Aug. 24, 1943. B. E. WOLFE 2,327,849

AUTOMATIC FEEDING DEVICE

Filed June 11, 1941

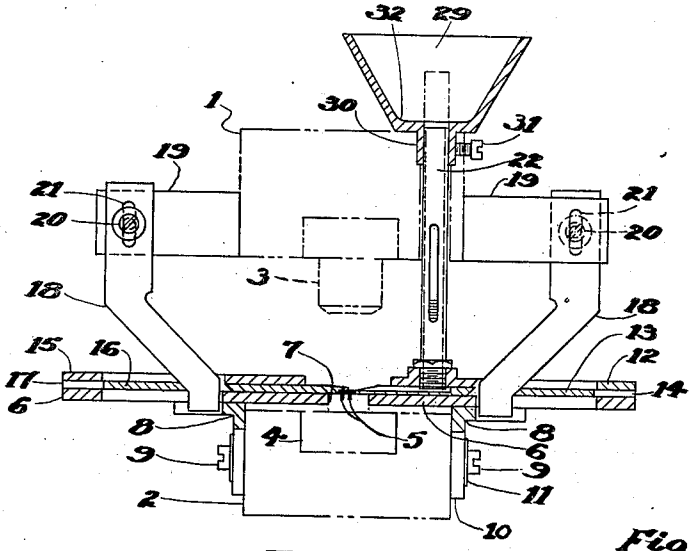

Fig. I

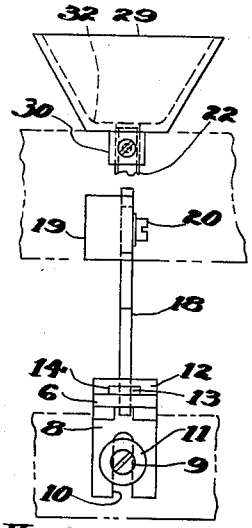

Fig V

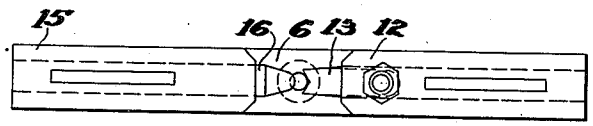

Fig. II

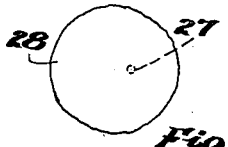

Fig VI

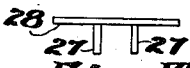

Fig. VII

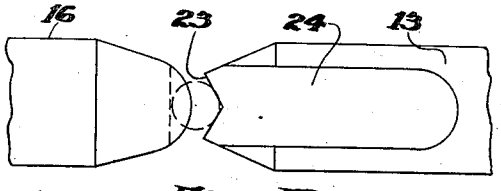

Fig. III

Fig. IV

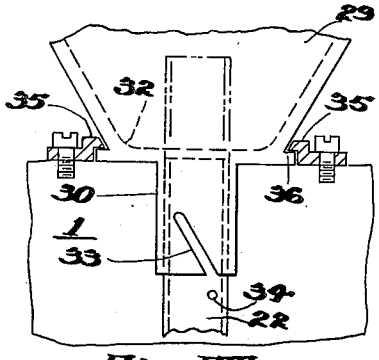

Fig. VIII

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AUTOMATIC FEEDING DEVICE

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8 Claims. (Cl. 78—96)

This invention relates to automatic feeding devices and particularly to devices adapted to feed and locate flat blanks in position to be processed.

The object of this invention is to provide means and method for automatically aligning flat blanks in orderly relation, periodically selecting one of the aligned blanks and moving it to a predetermined location.

Another object is to provide a hopper so formed as to permit flat blanks to lie horizontally therein, and means reciprocable in and out of the hopper and adapted to automatically pick up and vertically align a group of the blanks, while maintaining them in effectively horizontal positions.

Another object is to provide automatic means adapted to align vertically a group of flat blanks, periodically select one of the aligned blanks and move it to a predetermined location against a stop member which has simultaneously and temporarily been moved to the locating position.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawing. It will be apparent that many changes may be made in the details of construction, arrangement of parts and method shown and described without departing from the spirit of the invention as expressed in the accompanying claims. I, therefore, do not wish to be limited to the exact details of construction, arrangement of parts and steps of the method shown and described, as the preferred form only has been set forth by way of illustration.

Fig. I is a front elevation of the device embodying the invention;

Fig. II is a partial plan view of the mechanism of the invention;

Fig. III is an enlargement of the central portion of Fig. II;

Fig. IV is a side elevation of the structure of Fig. III;

Fig. V is a right end elevation of part of the structure of Fig. I;

Fig. VI is an enlarged plan of a blank after processing;

Fig. VII is a side elevation of the blank of Fig. VI; and

Fig. VIII is an enlarged, partial elevation of an alternate structure.

This invention relates particularly to an automatic feeding and locating device adapted to be used in the processing of small flat blanks of the character used in forming gold numerals with clinching feet thereon to be used on watch dials.

Prior to this invention the feeding and locating of such blanks to their process position in a press, has been a difficult and painstaking job, and one which necessitated a skilled and fast operator. The blanks had to be picked up one by one, and carefully placed in exact location in the press. Since the blanks are relatively small, and the necessary position between the dies critical, this method has been a difficult and relatively expensive one.

For example, the normal blank before swaging is approximately 215 thousandths of an inch in diameter and 11 thousandths thick. After swaging, the blank is approximately ¼ inch in diameter and 10 thousandths thick. The length of the feet, including the thickness of the blank is, for one size, 33 thousandths, and for another size, 52 thousandths.

The operation consists of placing a flat blank between two dies, one of which has two small openings therein, and both of which have been carefully designed and formed with a view to making metal flow from the flat blank into the small openings of the die to form integral feet on the flat blank under the swaging action of the press.

Since the dies are carefully formed to cause the metal to flow into the die openings, the location of the blank between the dies is critical and must be accurate to permit the effective use of the press.

This necessary accuracy is difficult to obtain manually and keeps the operation of the press relatively slow, even with a skilled operator.

The device of this invention provides means and method of automatically selecting and exactly positioning the flat blanks so as to obviate the prior art difficulties outlined above. All that is necessary is to shovel a group of the blanks into a hopper and they are automatically and quickly carried through the selecting, positioning, processing and removal steps of the operation. A relatively unskilled operator may be used, and the work is carried out at a good rate of speed and therefore the device of this invention provides definite time and cost savings over the prior art method.

An alternate structure designed to give added efficiency to the device, particularly when there are only a few blanks in the hopper is one which automatically agitates the blanks in the hopper without permanently upsetting their flat horizontal positions.

The device of this invention is adapted for use in a press or swaging machine, in which die blocks may be positioned in alignment, and which may be so operated as to bring the dies in the die blocks together so as to press or swage an object between the dies.

The die blocks of this invention are illustrated at 1, for the upper, and 2, for the lower. See Fig. I. Die block 1 has a substantially plain, flat, circular cross-section die 3, mounted therein and die block 2 has a die 4 mounted therein which is similar to die 3 except that it has small vertical perforations 5 therein.

The die block 2 is so mounted in the press as to be stationary during the operation of the press, and the die block 1 is so mounted in the press as to recurrently and forcibly move up and down with respect to die block 2 so as to bring about relative movement between the upper die 3 and the lower die 4, and to process a flat blank therebetween in such a manner as to cause the material of the blank to flow into the openings 5 in the lower die 4 and form integral feet on the blank to the shape of the openings 5. These are preferably of a substantially circular cross-section and solid cylinder formation, although other shapes and formations may be produced if desired by calculated construction of the dies and the openings in the lower die.

The flat blanks which are handled by the device of this invention are each located in a flat position to one side of and level with the top face of the lower die 4 and then pushed into position on the top face of the lower die 4.

Simultaneously with the above mentioned pushing action, a stop member is moved horizontally to a position adjacent the top face of the lower die 4 and is at such a level and opposite position with respect to the approaching blank as to provide a stop against which the blank is pushed, thus locating it in the desired position on the top face of the lower die 4. As soon as the blank is thus positioned, the stop member and the pushing member are both reversed in their motion and withdrawn from the die 4, leaving the blank on the die 4 ready to be processed between die 3 and die 4.

After the blank has been swaged between the dies, and the integral feet formed thereon, it is preferably removed from between the dies by first being pushed upward from beneath to clear the newly formed feet from the die, and then being air blown from between the dies. This removal may be accomplished in the above usual, or other suitable manner.

In order to provide a surface on which the blanks may be pushed to position them on the top surface of the die 4, a base plate 6 is provided formed with an opening 7 centrally thereof and of a shape and size corresponding to the upper portion of the die 4. The base plate 6 is located with the upper portion of the die 4 positioned in the opening 7 of the base plate 6 and with the upper surfaces of the die 4 and base plate 6 sufficiently level with each other to permit a flat, relatively thin blank to be pushed, while lying flat, from the upper surface of the base plate 6 to the upper surface of the die 4.

The base plate 6 is maintained in the above described position by supporting angle brackets 8, which are vertically adjustable. These brackets are mounted on the sides of the die block 2 by means of bolts 9. The angle brackets 8 are provided with vertical slots 10, and the bolts 9 with washers 11 of larger diameter than the width of the slots 10.

The base plate 6 has its bottom surface secured to the top of the angle pieces 8 so that through vertical adjustment of the angle pieces 8 by the cooperative arrangement of the slots 10, bolts 9 and washers 11, the level of the top of the base plate 6 may be changed. This is useful not only for the initial leveling of the top of base plate 6 with the top of die 4, but also for readjustment of the top of base plate 6 to a lower or higher level when the die 4 has been worn or depressed through use or when a new or different top level die is used in the place of die 4.

The assembly for picking up, pushing, guiding and locating the blank is mounted on the upper surface of base plate 6 and includes a cover plate 12 for a pusher bar 13. Pusher bar 13 is adapted to slide on the upper surface of base plate 6 toward and away from the die 4 in a slot 14 in the under side of cover plate 12. Cover plate 12 is secured to the base plate 6.

On the opposite side of the die 4, the above mentioned assembly includes a cover plate 15 for a locater and stop bar 16. Locater bar 16 is adapted to slide on the upper surface of base plate 6 toward and away from the die 4 in substantially opposite relation to the movement of the pusher bar 13, in a slot 17 in the under side of cover plate 15. Cover plate 15 is secured to the base plate 6.

Movement of the pusher bar 13 and locator bar 16 back and forth in their respective cover plate slots 14 and 17 is accomplished through the action of cam bars 18. Cam bars 18 extend vertically and are connected to, and move up and down with, the upper die block 1 during the operation of the press.

The connection of the cam bars 18 to the die block 1 is accomplished through the supporting bars 19 which are secured to the die block 1 and to which the cam bars are secured for vertical adjustment through bolts 20 and associated washers and slots 21 in the cam bars 18. Vertical adjustment of the cam bars may be made in order to change the starting and stopping positions of the pusher and locater bars 13 and 17, or to compensate for a change in the level of the die 4 by wear or replacement.

The cam bars 18 are substantially rectangular in cross section with the narrow edges lying in the direction of the movements of the pusher bar 13 and locater bar 16. The connections of the cam bars 18 to the supporting bars 19 are at points substantially equally and relatively distantly spaced laterally from the upper die block 1, and extend downwardly and inwardly toward the lower die block 2.

Cover plates 12 and 15, pusher bar 13, locater bar 16, base plate 6, and the angle pieces 8 all have vertical openings through which the cam bars 18 pass as they move up and down with the upper die block 1. The openings in all of the above, however, except the pusher bar 13 and the locater bar 16, are sufficiently extended horizontally to permit the passage therethrough of the cam bars 18 without any camming effect.

The openings in the pusher bar 13 and the locater bar 16 are of much less horizontal extent than the other above mentioned openings and are only a small amount greater in horizontal extent than the cross sectional extent of the cam bars 18 in the same direction.

The cam bars 18 are angled with respect to the vertical, and as the cam bars are moved

through the openings of the bars their up and down movement brings about a cam action between them and each of the pusher and locater bars 13 and 16 respectively. Accordingly, as the upper die block 1 is moved downwardly, the pusher and locater bars 13 and 16 are cammed away from the die 4, and as the upper die block 1 is moved upward, the pusher and locater bars 13 and 16 are cammed toward the die 4. Consequently, the pusher and locater bars 13 and 16 move and position a blank on the die 4, while the die 3 is raised. These bars are then moved out of the path of the dies, leaving the blank on the die 4. Subsequently, the die 3 is brought down toward the die 4 in the course of the operation of the press and the blank or article being swaged, pressed, stamped, etc., is operated on.

Each time the pusher bar 13 is moved away from the die 4, a fresh blank is fed to rest flat on the upper surface of base plate 6, ready to be picked up by the pusher bar 13. This action is accomplished through the use of a vertical tube 22 having a group of vertically arranged and aligned, substantially horizontally, flat blanks therein. As one blank is removed from the bottom of the vertical group of blanks in tube 22 by the pusher bar 13, and the bar 13 is retracted, the next blank in the vertical alignment falls into ready position on the upper face of the base plate 6 under gravital action aided by the pressure of the remaining vertically aligned blanks.

The tube 22 is attached to, and extends through, the cover plate 12. The lower end of the tube 22 is located vertically and closely adjacent the upper surface of the base plate 6. The distance between the lower end of the tube and the base plate is only slightly greater than the thickness of the blanks so as to permit only one blank at a time to be pushed from under the aligned blanks and supply tube 22 without otherwise disturbing the alignment of the blanks.

The pusher bar 13 has its inner or blank contacting end formed as shown in Figs. III and IV, with a V shaped depression 23 in the direction of the length of the pusher bar. This depression is adapted to receive the blank and aid in keeping it in line in the direction of the movement of the bar 13 while the blank is being pushed toward the die 4.

The bar 13 has a slot 24 in its top portion which is of such depth that the remaining thickness of the bar is able to pass beneath the lower end of the tube 22 and yet prevents the next blank in line from leaving the tube 22 until the pusher bar 13 has been cammed away from the die 4 far enough to permit the next blank to drop from the tube 22 to the base plate 6 and within or in line with the V recess 23.

The locater bar 16 has, at its inner or blank contacting end, an overhang 25 which is of sufficient height above the base plate 6 to allow a blank to be pushed beneath it, and which acts as a holding device to keep the blank from snapping up when pushed against the locater bar 16 by the pusher bar 13. The setback 26 of the overhang 25 is calculated, as are also the dimensions and contours of the push bar 13, the locater bar 16, and the cam bars 18, to bring the blank to such a location on the top of the die 4 as will take the greatest advantage of the special construction of the operating faces of the dies. The metal of the blank is thereby caused to flow into the foot forming holes 5 of die 4 and the feet 27 (Fig. VII) on the blank 28 are properly located.

The supply tube 22 is fed from a hopper 29 mounted on the die block 1 and is adapted to move up and down therewith. The outlet tube 30 of the hopper 29 fits over the upper end of the supply tube 22 in a sliding fit, so that the relative movement between the die blocks 1 and 2, in the course of the operation of the press in which the blocks are mounted, causes the supply tube 22 to move in and out of the main body of the hopper 29. The extent to which the tube 22 moves into the hopper may be varied by adjustment of the hopper up or down through the use of the lock screw 31.

The hopper 29 is formed with a substantially flat inside bottom portion 32 of such lateral dimension as to permit the blanks to lie effectively flat thereon. When the upper end of the tube 22 enters the hopper, the blanks are lying in effectively horizontally flat positions and tend to drop straight into the tube 22 without falling edge first or partly canted in such a way as to jam or block the tube.

The alternate structure of Fig. VIII illustrates the hopper 29 having an angled slot 33 in the outlet tube 30 and a pin 34 secured to the tube 22 and adapted to engage the slot 33. The hopper 29 is held on the die block 1 through the holding action of the brackets 35 on the flange 36.

As the die block 1 is moved up and down and the tube 22 moves in and out of the hopper 29, the pin 34 engages the slot 33 and causes the hopper 29 to rotate first in one and then in the opposite direction. This motion is designed to so shuffle the blanks lying in the hopper 29 as to move them into alignment with the tube 22 so that they may readily be picked up, while keeping them in substantially flat positions in the hopper 29. Also any of the blanks which are edge down or canted in the hopper will be agitated so as to tend to make them lie flat, by the rotary motion of the hopper 29.

Various other constructions and modifications are readily apparent from a reading of the specifications.

What I claim is:

1. In a device for forming integral pins on flat blanks, an automatic feeding device comprising a hopper, an aligning device mounted for reciprocatory relative movement with respect to said hopper and adapted to periodically pick up and align groups of blanks from the hopper, means adapted to produce in said hopper a movement of agitation different from and in addition to said reciprocatory relative movement, and a selection member adapted to periodically and successively pick out one of said blanks from said aligning device and move it to a predetermined position in said device.

2. In a device of the character described, an automatic feeding device comprising a hopper adapted to permit flat blanks to lie in effectively horizontally flat positions therein, an aligning device mounted for reciprocatory relative movement in and out of said hopper and being adapted thereby to periodically pick up and align groups of blanks from the hopper and hold them in effectively horizontally flat positions, means adapted to produce in said hopper a movement of agitation different from and in addition to said reciprocatory relative movement, and a selection member adapted to periodically and successively pick out one of said blanks from said aligning device and move it to a predetermined position in said device.

3. In a device of the character described, a lower die block, an upper die block mounted for controlled movement toward and away from said lower block, a horizontally extending base plate mounted on said lower block and having a vertically extending horizontally elongated opening therethrough on each side of said lower block, a cover bar mounted on each end of said base plate, having an opening in alignment and coextensive with one of said base plate openings and a longitudinally extending downwardly facing slot, a work control bar slidably mounted in each of said slots and having an opening therethrough in alignment with and of less horizontal extent than the opening of its associated cover bar, a pair of cam arms mounted on opposing sides of said upper die block each extending through the opening of one of the cover bars, one of the work control bars and one side of the base plate, with the dimensions and contour of said cam arms being such that movement of said die blocks relative to each other will produce, through said cam arms, movement of said work control bars relative to each other, and means adapted to feed workpieces through one of said cover bars to rest on said base plate in position to be moved by one of said work control bars.

4. In a device of the character described, a pair of die assemblies arranged for controlled relative movement with respect to each other, a pair of work control members mounted on one of said assemblies for sliding movement with respect to each other, one of said members being adapted, by virtue of a horizontally recessed end, to push a workpiece into operative position between said die blocks without horizontal deviation from the line of push, the other of said control members being adapted to form a stop for said workpiece adjacent said operative position and, by virtue of an undercut end, to prevent vertical displacement of said workpiece as it is pushed into said operative position, and a pair of rigid cam arms mounted on the other of said assemblies, each of said arms adapted to impart movement to one of said control members upon relative movement between said assemblies.

5. In a device of the character described, a pair of die assemblies arranged for controlled relative movement with respect to each other, a workpiece feeder member and a workpiece stop member each having an opening therethrough and mounted for sliding movement on one of said die assemblies, supply means adapted to guide a workpiece into operative position with respect to said feeder member, and a pair of cam arms rigidly secured to the other of said assemblies and each extending through the opening of one of said members, said arms being adapted, upon relative movement of said assemblies toward each other, to pass through and to so bear on a side of their respective opeings as to impart a sliding movement to said members sufficient to cause said feeder member to impel a workpiece into operative position between said die assemblies and to position said stop member adjacent said operative position between said die members.

6. In a device of the character described, an automatic feeding device comprising a hopper member, an aligning member adapted to periodically pick up and align groups of blanks from said hopper, means adapted to agitate said hopper including a fixed pin on one of said members and a transverse slot on the other, and a selection member adapted to periodically and successively pick out one of said aligned blanks and move it to a predetermined position in said device.

7. In a device of the character described, a pair of die assemblies arranged for controlled relative movement with respect to each other, a workpiece feeder member, a workpiece stop member, supply means for guiding a workpiece into operative position with respect to said feeder member, cam members adjustably carried on one of said die assemblies and engaging the workpiece feeder member and said workpiece stop member to operate said members to properly position said workpiece with respect to the die assemblies.

8. In a device of the character described, a pair of die assemblies arranged for controlled relative movement with respect to each other, a workpiece feeder member, a workpiece stop member, supply means for guiding a workpiece into operative position with respect to said feeder member, cam members independently adjustably carried on one of said die assemblies and engaging the workpiece feeder member and said workpiece stop member to operate said members to properly position said workpiece with respect to the die assemblies.

BRUCE ELDER WOLFE.