This invention relates to flower-stemming machines in general and in particular to such a machine having power actuating means.

Flower-stemming machines of the prior art have all been manually operated. In the Knuttila Patent No. 2,022,043, there is disclosed a device capable of applying a deformable metal pick to the stem of a flower. In one embodiment of the Knuttila patent, the operator was required to take a flower in his left hand and with the ball of his right hand gives a quick, inward blow to a handle which actuates the pick-feeding mechanism. Thereafter, the operator places the stem of the flower on top of the pick and, with a quick blow of his right hand on another knob, operates the jaws which crimp the pick about the flower stem.

Another embodiment disclosed in the same Knuttila patent requires the operator to first move a handle in one direction to actuate the pick feeding mechanism. Once the pick has been displaced, the operator must move the same handle in the opposite direction in order to close the crimping jaws.

The first Knuttila embodiment described hereinabove was not particularly well adapted to low-cost mass production of floral displays since it required a great deal of manual dexterity. The operation of the machine was particularly fatiguing since the operator was required to strike the lever and knob with considerable force to activate the mechanism. The second Knuttila embodiment, in U.S. Patent No. 2,022,043, also suffered substantially the same defects and, in addition, introduced the possibility of the operator becoming confused and moving the handle twice in the same direction. This resulted in jamming the first one which jammed the machine. Much valuable production time was thereby lost.

Still another manually operated machine is described in the Giovannelli Patent No. 3,197,998 granted on Aug. 31, 1965. Here again the picks are advanced by the movement of an external handle in one direction and the jaws are closed about the pick and the flower stem by movement of the same handle in the opposite direction. While this last mentioned patent had certain advantageous features related to improved feeding means of the picks the machine itself was still operated in the manual mode. It will be appreciated that with both of the aforementioned patents a certain element of fatigue is inherent in the constant manipulation of the handle. In addition, a certain amount of manual skill and dexterity is also required.

The present invention distinguishes over the prior art presently available in that in at least one embodiment the forces required to advance the picks and to close the crimping jaws are provided by pneumatically operated mechanisms. It is to be understood that where pneumatic actuating means are used they may be replaced by electrically operated solenoids. The operator in this first embodiment need only depress an easily moveable external lever in order to initiate the two-part cycle. In another embodiment of this invention, the picks are advanced by manually displacing an external handle in the manner of the Giovannelli patent.

The crimping jaws are closed by pneumatic means upon a slight overtravel of the external handle after it has returned to its original position. Thus while it is still necessary for an operator to manipulate an external lever at least the heavy pressures required to close the crimping jaws has been eliminated in both embodiments and in fact in the first embodiment, pneumatic means are used to advance the pick as well.

In still another embodiment of the invention there is no lever action required. The operator merely places the flower stem on the crimping station and contacts a switch. The presence of the flower stem starts the two-part cycle. Pneumatic means crimp the pick about the stem and when the assembled flower is removed a absence of a pick at the crimping station causes the next pick to be pneumatically advanced.

The first embodiment of this invention permits the operator to close the crimping jaws with the same hand that is applying the flower stem to the waiting pick. The operator's hand does not have to be moved a great distance so that the sequence of motions are perfectly natural and do not require any great skill and/or training. Pneumatic cylinders sequentially operate the crimping jaws and the rods that push the picks.

The second embodiment of this invention utilizes pneumatic means only to close the crimping jaws. Since this step requires the greater force of the two steps, the greater operator effort is eliminated. A handle is deflected in one direction each time a pick is fed. At the end of the return stroke the handle is moved only a very short distance in the opposite direction in order to actuate the pneumatic drive means. By this arrangement the overall cost of the unit is reduced without appreciably adding to the physical efforts required by the operator.

In the third embodiment a fully automatic flower-stemming machine is provided. There is no manipulation of any external levers. The operator need only contact a switch with the flower stem. The switch is located between the crimping jaws at a point past the place where the flower stem is originally inserted. Thus when the switch is energized the flower stem is assured of being in proper place for the crimping operation. As in the first embodiment means are provided for detecting the absence of a pick such as when an assembled flower is removed so that the next pick in the stack may be automatically fed to the crimping station.

Accordingly, it is an object of this invention to provide an improved semi-automatic pick-applying machine. It is also an object of this invention to provide an improved, fully automatic pick-applying machine.

It is another object of this invention to provide a flower-stemming machine wherein a manual operation is required but wherein the operating forces are supplied by pneumatic means.

A particular object of this invention is to provide a semi-automatic flower-stemming machine wherein the picks are advanced manually and are crimped automatically by pneumatic means.

An additional object is to provide a semi-automatic flower-stemming machine that does not require skilled labor.

A further object is to provide a fully automatic pick-applying machine wherein the cycle of operation is initiated by the presence of a flower stem.

These and other features, objects and advantages of the invention will, in part, be pointed out with particularity and in particular will, in part, become obvious from the following more detailed description of the invention, taken in conjunction with the accompanying drawings which forms an integral part thereof.

In the various figures of the drawing like reference characters designate like parts.

FIG. 1 is a side elevational view of one semi-automatic
embodiment of the improved pick applying machine with portions broken away;

FIG. 2 is a sectional plan view of the first embodiment taken along line 2—2 of FIG. 1;

FIG. 3 is a front elevational view of the crimping jaws and the camming means that actuate them;

FIG. 4 is a plan view of a pair of push rods with a deformable pick disposed therebetween;

FIG. 5 is a front view of the pair of push rods;

FIG. 6 is a sectional elevational view taken along line 6—6 of FIG. 1 illustrating the positioning of a pick sensing valve;

FIG. 7 is a side elevational view of an alternative semi-automatic embodiment of this invention;

FIG. 8 is a schematic illustration of a fully automatic flower-stemming machine; and

FIG. 9 schematically illustrates alternative construction of the last embodiment.

Referring now to the drawing, FIG. 1 and FIG. 2 illustrate one embodiment of an improved semi-automatic pick-applying machine 10 of the present invention. A hollow base 12 supports a pair of upright, flanged stanchions 14 which are laterally spaced about the longitudinal machine center line in a staggered relationship to each other.

A stack of deformable picks 16 is positioned on the longitudinal center line of the machine between upright stanchions and are maintained in proper position by the stanchion flanges. Each pick has a substantially flat body portion 18 having a longitudinal, central depression 20 and a plurality of deformable fingers 22 staggered on either side of the body portion at one end thereof. Fingers 22 also straddle the stanchion flanges. The opposite end of pick 16 is provided with a plurality of teeth or notches 23 similarly spaced on either side of the body portion in staggered relationship to each other. The trailing edge 22a of the two rearward fingers 22 (FIG. 4) abuttingly receive the spaced, parallel push rods 24 in order to be longitudinally displaced thereby.

Push rods 24 are formed from standard rectangular stock and have a downwardly turned rearward end 26. The cylindrical frontal end 28 of the push rods may readily be formed off center, as shown in FIG. 5, by a routine turning operation in a lathe. For convenience in description the push rod will be described although, as shown in FIG. 4, there are right and lefthand rods of different length, the different configuration being accounted for by the staggered relationship of the push fingers 22 on either side of the longitudinal center of the machine.

The top of cylindrical front end 28 of the push rod is positioned below the top surface of the rod to define a finger-engaging vertical plane 30 of such dimension as to engage one and only one pick with enough margin to allow for turns on the pick. Typically, a pick is approximately 0.012" thick and a burr, 0.003" thick. Therefore, plane 30 will have a dimension t of 0.014" and can advance one pick at a time, whether they are perfectly stamped or are burred as the result of using worn production dies. Conical tip 32 assures smooth travel of the push fingers 22 which also serves to guide the fingers into a firm and square abutment with vertical plane 30. In addition, in the manufacture of picks, it is imperative to allow some radius at the junction fingers 22 and body portion 18. Hence the push rods are provided with relief in the form of chamfered corner 34.

Directly beneath the stacked picks is a centrally located, longitudinal groove 36 (FIG. 2) formed in the top surface of base 12. The groove is shaped such that it will cradle the body portion 18 of the lowermost pick 16 in the stack. A pair of ways 38 are formed at the top of the base member, parallel to and laterally spaced from groove 36. Ways 38 have flat, smooth bottom and side walls adapted to slidably receive push rods 24.

A pair of spaced, parallel ledges 40 are also formed in the base member just below and parallel to the plane of ways 38. Following block 42, at its outboard ends 44, is adapted to slidably move on the ledges and in so doing displace the push rods.

Transverse groove 46, formed in the top surface of the follower block, engages the turned down 26 of each push rod so that upon actuation of the push rods, by means to be described more fully hereinafter, the lowermost pick in the stacking will be moved longitudinally into position between the crimping jaws 48.

Crimping jaws 48 are comprised of a pair of opposed sets of plates 50a and 50b having spacing therebetween so that the longitudinal spacing of the plates conforms to the longitudinal spacing of the pick fingers 22. The respective sets of plates are pinned together and are each further provided with pivot shafts 52a and 52b rotatably journaled in base member 12. A single screw 54 is provided with a head portion that spans both shafts 52a and 52b to thereby retain them in the base member. At their lower ends, each jaw is provided with a roller 56 which extends between the two outboard plates of each set of plates.

At the proper time, the crimping jaws are actuated by a bell crank 58 in a manner to be described more fully hereinafter. As may be best seen in FIG. 1 and FIG. 3, the bell crank is pivotable about transverse shaft 60 which is journaled in the spaced side walls of the base member. One arm 62 of bell crank 58 terminates in a cam 64 which is positioned between rollers 56 at the lower ends of jaws 48. It will be seen that upward travel of the cam will cause the rollers in the lower ends of the jaws to separate and will cause the plates 50a and 50b in the upper ends of the jaws to come together and crimp fingers 22 of the pick about the stem of the flower. The other arm 66 of bell crank 58 is provided with a pivotable linkage 68 extending to the bell crank actuating means.

Included in structural features of the machine is a cover plate 70 which is secured to the top of base member 12 by means of screws 72. Cover plate 70 retains the push rods during their translation within ways 38. As the pick 16 is advanced to the left (FIG. 1 and FIG. 2) body portion 18 slides along centrally disposed longitudinal groove 36 and underneath retaining spring 74 carried by adjustable bracket 76. Spring 74 assures that the pick will follow an exact predetermined path. Cover plates 78 are also secured to the top of base 12 to conceal and protect crimping jaws 48.

For each embodiment of this invention a cycle of operation starts with a pick 16 positioned between jaw assemblies 48. The pick rests on or against forward end of groove 36 so as to cradle the body portion 18 of the lowermost pick. The operator places a flower stem on to the portion of the pick between the jaws and then proceeds to actuate the jaw closing mechanism.

A three-way valve 100 is mounted for convenience on one side of the base 12 at the forward end thereof. Inlet 102 is connected by means of a T fitting 104 to a suitable source of compressed air 106. The valve 100 is also provided with a second fitting 108 that has a conduit 110 connected thereto. Pneumatic cylinder 112 is coupled to the opposite end of the valve in means of a suitable fitting. Valve 100 is further provided with upwardly extending actuator button 114 that is responsive to a lever 116 pivotally mounted on the valve 100. The three-way valve, when actuated, permits air to enter the cylinder 112 and when released permits air to be exhausted from the cylinder to the atmosphere so that the pick may be returned to its original position by an internal spring.

It will be seen that the free end of the lever is positioned directly in front of the housing at a point just below the crimping jaws. Thus, the operator can hold the flower in one hand, place the stem of the waiting pick between the jaws, and with the same hand that holds the flower, depress the free end of the lever. This action will cause the cylinder piston 112a to displace the bell crank
forward to permit the cam to close the crimping jaws in the manner described hereinabove. It will be noted that the operator must use the hand that holds the flower in order to depress the lever 116. There is assurance then that he cannot hurt himself by accidentally placing his finger between the crimping jaws.

The second phase of the cycle of operation concerns the lateral movement of successive picks. In the first embodiment this is accomplished by a second cylinder 120 mounted adjacent to the rearward end of the machine directly above the crimping cylinder. Cylinder 120 is provided with piston means 120a that is engaged in the rearward end of block 42. At the appropriate time the push rods will engage with the laterally extending fingers of the pick and drive the pick forward. A resilient bumper is placed on the cylinder piston 120a to cushion the return thereof. Cylinder 120 may be a one-inch single acting, spring return type.

Means are also provided in combination with the cylinder 120 for sensing the absence of a pick at the crimping station. A feeler valve 130 is mounted such that the moveable piston 130a thereof is positioned directly over groove 36 proximate the position of a pick when it is in the crimping station. Valve 130 is connected to T fitting 104 by means of a conduit 132. A second conduit 134 extends from the valve 130 to the second piston. When a pick is in position, valve 130 is in a position of inverted by the thickness of the pick. When a pick is removed, such as after the fingers are crimped, piston 130a will be extended, the valve will be opened, and the compressed air will flow through the T fitting, through conduit 132 through the valve 130 and through the conduit 132 to the second piston 120a. This action will cause the pick to move towards the forward end and deliver the next lowermost pick.

It will be seen from the foregoing that by very simple means sequential operation of the crimping jaws and the pick delivering system is provided. The operator need only depress the lever that actuates the crimping jaws in order to start the cycle. Once the cycle is initiated the jaws will crimp and the next lowermost pick will be delivered in that sequence each time the operator depresses the lever. It should be noted that a minimal force is required on lever 116 in order to depress valve button 114. A lever 136 is pivotally mounted on the cylinder 130 in order to permit manual or non-sequential operation of the pick moving cylinder. The lever 136 is coupled to the valve button 114 so that the piston 130a may be moved upwardly. This will cause the cylinder to deliver a pick out of sequence. This procedure may be necessary should a pick be deformed or have a burr that interferes with its normal fitting. Because the picks are made of a thin metal and because the stamping dies therfor are subject to wear, it is possible that a defective pick may be present which can cause a malfunction. Should this occur, the lever 136 permits the selective actuation of the pick driving cylinder. Once the defective pick has been removed, the cycle reverts to the semi-automatic system that requires the operator to depress the lever after each insertion of a flower stem.

FIG. 7 illustrates an alternative embodiment of a semi-automatic flower-stemming machine comprising this invention. Since the greater force is required for the crimping operation, rather than the pick feed, this portion of the prior embodiment is retained and will not be described again in detail. However, in order to reduce the cost of the machine, the pick moving portion of the cycle has been made separable. All other components of the apparatus remain the same except for that which will now be described.

An external handle 150 is journaled in the machine base on shaft 152 and is loosely connected by means of link 154 to the rearward end in the bell crank 156 that operates the crimping jaws. An arm 150 is rigidly secured to the shaft 152 and has a transverse rib 160 for engaging the follower block at the rearward end of each push rod. When the operator desires to place a pick between the crimping jaws he moves towards the left as shown in FIG. 7. By virtue of the aforementioned link arrangement, the push rods are translated from rearward position in order to deliver the lowermost pick.

The handle is resiliently mounted by means of spring 162 so that it normally returns to its rest position. The operator at this time need only deflect the handle to the right a short distance in order to engage the actuator button of valve 164. A course of compressed air feeds the valve as described hereinbefore and causes piston 112a and cylinder 112 to close the jaws.

FIG. 8 schematically illustrates a fully automatic embodiment of this invention. The basic concept of feeding one pick at a time and then crimping the pick fingers about the flower stem remains the same as in the previous embodiments. Accordingly, where components are the same with regard to either function or structure their description will not be repeated.

The fully automatic machine utilizes a normally closed switch 200 positioned in the path of the flower stem. Where the flower stems have little rigidity, such as a wire stem, it is preferable that switch 200 be of the snap acting type requiring the least minimum of energizing force. Where the flower stems are, for example, polyethylene and have operated them of insulated by the thickness of the pick. When a pick is removed, such as after the fingers are crimped, piston 130a will be extended, the valve will be opened, and the compressed air will flow through the T fitting, through conduit 132 through the valve 130 and through the conduit 132 to the second piston 120a. This action will cause the pick to move towards the forward end and deliver the next lowermost pick.

It will be noted that the switch is inboard of the forward end of the machine and past the transverse line of movement of the crimping jaws. Thus, in order to actuate the switch, the operator must place the flower stem between the crimping jaws and advance the item towards the switch. Once the switch is actuated, and it requires only a very small force for this purpose, the pneumatic system that is coupled to the switch will be energized.

For purposes of this description the pneumatic system shown in the FIG. 8 embodiment is comprised of a first air cylinder coupled to the crimping jaws and a second air cylinder coupled to the pick advancing means. The mode or sequence of operation is therefore the same as in the first mentioned embodiment except that the operator need not depress a lever in order to initiate the cycle. Almost all of the flower stems presently being assembled are rigid enough to close switch 200. Since only a minimum of pressure is required for this purpose, the pneumatic system is easily energized and operator fatigue is reduced to the barest minimum. Further, the speed of the machine is dependent only on the skill of the operator. Having thus disclosed the best embodiment of the invention presently contemplated, it is to be understood that various changes and modifications may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. In an improved machine using a source of compressed gas for applying a deformable pick to the stem of a flower, the machine having a pair of ways, feed means for supplying picks to the ways, a pair of longitudinally movable push rods disposed in the ways on either side of the pick, opposed crimping jaws movable in a direction perpendicular to the line of movement of the push rods, the jaws being arranged to deform the pick about a flower stem placed on the ways and a cam to actuate the crimping jaws, the improvement comprising:

(a) first actuator means arranged to displace the push rods whereby a pick is placed between the crimping jaws;
(b) second power-driven actuator means arranged to displace the cam whereby the crimping jaws are moved in timed relation to said first actuator means.
2. The device in accordance with claim 1 wherein said first and second actuator means are pneumatic cylinders adapted to be driven by the source of compressed gas.

3. The device in accordance with claim 1 wherein there is further included manually operable lever means arranged to energize said second actuating means.

4. The device in accordance with claim 2 including valve means sequentially coupling said first and second actuating means to the source of compressed gas.

5. The device in accordance with claim 2 including sensing means arranged to detect the absence of a pick between the crimping jaws, said sensing means being coupled to said first actuator means whereby when a pick is absent said first actuator means is driven by the source of compressed air.

6. The device in accordance with claim 5 wherein said sensing means is an air valve having a retractable piston positioned in the path of the pick.

7. The device in accordance with claim 5 wherein said sensing means further includes manual actuation means therefor.

8. The device in accordance with claim 2 including switch means coupled to said second actuator means, said switch means being responsive to the presence of a flower stem in the crimping jaws whereby energization of said switch means operates said second actuating means.

9. The device in accordance with claim 1 wherein said first actuator is a lever coupled to the push rods and arranged to move the push rods between a first position at which a pick is received and second position wherein the pick is delivered to the crimping jaws, said second actuating means being a pneumatic cylinder having a piston coupled to the cam, there being further included valve means coupled to said second actuating means and arranged to be engaged by said lever on the return of said lever to the first position whereby the crimping jaws are closed.

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