March 12, 1935. F. J. MEYERS ET AL 1,994,250

RHINESTONE EMBROIDERING MACHINE

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Fig. 1.

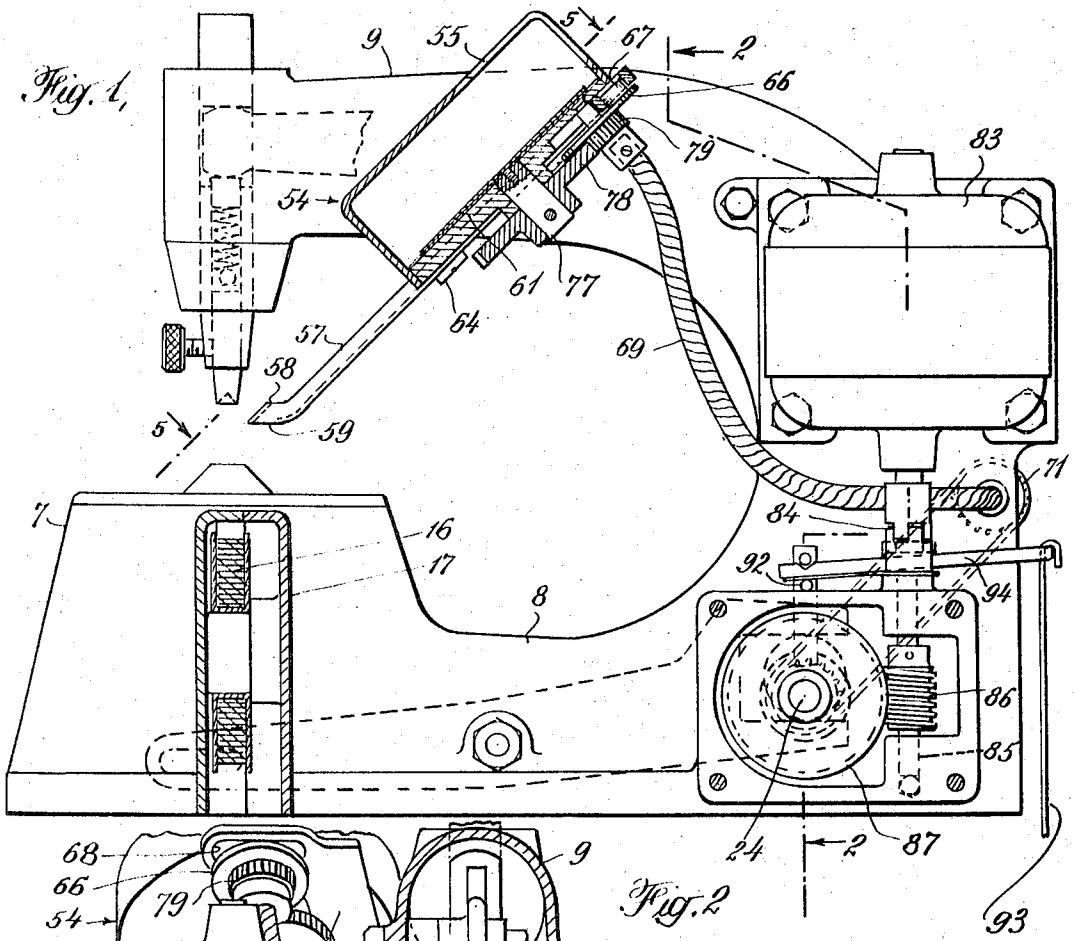
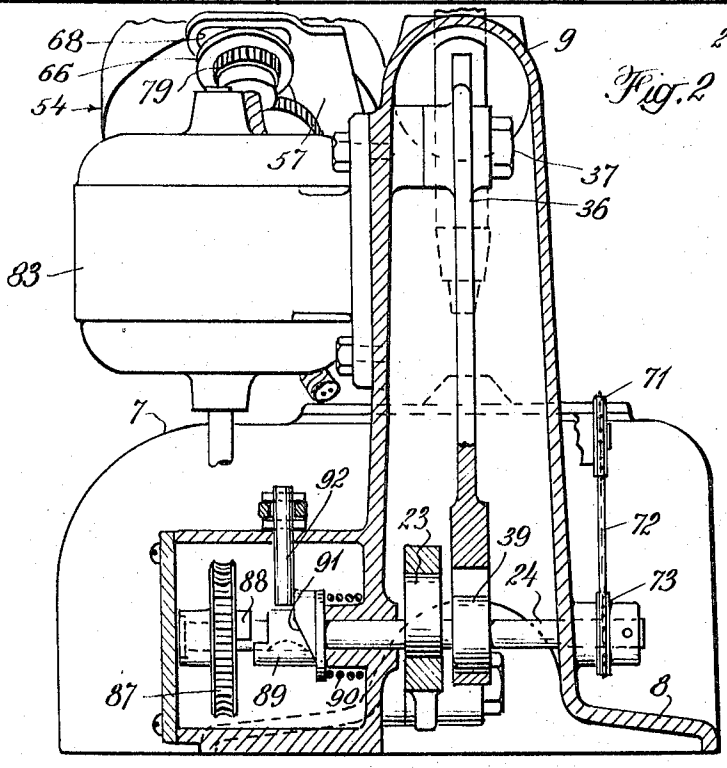



Fig. 2.




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RHINESTONE EMBROIDERING MACHINE

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Fig. 3

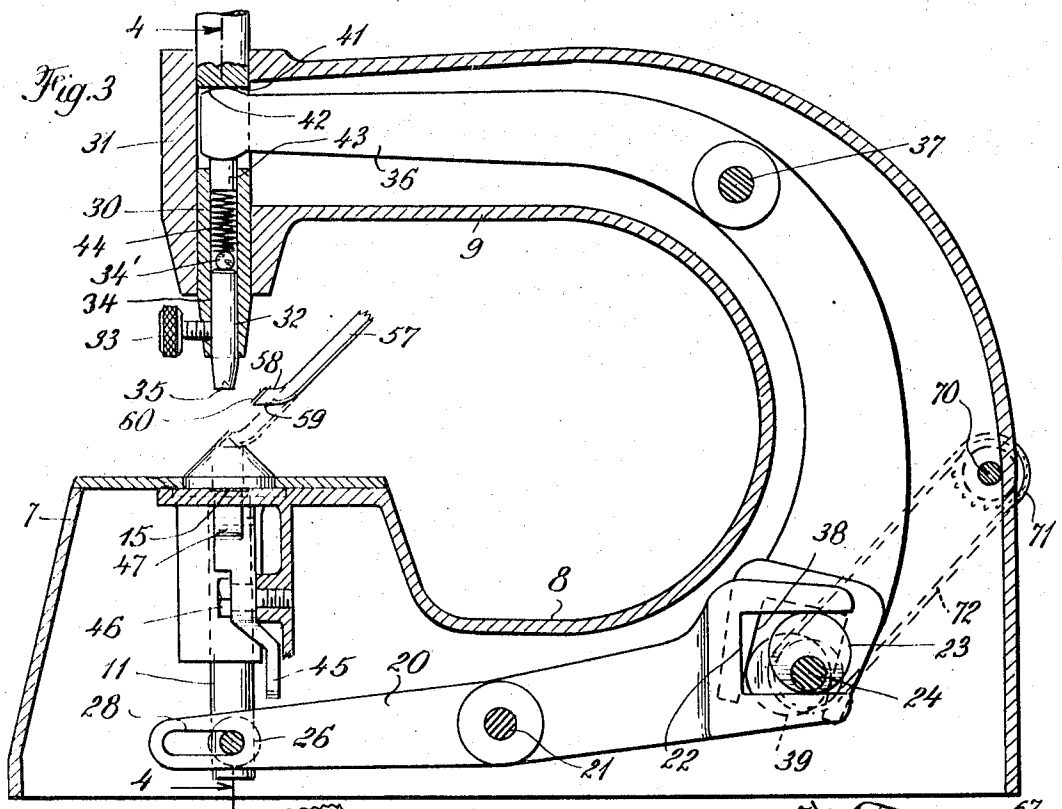



Fig. 4,

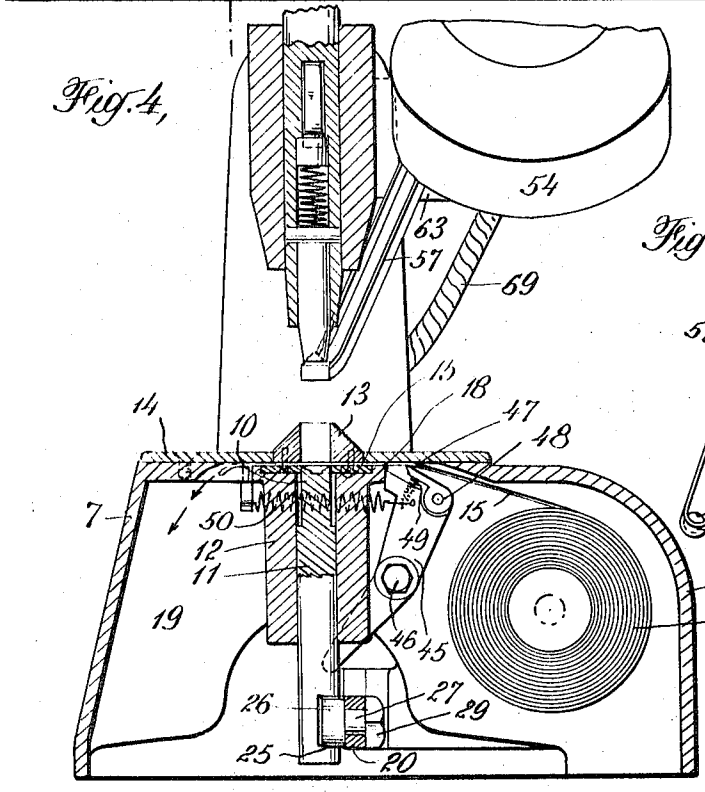
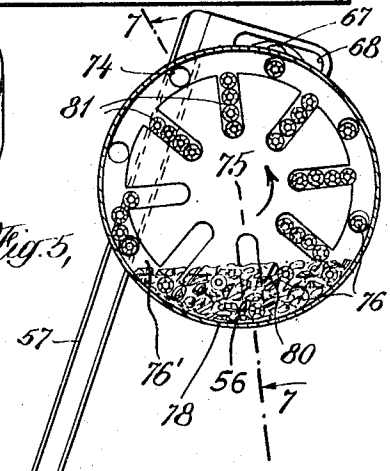



Fig. 5,




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RHINESTONE EMBROIDERING MACHINE

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Fig. 6,

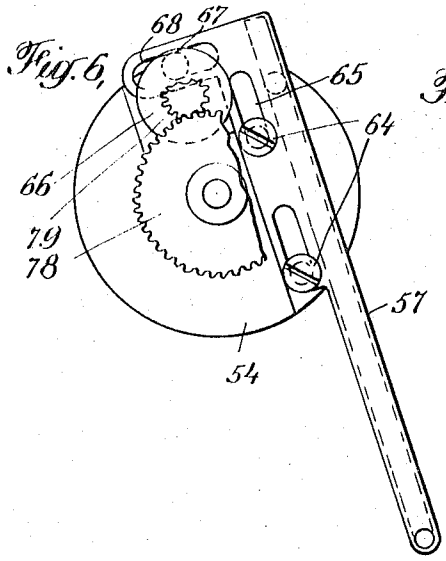



Fig. 7a,

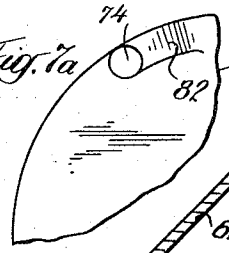



Fig. 7,




Fig. 13,

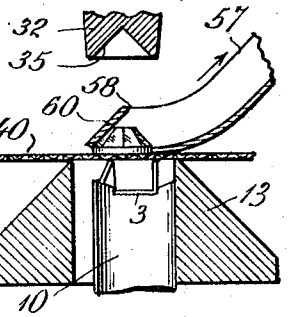



Fig. 8,

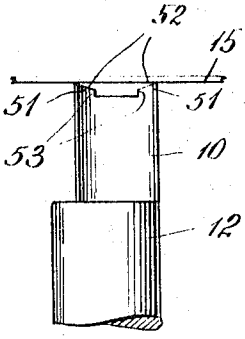



Fig. 9,

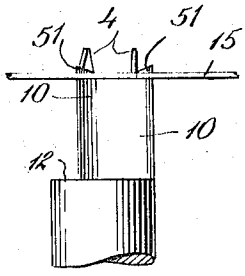



Fig. 10,

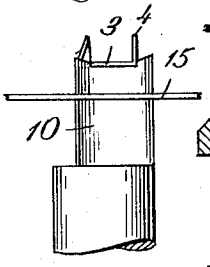



Fig. 14,

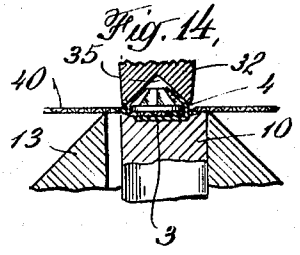



Fig. 11,

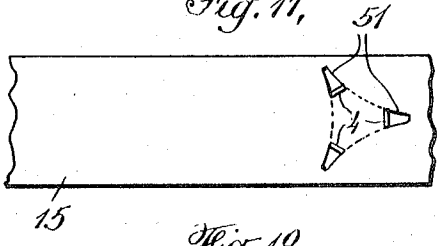



Fig. 12,

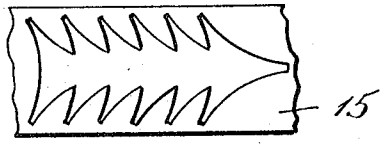



Fig. 18,

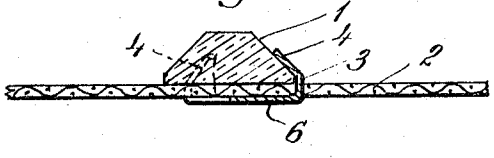



Fig. 15,

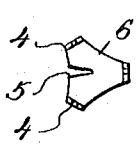



Fig. 16,

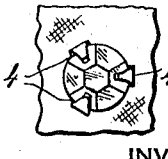
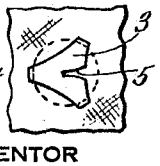



Fig. 17.




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Patented Mar. 12, 1935 1,994,250

# UNITED STATES PATENT OFFICE

1,994,250

## RHINESTONE EMBROIDERING MACHINE

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New York, N. Y.

Application November 17, 1932, Serial No. 643,065

13 Claims. (Cl. 29—10)

This invention relates to machines for attaching gems or stones, and more particularly artificial stones such, for example, as rhinestones, to fabric for the purpose of ornamentation.

The principal object of the invention is to provide a machine for attaching gems to fabric or other sheet material in which all of the necessary operations are mechanically performed so that all that is required of the operator is to feed the fabric to the machine in such a way that the stones will be applied in accordance with the desired design.

It is a further object of the invention to provide a machine which will apply the stones to the fabric one at a time and repeat the operation indefinitely.

It is a further object of the invention to provide a machine in which the feeding of preformed mountings for attaching the gems to the fabric is avoided together with all of the difficulties heretofore encountered in providing for the automatic feeding of such mountings.

It is also an object of the invention to provide a metal mounting for attaching the gems to the fabric which is of improved construction, which holds the gems securely in place, and which is extremely light in weight.

It is a further object of the invention to provide an automatic machine for the purpose described which has relatively few and simple parts, and which is low in cost of manufacture and is not liable to easily get out of order or entail expensive maintenance or service charges.

It is our aim to provide a machine which is so positive in its operation and so easily manipulated that it will be practical for use in rhinestone embroidery work and thus actually take the place of the hand tools which are customarily used by dress manufacturers for attaching rhinestones.

Our invention will be understood from a consideration of the accompanying drawings wherein is illustrated the best present embodiment of our invention. It is to be understood, however, that the disclosure in these drawings and in the following description is illustrative only, and that the scope of our invention is set forth in the appended claims. In these drawings

Fig. 1 is a side elevation of our improved machine;

Fig. 2 is a view partly in section and partly in front elevation taken on the broken line 2—2 of Fig. 1;

Fig. 3 is a vertical longitudinal section taken centrally of Fig. 2 and looking toward the right;

Fig. 4 is a view partly in front elevation and partly in section taken on line 4—4 of Fig. 3;

Fig. 5 is a sectional view of the gem feeding device taken on line 5—5 of Fig. 1, looking in the direction of the arrows;

Fig. 6 is a bottom view of the gem feeding device;

Fig. 7 is a vertical section of the gem feeding device taken on the broken line 7—7 of Fig. 5;

Fig. 7a is a view showing a detail of the gem feeding device;

Figs. 8, 9 and 10 are diagrammatic views showing the formation of a setting from a strip of sheet metal;

Fig. 11 is a plan view of a fragment of metal strip corresponding with the positions of the punch shown in Figs. 8 and 9;

Fig. 12 is a plan view of the waste strip from which a series of mountings have been formed;

Figs. 13 and 14 are enlarged fragmentary sectional views showing the attaching of a stone to the fabric;

Fig. 15 is a plan view of our improved mounting drawn to an enlarged scale;

Figs. 16 and 17 are, respectively, a front view and a rear view of a fragment of fabric to which a rhinestone has been applied; and

Fig. 18 is an enlarged sectional view through a rhinestone and mounting and the fabric adjacent thereto.

Referring first to Figs. 15 to 18 of the accompanying drawings, our improved machine and mounting are of the type in which the rhinestone 1 is secured to the fabric 2 by means of the mounting 3 which is of metal and is applied to the fabric from the reverse side. The three prongs 4 of the mounting pierce the fabric and are bent over the inclined front surface of the rhinestone as shown in Figs. 16 and 18.

It will be understood that in decorating dress fabrics, for example, with rhinestones applied in this manner, the stones are arranged in the form of some figure or design and that for a single gown it is necessary to apply a very large number of stones. In order to keep the cost of the gown within reason, it is necessary that these stones be quickly, neatly and uniformly mounted upon the fabric, and it is, of course, important that they be firmly secured so that they will remain in place during the ordinary wear of the garment.

Because of the very large number of stones used and the necessary weight of the stones, it is of great importance that the mountings be reduced in weight to the utmost practical mini-

mum. We accomplish this in our improved mountings, as shown in Fig. 15, by making the mounting substantially in the form of an equilateral triangle, with the sides, however, curved inwardly, as shown in Figs. 15 and 17, so as to remove all of the metal except that necessary for the required strength. To further reduce the weight of the mounting, a kerf or slot 5 is cut into one side of the base portion 6. This kerf extends to at least the center of the mounting and preferably slightly beyond.

In accordance with our invention, instead of utilizing previously formed mountings, which are difficult to feed automatically because of their odd shape and their upstanding sharp prongs, we provide for the formation of the mountings as they are needed, from a solid strip of metal ribbon by means of a suitable punch and die. Then by a continuation of the punching stroke of the punch, the prongs of the mounting, immediately after being formed, are forced through the fabric. Just before the prongs pierce the fabric the rhinestone is deposited in position on the upper or front surface of the fabric immediately above the mounting, and practically simultaneously with the contact of the prongs with the fabric a forming tool descends on top of the stone, which holds the stone and thereby the fabric against the piercing pressure. As the prongs are pushed up through the fabric, or immediately after they are pushed up through the fabric, the prongs are bent over the surface of the stone.

The mechanism for forming the mountings is contained within a hollow housing 7 that is cast on the outer end of a hollow base 8 which extends rearwardly from the housing 7 as shown in Figs. 1 and 3. A hollow upper arm 9 extends upwardly and forwardly from the rear end of the base 8, and supports at its forward end over the housing 7 mechanism for actuating the forming or crimping tool.

The punch which forms the mountings is shown at 10 and is mounted upon the upper end of a plunger 11 which reciprocates vertically in an aperture in frame member 12 which is cast integrally with housing 7. The cooperating die is indicated at 13 and is removably secured to the top of member 12. Surrounding the die is a bed plate 14 which prevents the cloth to which the rhinestones are to be applied from coming in contact with the mechanism in housing 7, this fabric being laid over the top of die 13.

The metal ribbon 15 from which the mountings are punched is contained on a spool 16 which is mounted for free rotation in an extension 17 at the right side of housing 7. Ribbon 15 passes beneath the lower surface of die 13 in a narrow guideway which is formed in the upper surface of a guide plate 18. After passing the punch and die the waste stock is directed downwardly into the space 19 of housing 7 and is discharged at the bottom of the housing. An arrow in Fig. 4 indicates the direction of movement. The guide plate 18 in addition to providing a guideway for the ribbon 15, serves to guide the upper end of punch 10 after it descends below the ribbon so as to keep the punch in registry with the die, it being understood that the shape of the hole through guide plate 18 is similar to the configuration of the die.

The punch plunger 11 is reciprocated by means of the horizontally pivoted driving arm 20 which is forked as indicated at 22 at its outer end for coaction with a driving eccentric 23 mounted on shaft 24. The connection between the outer end of arm 20 and the lower end of plunger 11 is effected in such a manner as to permit the ready removal of plunger 11 and punch 10 through the bottom of housing 7. In order to accomplish this, the lower end of plunger 11 is provided with a transverse slot 25 in which is received a round knob or projection 26. Knob 26 has a shank 27 which passes through a longitudinal slot 28 in the end of arm 20, and on the outer end of this shank is a nut 29 which clamps the knob to the arm. In order to remove plunger 11 it is only necessary to loosen nut 29 and slide knob 26 to the outer end of slot 28, after which the plunger 11 will drop out of its aperture in frame member 12.

The mechanism for forming or crimping the prongs 4 of the gem mountings comprises a reciprocating plunger 30 which slides vertically in an aperture in the head 31 on the outer end of hollow arm 9. A crimping tool 32 is removably mounted by means of a thumb screw 33 in a longitudinal bore 34 extending upwardly from the lower end of plunger 30. The lower end of crimping tool 32 is provided with a conical recess 35, the walls of which are so shaped as to appropriately bend or crimp the ends of the prongs 4 against the sides of the stone 1, as shown in Fig. 18.

The reciprocation of plunger 30 and crimping tool 32 is accomplished by means of a driving arm 36 which is pivoted in hollow arm 9 at 37 and which passes through arm 9 to shaft 24. The lower end of arm 36 is provided with a fork 38 which coacts with a second eccentric 39 mounted on shaft 24. The two eccentrics 23 and 39 which drive arms 20 and 36, respectively, are placed at the proper angle with respect to each other so as to cause plunger 11 to rise simultaneously with the descent of plunger 30 and bring the punch 10 and crimping tool 32 into coaction approximately at the top of the die 13 as illustrated in Fig. 14. By means of this coaction, the prongs 4 of the mounting 3 are forced through the fabric 40, and then bent or crimped over against the pyramidal surface of the rhinestone.

It is important to prevent the crimping tool 32 from striking the stone too hard a blow as the parts come together, and it is also desirable to hold the crimping tool in its lowermost position in contact with the stone while the plunger 11 completes the final movement of its stroke, during which time the prongs of the mounting are forced through the fabric and bent over the stone. To obtain this action, a resilient operating connection is arranged between the end of arm 36 and plunger 30. To this end plunger 30 is provided with a transverse slot 41 (Fig. 3) which is somewhat wider than the rounded head 42 on arm 36. The upper surface of head 42 coacts with the surface of slot 41 while the lower surface of the head coacts with a short movable plunger 43 which is positioned within the upper end of bore 34. Plunger 43 is resiliently connected with plunger 30 by means of a helical spring 44, the lower end of this spring resting upon a pin 34'.

The feeding mechanism for advancing the strip 15 after completion of each operation is illustrated principally in Fig. 4. For this purpose a feeding lever 45 is pivoted at 46 and so positioned that the lower end or tail of the lever is in the path of driving arm 20. At the upper end of feeding lever 45, a feeding pawl 47 is pivoted at 48. This feeding pawl is biased upwardly into fric-

tional engagement with the under surface of strip 15 by means of a small helical spring 49.

The feeding movement of strip 15 necessarily must take place during the short interval of time when the top of punch 10 is below the ribbon guideway 15, and accordingly feeding pawl 47 is arranged to be moved to the right by the engagement of driving arm 20 with the tail of lever 45 during the upward stroke of arm 20 and plunger 11. This movement stretches the helical actuating spring 50 which is attached at one end to the housing 7 and at the other end to lever 45. During this movement the feeding pawl 47 merely slides along the smooth surface of strip 15. However, as soon as plunger 11 descends to the point where the upper edge of the punch 10 releases strip 15, the strip is quickly fed toward the left by the contraction of actuating spring 50.

In a machine of this sort it is particularly important that the mechanism be of simple construction and that the formation of the mountings take place as quickly as possible. With these ends in view, punch 10 is provided with three projections 51 (see Fig. 11) which correspond in shape, when viewed from the top, to the outline of the prongs 4 of mounting 3. The punching surfaces of these three projections are tapered inwardly as indicated at 52 in Fig. 8 and provided with vertical shoulders 53. The purpose of the tapering surface 52 is to cause the outer and uppermost corners of projections 51 to first pierce the metal ribbon or strip 15 and thereby cut out the prongs 4.

A slight continued upward movement of the punch beyond this point turns the prongs to upright position as shown in Fig. 9, this being accomplished by the shoulders 53. At this point of the punching operation the formation of the prongs 4 is completed as shown in Fig. 9 and in top view in Fig. 11, leaving the substantially triangular projections 51 of the punch 10 projecting through strip 15. The continued upward movement of punch 10 carries the punch entirely through strip 15, cutting out the material along the curved dotted lines shown in Fig. 11, and completing the formation of the mounting 3.

Fabric 40 (Fig. 13) has previously been placed by hand on the upper projecting surface of die 13. As previously described, the upward movement of punch 10 continues, carrying the mounting upwardly through the die 13. In this connection, the shoulders 53 of the die serve to firmly hold the mounting on the upper end of the die while the prongs of the mounting are forced through the fabric 40 and into contact with the conical surface 35 of crimping tool 32, as shown in Fig. 14.

A very important feature of machines for attaching ornamental stones to fabric is the manner of and mechanism for feeding the stones into position to be attached to the fabric, and our improved machine has been found to be extremely reliable in this respect. Our improved mechanism for selecting and feeding the stones is illustrated in Figs. 1, 5, 6, 7 and 19, among others.

A supply of stones is contained in the lower portion of a reservoir or hopper 54 having an opening 55 through which the stones may be introduced. The stones are arranged promiscuously in the hopper in a loose pile or mass 56. By means of mechanism which is about to be described, the stones are selected, positioned right side up, and fed one at a time into a chute 57 by means of which they are carried to operating position, and deposited right side up on the upper surface of the fabric 40, as shown in Fig. 13.

Inasmuch as each stone must be deposited on the fabric immediately over the mounting 3 which is resting on the die 10, and also in the path of the crimping tool 32, chute 57 is made to reciprocate longitudinally at an angle to the vertical center line of the punch and crimping tool. While the mounting 3 is being elevated through the die 13 and crimping tool 32 is advancing downwardly, chute 57 reaches the full-line position shown in Fig. 13, and also shown dotted in Fig. 3, where the foot or bottom 58 of the chute rests upon the fabric 40.

While momentarily in this position, a single stone which has been selected and removed from the pile 56 is discharged into the upper end of chute 57 and slides down to the foot of the chute which is provided with an opening 59 through which the stone is deposited on the surface of the fabric. Then the chute immediately starts back to its uppermost position, just clearing the downwardly moving crimping tool. Immediately after the foot 58 of the chute clears the crimping tool 32, the crimping tool descends onto the stone and holds the stone in position on the fabric. While the stone is thus held, the die 10 reaches the top of its stroke, forcing the prongs of the stone mounting through the fabric and crimping the prongs over the stone.

It is important that the stone be accurately positioned over the prongs of the mounting 3 and this is accomplished by the walls of the opening 59 in foot 58 and by the concave conical surface of the crimping tool. The stone in sliding down chute 57 attains a considerable velocity, and it is extremely difficult to stop the stone at the desired position over the prongs of the setting. To avoid the tendency of the stone to bound out of position, the end wall 60 of foot 58 is arranged at substantially the same angle as the pyramidal sides of the stone, and in this way the stone is stopped perfectly still and placed accurately in position over the mounting 3. The angle of the chute with the horizontal corresponds with the slope of the sides of the stone so that as the chute recedes upwardly to its upper position, there is no tendency for the wall 60 to displace the stone from its position.

The hopper 54 comprises a base member 61 forming the hopper bottom, and a removable shell or cover 62, and the base is secured to a bracket 63 on the side of hollow arm 9 of the machine housing (see Figure 4).

The mechanism for causing the reciprocation of chute 57 is illustrated more particularly in Figs. 6 and 1. The chute is attached to the base of the hopper by means of two screws 64 which engage longitudinal slots 65, and thus slidably support the chute in such a way as to permit longitudinal movement. Motion is given the chute by means of a small crank disc 66 which is rotatably mounted on the hopper base 61 and has a crank pin 67 which operates in a transverse slot 68 at the upper end of the chute. Crank disc 66 is rotated by means of a flexible drive shaft 69, the opposite end of which is connected to a short shaft 70, at the rear of the machine housing, which carries a sprocket 71. Sprocket 71 is driven in turn by means of a chain 72 (Fig. 2) from a sprocket 73 mounted upon shaft 24.

The chute 57 is a straight channel open at its upper side and just deep enough to accommodate the largest sized stone which it is desired to use.

The selection and delivery to chute 57 of the stones one at a time from the pile 56 within the hopper presents a considerable problem. It is

of the utmost importance that a stone be deposited in chute 57 for each operation of the stone attaching mechanism (plungers 11 and 30) for otherwise metal stone settings 3 would be fastened to the fabric without stones in them. This would require the operator to bend up the prongs of the settings so attached by means of a suitable implement and remove the settings before he could go on with his work. A loss of time would occur, and the advantages of our present machine would be largely offset. With the mechanism which we have devised, however, and which is now to be described, delays of this sort are substantially avoided.

In this mechanism the stones are discharged into the chute 57 from the hopper 54 by means of a single outlet 74 in base member 61 directly over the upper portion of the chute. The stones must be discharged through this aperture right side up and only one stone at a time, and in order to select stones from the pile 56 which are right side up and carry them singly to aperture 74, disc 75 is arranged to rotate adjacent the bottom of the hopper. This disc has a plurality of apertures 76 in its peripheral margin 76', large enough to receive only one stone and preferably of the same size as outlet 74. Disc 75 is mounted upon a short shaft 77 and slowly rotated by means of a gear 78 that meshes with a pinion 79 which is mounted alongside of crank disc 66 and rotated simultaneously therewith by flexible shaft 69.

The face of disc 75 is arranged preferably at an angle of 45° with the horizontal, so that the rhinestones will readily slide over its surface. As the disc rotates, the apertures 76 in passing beneath the pile of stones 56 pick up whatever stones happen to lie in upright position in their path and carry them slowly in the direction of the arrow shown in Fig. 5 towards the discharge aperture 74, the stones sliding along the upper surface of the hopper bottom 61. The thickness of the margin 76' adjacent the aperture 76 is slightly greater than the height of the base of the stone, as may be seen in Fig. 7, so that once a stone is seated within the aperture 76, it will not become dislodged. There is room enough in each aperture for only one stone, and if additional stones are dragged up from the pile 56 they invariably fall back into the pile before the aperture reaches the outlet 75. In the example shown in the drawings there are eight apertures 76 in the disc, and the gear ratio between gear 78 and pinion 79 is therefore 8:1 so that one aperture 76 will advance a stone to the outlet 74 for each operation of the mounting forming and applying mechanism.

In order to insure that stones shall be arranged in their upright position in the margin 76' so as to be in the path of apertures 76 as they pass beneath the pile 56, and thus insure that every aperture 76 as it leaves the pile contains a stone, the disc 75 has a raised inner portion 80 within the margin 76', and this raised inner portion is provided with a plurality of radially arranged slots or recesses 81 (see Fig. 5), the floors of which are level with the surface of margin 76'. In passing through the pile 56 these radial recesses each collect one or more stones (as shown in Fig. 5) and carry them out of the pile 56. These stones are retained in the recesses as the disc rotates until the recesses reach successively an angular position at the left-hand side of the pile which will permit the stones to slide radially out of the recesses into the margin 76'.

A supply of stones in upright position is thereby continuously provided in the margin 76' at the left-hand side of the pile of stones. This supply of upright stones lies directly in the path of the aperture 76 so that as each empty aperture after leaving outlet 74 descends toward the pile, it finds a number of stones arranged in upright position ready to be caught within it. The retentive action of the apertures 76 on the side of the stones is sufficient to retain the stones in the apertures as they pass through the pile.

In order to reduce to the minimum the chance of the stones turning upside down as they pass through the outlet 74 into chute 57 the chute slides in a recess in the hopper bottom 61 so as to bring the top of the chute close to the upper surface of the hopper bottom. Also, the hopper bottom is provided with a sloping approach 82 (see Fig. 7a) adjacent outlet 74 so that at the instant the stones are released through outlet 74 the distance they have to fall to strike the bottom of chute 57 is substantially no greater than the height of the walls of the chute itself.

The machine is driven by means of a small electric motor 83, the shaft of which is connected by means of a flexible coupling 84 to a vertical shaft 85. On shaft 85 is a worm 86 which drives a worm gear 87 that rotates loosely on shaft 24. Worm gear 87 rotates continuously so long as motor 83 is energized, and in order to cause the machine to operate, a clutch mechanism of usual construction is provided. This clutch mechanism includes a projection 88 upon the inner side of gear 87 which engages a complementary clutch member 89 which is keyed to shaft 24 in such manner as to permit it to be moved longitudinally of its shaft so as to retract it from the path of projection 88.

Clutch member 89 is biased towards the projection 88 by means of a helical spring 90, and in order to move clutch member 89 out of engagement with projection 88, member 89 is provided with a cam surface 91 with which a clutch actuating pin 92 coacts. When pin 92 is raised from the position shown in Fig. 2, it releases clutch member 89 which is immediately projected into the path of projection 88 by means of the spring 90, and shaft 24 is thereby driven by gear 87. Shaft 24 will continue to rotate so long as pin 92 is raised. Whenever pin 92 is lowered into the path of cam surface 91, however, member 89 will be retracted, causing the disengagement of the clutch, and the rotation of shaft 24 will cease.

Pin 92 is preferably under the control of a foot lever (not shown) which is connected to pin 92 by means of a link 93 and a lever 94, shown in Fig. 1. Therefore, if the operator wishes to apply a single stone to a piece of fabric he places the fabric over the top of die 13 and depresses the foot control lever, instantly releasing the lever when the machine starts. Then, upon the completion of a single revolution of shaft 24 which causes the formation of the stone mounting and its application to the fabric, as previously described, the clutch mechanism will be automatically disengaged.

If, however, the operator desires to allow the machine to run continuously, which is the usual practice, he merely keeps the foot control lever depressed, and the actuation of the stone-applying mechanism takes place repeatedly, and hence applies the stones to the fabric as fast as the machine will operate, the operator shifting the fabric between each application of a stone and following the design or pattern, which,

for convenience, is usually outlined on the fabric.

The approved machine of our invention has proved to be very effective in placing stones upon dress materials, as it is reliable in operation and of such simple construction that it is not liable to readily get out of order. Moreover, it will operate to satisfactorily apply stones of a wide variety of sizes. When a change in size of stone is desired for the particular work in hand, it is only necessary to remove plunger 11 and die 13, and replace these by a punch and die suitable to produce a setting of the desired size. The crimping tool 32 may also be replaced with a similar tool of different size. This crimping tool is of extremely simple construction and the punch and die are not in the least complicated to make so that their cost is not high, and a complete set of punches and dies to take care of the entire range of sizes of stones is supplied with each machine.

We claim:

1. In a machine for attaching ornamental stones to sheet material, the combination of a punch and die for successively forming stone mountings from sheet metal, means operated in timed relation with said punch and die for forcing the prongs of said mountings through a sheet of material while said mounting is within said die, mechanically actuated means for automatically and successively feeding stones between said prongs, and means operated in timed relation to said stone-feeding means for thereafter crimping said prongs over said stone.

2. In a machine for attaching ornamental stones to sheet material, the combination of a die, a punch co-acting with said die to form a stone mounting and push the same through the die to the opposite surface thereof, and a crimping tool movable to and from said opposite surface of the die and coacting with said punch and die to force the prongs of said setting through a sheet of material and crimp them over the surface of a stone.

3. In a machine for attaching ornamental stones to sheet material, the combination of a support for said sheet material, a movable support for a stone mounting arranged to reciprocate with respect to said material support, a crimping tool also arranged to reciprocate with respect to said material support, mechanically actuated means for automatically and successively depositing stones one at a time upon said material above a mounting resting upon said mounting support, and means for bringing said mounting support and said crimping tool simultaneously into coaction with said material support to force the prongs of the stone mounting through the material and crimp them over the surface of the stone.

4. In a machine for attaching ornamental stones to sheet material, the combination of a die, a punch arranged to reciprocate vertically through said die and therewith form a stone mounting carrying the same upon the punch to the upper surface of the die, a crimping tool mounted for vertical reciprocation over said die, and means to cause the simultaneous reciprocation of said punch and crimping tool into coaction with said die to form a stone setting and apply the same to said sheet material.

5. In a machine for attaching ornamental stones to sheet material, a depositing device for depositing stones in upright position on said material between the stone-attaching devices thereof, comprising a chute having a positioning foot at its lower end, means for moving said foot into and out of depositing position between said devices, and means for feeding stones one at a time to said chute while the foot thereof is in said depositing position.

6. In a machine for attaching ornamental stones to sheet material, a depositing device for depositing stones in upright position on said material between the stone-attaching devices thereof, comprising a chute having a positioning foot at its lower end, means for moving said foot into and out of depositing position between said devices, means for feeding stones one at a time to said chute while the foot thereof is in said depositing position, the foot of said chute having a positioning opening in the bottom thereof and having an end wall disposed substantially at the same angle as the side of the stones so as to stop a descending stone at the end of its descent without rebounding.

7. In a machine for attaching ornamental stones to sheet material, a die, a punch coacting therewith for forming stone mountings, said punch having a plurality of projections at its end for cutting and bending the prongs of the mounting prior to the punching of the mounting, said projections having shoulders for retaining the mounting on the end of the punch, and means coacting with said punch for applying said mounting to a sheet of material and crimping the prongs over a stone.

8. A selecting and feeding mechanism for ornamental stones or similar articles comprising a hopper having an inclined bottom and adapted to receive and hold therein a mass of stones, an outlet in the upper portion of said inclined bottom above said pile of stones for discharging the stones from the hopper, a carrier arranged to move over said bottom through said pile of stones and carry the stones one at a time to said discharge outlet, a reciprocating chute for receiving and conveying the stones from said outlet, and means for reciprocating said chute in timed relation to the discharge of stones from said outlet.

9. In a selecting and feeding device for ornamental stones or similar articles, a hopper having an inclined bottom adapted to receive on its lower portion a mass of stones, a discharge outlet in the upper portion of said bottom, and a stone carrier moving over the surface of said inclined bottom through said mass of stones to carry said stones to said discharge outlet, said carrier being provided with selecting means for selecting from said mass only stones which are in upright position, and means within said hopper for arranging stones from said mass in upright position and delivering them to said selecting means.

10. In a selecting and feeding device for ornamental stones or similar articles, a hopper having an inclined bottom adapted to receive on its lower portion a mass of stones, a discharge outlet in the upper portion of said bottom, a stone carrier moving over the surface of said inclined bottom through said mass of stones to carry said stones one at a time to said discharge outlet, said carrier being provided with selecting means for selecting from said mass only stones which are in upright position, and means within said hopper for arranging in the path of said selecting means stones from said mass which are in upright position.

11. In a device for selecting and feeding ornamental stones or similar articles including a hopper having an inclined bottom for receiving a mass of stones on the lower portion thereof, the

combination of a discharge outlet in said bottom above said mass of stones, a rotary disc having a thin marginal portion arranged to rotate adjacent the bottom of the hopper, said disc being provided in its marginal portion with an aperture adapted to receive one stone in upright position as said aperture passes through said mass and by which said stone is carried to said discharge outlet, said disc having an inner portion of greater thickness than said marginal portion, and radial recesses arranged within said inner portion for collecting stones from said mass during the rotation of said disc and discharging them in upright position on the said marginal portion so as to provide a supply of stones in upright position in the path of said aperture.

12. In a machine for attaching ornamental stones to sheet material, the combination of a die, a punch coacting with said die to form a stone mounting and push the same through the die to the opposite side thereof, and a tool mounted for reciprocation with respect to the opposite side of said die and coacting with said punch to force the prongs of said mounting through a sheet of material.

13. In a machine for attaching ornamental stones to sheet material, the combination of a die, a punch coacting with said die to form a stone mounting and push the same through the die, means actuated in timed relation with said punch for forcing the prongs of said mounting through a sheet of material while said mounting remains in engagement with said punch, mechanically actuated means for feeding a stone into attaching position with respect to said mounting, and means for thereafter crimping said prongs over said stone.

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