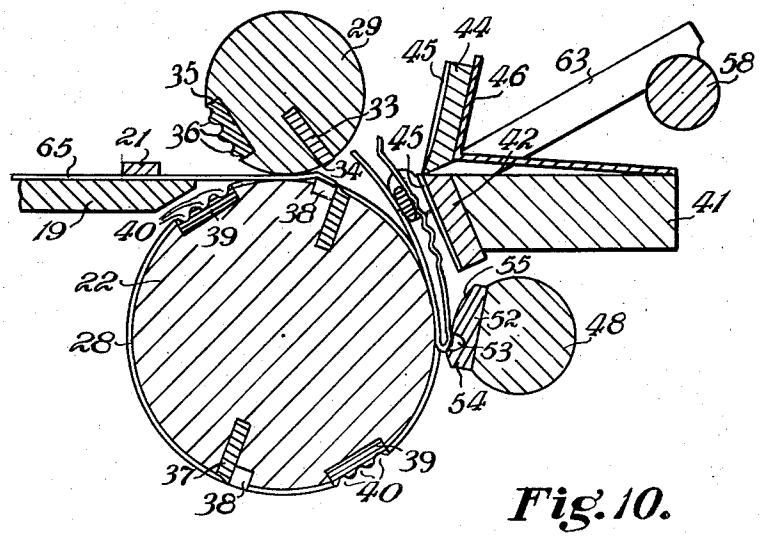


Fig. 10.

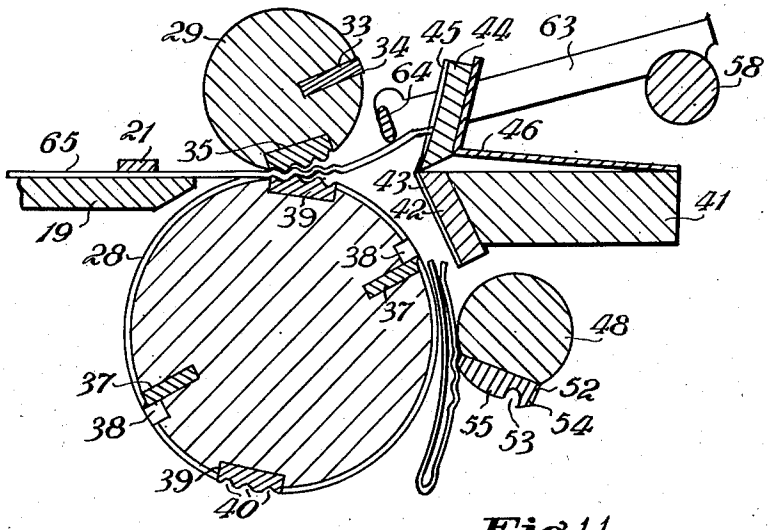


Fig. 11.

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Patented Sept. 14, 1948 2,449,263

UNITED STATES PATENT OFFICE

2,449,263

MACHINE FOR MANUFACTURING HAIR SLIDES, HAIR PINS, OR THE LIKE

William Murray Welsford, Melbourne, Victoria, Australia

Application January 29, 1947, Serial No. 724,994
In Australia February 15, 1946

8 Claims. (Cl. 140—87)

1

This invention relates to a machine for the manufacture of hair slides of the type commonly known as "bobby pins," hair pins and the like.

It is the principal object of my invention to provide a machine of simple and inexpensive construction which is effective in manufacturing hair slides or hair pins from wire more rapidly and economically than has hitherto been done.

With this object in view, my invention resides broadly in a machine for manufacturing hair slides, hair pins or the like comprising two rollers adapted to be counter-rotated; means for feeding a wire between the two said rollers; cutting means associated with the said rollers and adapted to sever the said wire at intervals; shaping means associated with each of the said rollers, the shaping means of one roller being adapted to interact with the shaping means of the other roller to impart desired configuration to the said wire; and means for bending the shaped wire over double to form a hair slide, hair pin or the like.

In order that my invention according to one preferred practical embodiment may be more readily understood, reference is now made to the accompanying drawings, wherein:

Fig. 1 is a perspective view of the machine,

Fig. 2 is an elevational view of the machine shown in Fig. 1, viewed from the other side,

Fig. 3 illustrates in section the machine depicted in Figs. 1 and 2.

Figs. 4 to 11 inclusive are cross-sectional views of the principal working parts of the machine, to enlarged scale, showing in sequence the interaction of the said parts to make a hair slide or "bobby pin."

The machine illustrated in these drawings has two similar metal side plates 1, each of which has two integrally formed legs 2 terminating in out-turned feet 3, whereby the machine may be conveniently anchored to a suitable foundation. The said side plates are retained in suitably spaced parallel relationship by means of two lateral spacer bars 4 held in place by nuts 5 near to the rear of the plates and by a rectangular plate 6 secured to the front end portions of the side plates by means of bolts 7.

A shaft 8 is journaled in bushes 9 fitted oppositely in the two side plates, and on this shaft between the two plates there is a metal feed roller 10 which may be formed integrally with said shaft. This roller has a multiplicity of spaced circumferential grooves 11 formed thereabout. The shaft 8 extends beyond the side plates on either side, and on one side a pulley wheel, gear

2

wheel, sprocket or the like (not shown) is adapted to be non-rotatably mounted whereby the said shaft may be connected to a source of power such as an electric motor, while on the other end of said shaft there is non-rotatably mounted a gear wheel 12.

Directly above the roller 10 there is mounted a feed roller 13 of the same diameter as that of feed roller 10, but having a plain surface. The said feed roller 13 is mounted on a shaft 14 which is journaled in bearing blocks 15, the said blocks being secured to the upper edges of the side plates 1 by means of threaded studs 16 and spring-loaded nuts 17. On one end of the shaft 14 a gear wheel 18 similar to gear wheel 12, is non-rotatably mounted and is in engagement with the said gear wheel 12 associated with the lower grooved feed roller 10, so that the two feed rollers 10 and 13 are adapted to be rotated oppositely at the same speed.

A guide plate 19 is fitted between and rigidly secured to the side plates 1 and has its upper surface substantially level with the junction of the two feed rollers 10 and 13. Grooves 20 are formed longitudinally in the said guide plate, the said grooves corresponding to the circumferential grooves 11 formed about feed roller 10. A cross-bar 21 is secured laterally across the said grooved guide plate near to its front end.

Positioned forwardly of the guide plate 19 is another roller, designated 22. The said roller 22 is disposed laterally between the side plates 1, its shaft 23 being journaled in bushes 24 in the said plates. On one end of the shaft 23 is secured a gear wheel 25 similar to gear wheel 12. A spur gear 26 is rotatably mounted on a stub axle 27 secured to a side plate 1 so as to mesh with both gear wheels 12 and 25. Roller 22 is of like diameter to rollers 10 and 13, and it has circumferential grooves 28 formed thereabout, the said grooves corresponding in number, size and spacing to the grooves 20 formed in the guide plate 19. It will be apparent that all three rollers 10, 13 and 22 are adapted to be rotated simultaneously and at the same speed, the two grooved rollers 10 and 22 moving in the same direction and oppositely to the plain roller 13.

A fourth roller is provided, and is designated 29. Roller 29 is one-half the diameter of roller 22, and it is positioned directly above and in contact with the said roller 22, its shaft 30 being journaled in spring-loaded bearing blocks 31 mounted on the upper surfaces of the side plates 1 in the same manner as are bearing blocks 15. On one end of shaft 30 there is fitted a gear

wheel 32, its effective diameter being one-half that of the gear wheel 25, with which it meshes.

Rollers 22 and 29 are provided with interacting wire cutting and wire-shaping elements. The upper roller 29 is fitted with a male cutter 33, the said cutter comprising a substantially rectangular piece of tool steel secured in a recess formed in the said roller so that the leading edge of the cutter 33 is disposed radially to the said roller. The outer leading edge portion of the said male cutter extends slightly beyond the surface of the roller 29, and the outer rear edge portion thereof extends a slightly greater distance, to form a heel 34. There is also fitted in the roller 29 a male shaping element 35. The said element is inset into and secured to the said roller longitudinally, and it consists of a metal piece of which the outer face is shaped to form three parallel ribs or projections 36.

To interact with the said male cutter 33 and male shaping element 35 of the roller 29, there are provided corresponding female elements in the grooved roller 22. Two diametrically opposite female cutters 37 are provided, each consisting of a substantially rectangular piece of tool steel inset substantially radially into the roller; and adjacent to the cutting edge of each, which is adapted to interact with the cutting edge of the male cutter 33, is a longitudinal recess 38 formed in the roller 22, of somewhat greater width than that of the said male cutter 33 of the roller 29. Two diametrically opposite female shaping elements 39 are inset into the roller 22, each of these elements consisting of a metal strip, the outer edge portion of which is formed with three spaced longitudinal grooves 40. The said elements 39 are so positioned and shaped that they are adapted to interact with the male shaping element 35 of the roller 29. As the roller 29 is adapted to rotate at twice the speed of and in the opposite direction to, the grooved roller 22, the interaction of male and female cutters and of male and female shaping elements is adapted to occur once for each rotation of the roller 29 and twice for each complete rotation of the lower grooved roller 22.

Forwardly of the roller 22, there is fitted between the side plates 1 a lateral plate 41. On the rear end of the said plate, spaced from the said roller, there is secured a downwardly and forwardly inclined bending plate 42 formed with grooves 43 which correspond in number and position to those of the roller 22. Another grooved bending plate 44, of which the grooves 45 likewise correspond to those of roller 22 in number and spacing, is adjustably positioned above the lower grooved bending plate 42. The upper bending plate 44 is fastened to an angle bracket 46 which is held to the lateral plate 41 by means of screws 47 passing in desired adjusted position through oversize or slotted holes in the said bracket and engaging in tapped apertures formed in the said lateral plate. The arrangement of the upper bending plate 44, bracket 46 and lateral plate 41 is such that the said plate 44 is somewhat inclined forwardly and upwardly.

A clinching roller 48 is rotatably mounted between the side plates 1 and below the lateral plate 41, its shaft 49 being journaled in suitable bushes in the said side plates. At one end of the shaft 49 there is fitted a gear wheel 50 of which the effective diameter is one-half that of gear wheel 25, with which it meshes. On the other end of the shaft 49 there is secured a cam 51. A clinching member 52 is secured longitudinally on a flat formed on the said clinching roller 48. The clinching member is made of metal, and has a longitudinal recess 53 formed therein. Forwardly of the said recess is a longitudinal raised stop 54 and rearwardly of the recess is a raised and radiused longitudinal shoulder 55.

The cam 51 is engaged by a screw-threadedly adjustable member 56 of a tappet 57. The said tappet is secured to one end of a shaft 58 which is journeled in bearing blocks 59. The said bearing blocks are adjustably secured to the upper surfaces of side plates 1 by means of bolts 60 passing through slotted apertures 61 in the said blocks and engaging in the said side plates. The adjustable member 56 of the tappet is maintained in constant contact with the cam 51 by means of a torsion spring 62. Coils of the said spring encircle shaft 58 and its ends are bent over at right angles, one end bearing on a block 51, the other on the tappet 57.

Welded or otherwise secured to the said shaft 53 are two parallel rearwardly extending rocker arms 63. At their rear or inner ends, the said rocker arms are joined by a lateral bending arm 64 of substantially elliptical cross-sectional configuration. The said bending arm is positioned between the rollers 29 and 22 to the rear and the upper and lower bending plates 44 and 42 to the front.

In order to operate the machine to manufacture hair slides, a number of reels of wire are provided, the said wire being of substantially half-round or flattened section. The ends of the wires, designated 65, are fed into the machine, each one passing between feed rollers 13 and 10, being guided in one of the grooves 11 of roller 10. Rotational movement of these feed rollers, which movement may be imparted by hand, feeds the wire 65 to and along one of the grooves 20 of the guide plate 19 and under the cross-bar 21, until it enters one of the grooves 28 of the roller 22 and moves between the rollers 22 and 29.

The wire having been fed to this position, the source of power is started to rotate shaft 8 and so cause the several rollers and moving integers of the machine to operate.

Particular reference is now made to Figs. 4 to 11 of the accompanying drawings which show the stages in the formation of a hair-slide of the type commonly known as a "bobby pin" from a length of wire 65. The feed rollers 10 and 13 are omitted from these diagrammatic illustrations, as the function of the said rollers is simply to feed the wire to the other illustrated integers.

Fig. 4 shows rollers 29 and 22 in such position that the male cutter 33 and one female cutter 37 of the said rollers interact to cut the wire 65, this being the initial point in the making of the hair slide.

In Fig. 5, the rollers are shown to have rotated a relatively short distance in opposite directions. The heel 34 of the male cutter 33, which projects from the surface of the roller 29, acts to bend the end of the wire 65 downwardly at an angle into the recess 38 of roller 22, the downwardly bent portion ultimately to provide a "lead-in" for the hair slide. It will be noted that Figs. 4 and 5 show the bending arm 64 in depressed position.

Fig. 6 shows a further stage in the manufacture of the hair slide, the rollers 22 and 29 having rotated for a further distance. The male and female shaping elements 35 and 39 have interacted to put undulations in the wire 65. At this

stage, the cam 51 (see Fig. 1) has rotated to such position as to permit the spring-loaded tappet 57 to move so as to raise the bending arm 64. As the roller 29 is half the diameter of roller 22, an upward curvature is imparted to the wire 65 which has passed between the rollers, and the said wire thus curves beneath the bending arm 64 and strikes at its end in one of the grooves 45 of the upper bending plate 44.

In Fig. 7, the wire is shown as having been forced further forwardly with further rotation of rollers 22 and 29 and an increasingly sharp curvature is imparted to the said wire as it is forced beneath the bending arm 64 and in contact with bending plate 44.

The next stage in the manufacture of the hair slide occurs when the cam 51 moves to such position that the tappet is rapidly forced to such position as to depress the bending arm 64 sharply to the position shown in Fig. 8. This results in the wire 65 being bent to form a loop. The formed and bent-over arm of the hair slide is now forced into the upper part of a groove 43 of lower bending plate 42 by the action of the said bending arm 64.

The wire continues to feed between rollers 22 and 29, and the bent-over formed arm of the hair slide moves slidably down the groove 43 in the plate 41 (see Fig. 9), until the looped or bent-over portion strikes against the stop 54 of the clinching member 52 secured to the rotating clinching roller 48. The male cutter 33 of roller 29 at this stage interacts with the other female cutter 37 of roller 22 to sever the wire.

Fig. 10 shows the hair slide completely formed and cut to shape, except in that the looped or bent-over portion thereof requires to be clinched so that the two arms of the hair slide will be forced to lie closely together in desired position. At this stage, the two arms of the slide are disposed on opposite sides of the bending bar 64. The clinching action is carried out by the shoulder 55 of the clinching member 52 which acts to compress the loop of the hair slide between itself and the roller 22. Fig. 10 also shows the commencement of manufacture of another hair slide between the rollers 22 and 29.

In Fig. 11, the hair slide has been clinched and has passed the bending arm 64, which is then caused to move upwardly by the action of cam 51 and tappet 57. The hair slide falls freely between roller 22 and clinching roller 48 into any suitable receptacle, and slides manufactured are carried away from time to time for heat treatment or tempering and rust-proofing in any suitable manner.

In order to economise in the manufacture of hair slides, the feed rollers 10 and 13 may if desired, be modified suitably as to construction and mounting so as to be adapted to roll round section wire to the flattened or half-round section ordinarily used in the manufacture of hair slides.

There may be provided a conveyor of suitable design to receive the manufactured hair slides or the like and carry them to one or more rapidly rotating grind wheels, the conveyor and grind wheel or wheels being so arranged and operating as to effectively grind the ends of each hair slide or the like to remove any burrs which may have resulted from the cutting operations. The grind wheel or wheels preferably form a part of the machine and are mechanically connected to the source of power thereof. The same or another conveyor may be provided to carry the pins subsequently to a heat treatment chamber, rust-proofing means and/or a suitable carding machine.

The machine herein described and illustrated is capable of manufacturing a considerable number of hair slides simultaneously, depending on the number of wires fed thereinto. However, in practice, I prefer to use a lesser number, preferably about four wires. Then, as wear occurs particularly of the cutters, the positions of the wires in the machine may be changed by feeding the said wires through different grooves of the several grooved integers of the machine.

The invention is simple and economical both in manufacture, and in operation, and is thus deemed to be effective in achieving the object for which it has been devised.

What I do claim is:

1. A machine for manufacturing hair slides, hair pins or the like comprising two parallel rollers adapted to be rotated in opposite directions and to feed a wire therebetween; a cutter associated with each roller, the cutters being adapted to interact to sever the said wire and to bend an end of the wire from which portion has been severed; corrugated portions associated with each roller and adapted to interact to impart undulations to the wire; a bending plate upon which the wire shaped by the rollers is adapted to bear; a bending member adapted to be moved in synchronization with the said rollers to impart a U-bend to the wire between the said fixed plate and the said rollers; and means for clinching the portions of the wire adjacent to the U-bend.

2. A machine for manufacturing hair slides, hair pins or the like according to claim 1 wherein the cutters comprise a male cutter and a female cutter, the male cutter consisting of a longitudinal blade inset substantially radially in the said roller, its outer edge portion extending from the surface thereof; and the female cutter consisting of a longitudinal blade inset substantially radially in the other roller and a longitudinal recess in such roller adjacent to the rear surface of the said blade; the front edge of the male cutter blade being adapted to interact with the rear edge of the female cutter blade to sever the wire, and the male cutter being adapted to bend the end of the wire from which portion has been severed into the recess of the female cutter.

3. A machine for manufacturing hair slides, hair pins or the like according to claim 1 wherein the bending plate consists of an upper portion and a lower portion, the upper portion inclining forwardly and upwardly, and the lower portion inclining forwardly and downwardly.

4. A machine for manufacturing hair slides, hair pins or the like according to claim 1 wherein the bending member comprises a bending arm secured at its ends to two rocker arms, the rocker arms being adapted to be moved in oscillatory manner by means of cam-actuated mechanism.

5. A machine for manufacturing hair slides, hair pins or the like according to claim 1 wherein one of the shaping rollers is double the diameter of the other shaping roller so as to be adapted to impart curved configuration to the wire passing between the said rollers, the larger roller having two cutters and two corrugated portions adapted to interact with a single cutter and corrugated portion of the smaller roller.

6. A machine for manufacturing hair slides, hair pins or the like comprising two co-acting feed rollers adapted to be rotated in opposite directions and to feed a wire therebetween; two co-acting shaping rollers adapted to be rotated

in opposite directions in synchronization with the said feed rollers and between which the said wire is adapted to be fed; a cutter associated with one shaping roller adapted to interact with a cutter associated with the other shaping roller to sever the wire and to bend the end of the wire from which portion has been severed; a plurality of longitudinal ridges on one shaping roller and corresponding longitudinal grooves being adapted to interact to impart undulations to the said wire; a bending member under which the shaped wire is adapted to be fed and a bending plate upon which the wire is adapted to bear, the said bending member being adapted to be moved reciprocally in contact with the said wire to impart a U-bend thereto between the said bending plate and the shaping rollers; a clinching roller adapted to be rotated in synchronization with the shaping rollers; a longitudinal projection on the said clinching roller, the said projection being adapted to clinch the arms of the wire adjacent to the U-bend between itself and one of the shaping rollers.

7. A machine for manufacturing hair slides, hair pins or the like comprising two co-acting rollers adapted to be rotated in opposite directions and to feed a wire therebetween; the rollers being so shaped as to impart desired configuration to the wire; means for imparting a U-bend to the shaped wire; cutters associated with the

rollers to sever the wire; and means for clinching the arms of the wire adjacent to the U-bend, such means comprising a clinching roller adapted to be rotated in synchronization with the shaping rollers; and a longitudinal projection on the said clinching roller, the said projection being adapted to clinch the arms of the wire adjacent to the U-bend between itself and one of the shaping rollers.

8. A machine for manufacturing hair slides, hair pins or the like according to claim 1 wherein the clinching means include a roller; a longitudinal recess in the said roller, the forward edge portion of the said recess being formed as a longitudinal stop and the rearward edge portion of the said recess being formed as a clinching shoulder

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