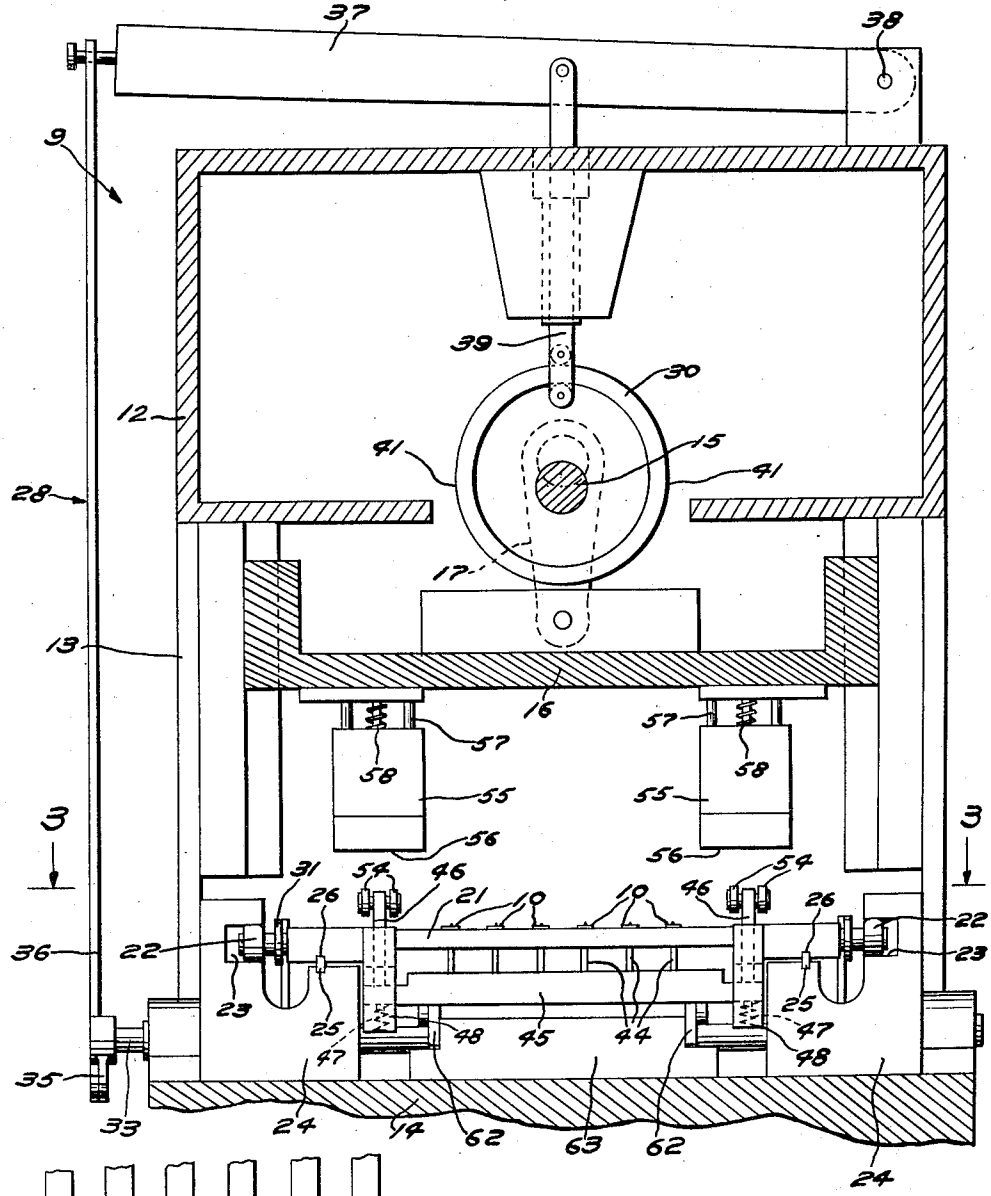
Dec. 30, 1958 O. H. MANNISTO 2,866,638

STRIP FEEDING MECHANISM

Filed Dec. 7, 1956 3 Sheets-Sheet 1

FIG. 1



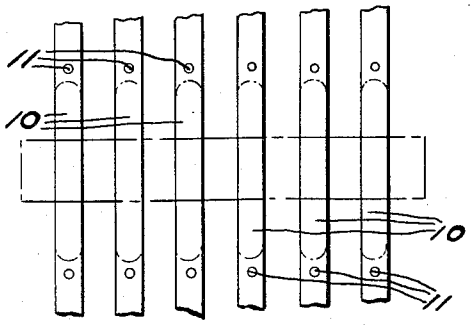


FIG. 2

INVENTOR
O. H. MANNISTO
BY C. B. Hamilton
ATTORNEY

Dec. 30, 1958 O. H. MANNISTO 2,866,638

STRIP FEEDING MECHANISM

Filed Dec. 7, 1956 3 Sheets-Sheet 2

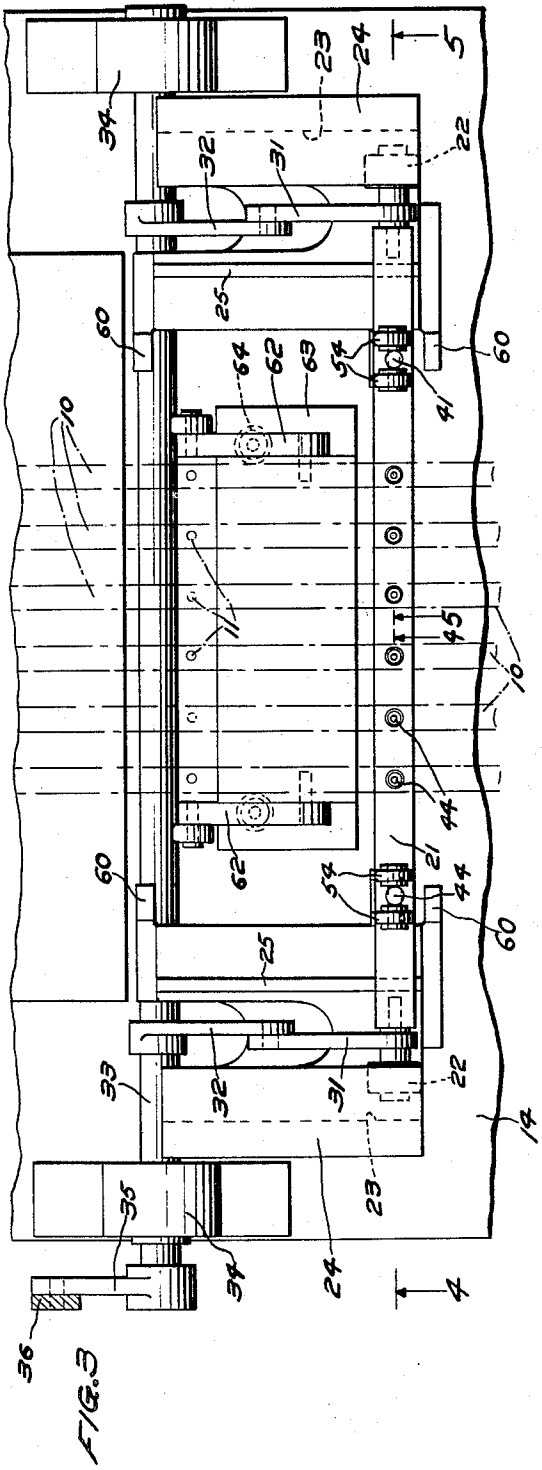


FIG. 3

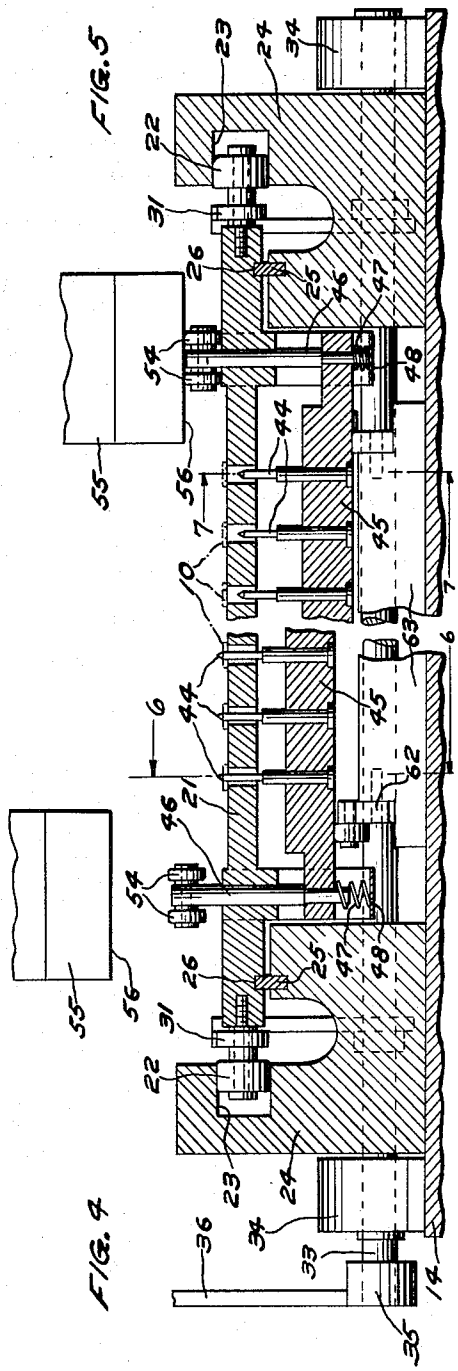


FIG. 4

FIG. 5

INVENTOR
O. H. MANNISTO
BY C. B. Hamilton
ATTORNEY

Dec. 30, 1958 O. H. MANNISTO 2,866,638

STRIP FEEDING MECHANISM

Filed Dec. 7, 1956 3 Sheets-Sheet 3

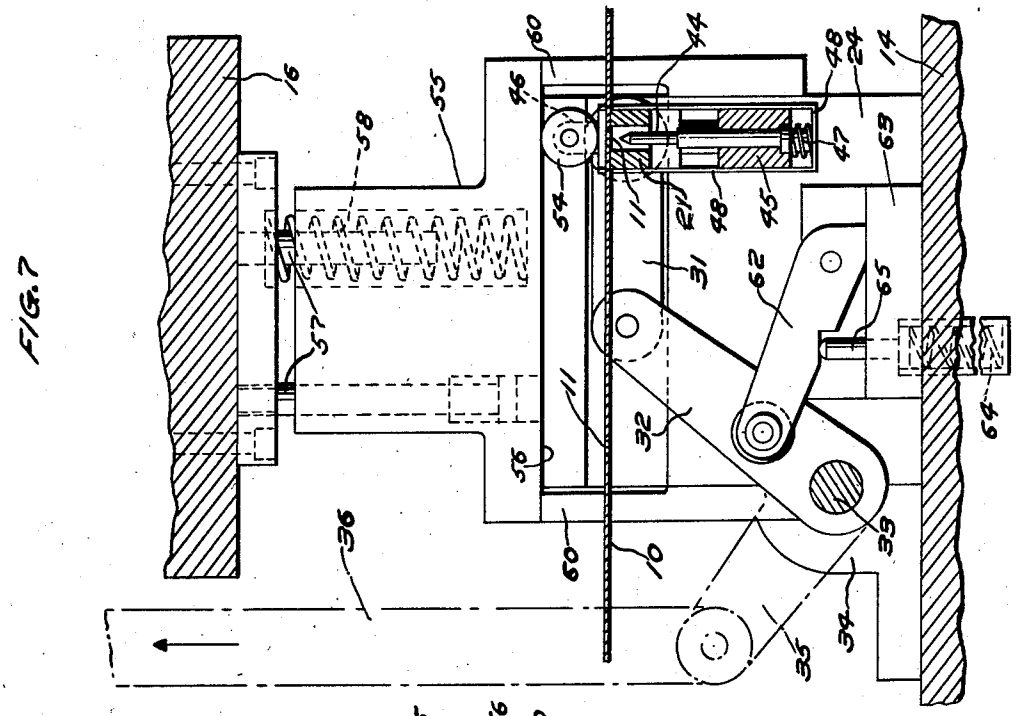


FIG. 7

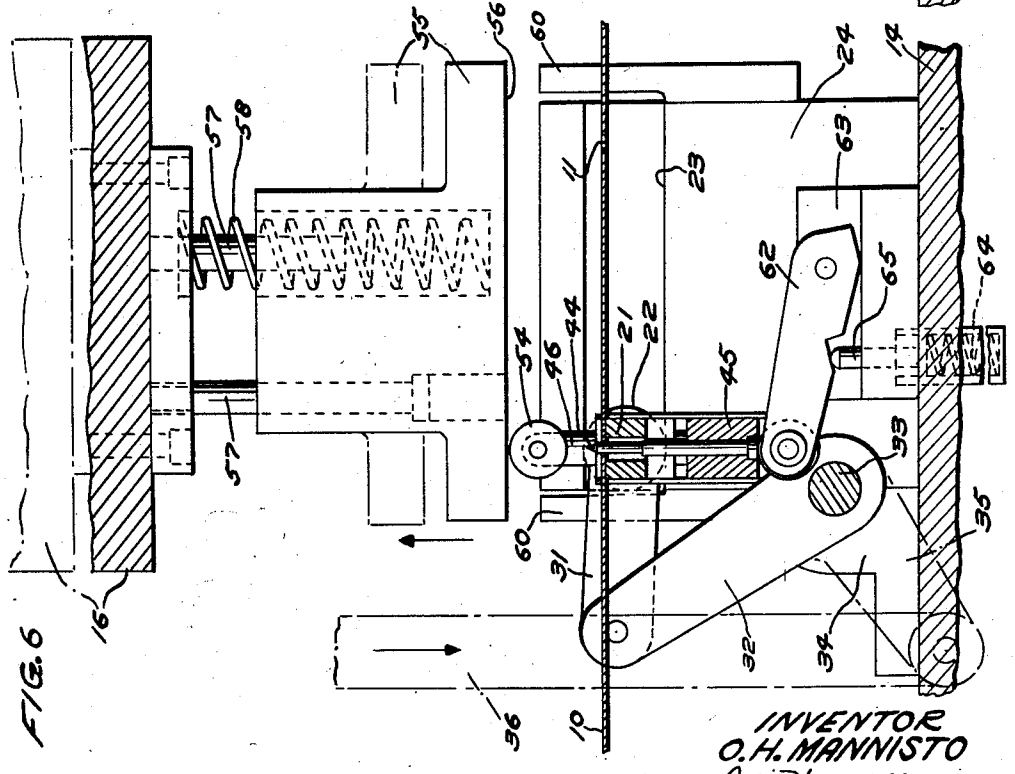


FIG. 6

INVENTOR
O. H. MANNISTO
BY C. S. Hamilton
ATTORNEY

United States Patent Office 2,866,638 Patented Dec. 30, 1958

2,866,638

STRIP FEEDING MECHANISM

Orville H. Mannisto, Brookfield, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

Application December 7, 1956, Serial No. 626,939

6 Claims. (Cl. 271—2.5)

This invention relates to strip feeding mechanism and more particularly to a mechanism for simultaneously advancing a plurality of strips step by step through a predetermined distance.

An object of the present invention is to provide an improved mechanism for intermittently advancing a plurality of strips through uniform distances.

A mechanism for feeding a plurality of perforated strips in a punch press illustrating certain features of the invention may include a shuttle bar mounted for horizontal movement and reciprocated through a predetermined stroke by linkage which is actuated by a cam on the crank shaft of the press for reciprocating the shuttle bar for each rotation of the crank shaft. A connector member having pins thereon engageable in the perforations in the strips is mounted on the shuttle bar for horizontal movement therewith and for vertical reciprocation relative thereto and is urged by springs to a normal upper position with the pins in engagement with the strips and is depressed to a lower position to disengage the pins from the strips by depressor members which are yieldably mounted on the ram of the press and cooperate with the springs to raise the pins into engagement with the perforations in the strips at one end of the feed stroke of the shuttle bar and to lower the pins and disengage them from the strips at the other end of the stroke of the shuttle bar.

Other objects and advantages of the invention will become apparent by reference to the following detailed description and the accompanying drawings illustrating a preferred embodiment thereof, in which

Fig. 1 is a fragmentary vertical cross-sectional view through a punch press showing the improved strip feeding mechanism thereon;

Fig. 2 is a fragmentary plan view of a plurality of strips which are to be fed and worked on in the punch press;

Fig. 3 is a fragmentary plan sectional view of the strip feeding mechanism taken on line 3—3 of Fig. 1;

Figs. 4 and 5 are fregmentary vertical cross-sectional grooves of the strip feeding mechanism taken on lines 4—4 and 5—5, respectively, of Fig. 3 and showing the connector pins in different positions; and

Figs. 6 and 7 are fragmentary vertical cross-sectional views taken on lines 6—6 and 7—7 of Figs. 4 and 5, respectively, showing the strip feeding mechanism in different positions.

Referring to the drawings, there is shown a punch press 9 for fabricating multi-part articles from a plurality of narrow strips 10 having uniformly spaced perforations 11 therein (Fig. 2) as disclosed in Patent 2,666,253 issued to I. A. Morberg on a method of making spring assemblages.

The punch press 9 has a bed 14, vertical end frames 13, a longitudinal upper cross frame 12, and a crank shaft 15 for reciprocating a ram 16 to which it is connected by means of a connecting rod 17. The feed mechanism for advancing the strips 10 comprises a shuttle bar 21 disposed beneath and transversely of the strips 10 and having rollers 22 mounted on each end thereof which ride in horizontal guideways 23 in guide blocks 24. These guide

blocks are mounted on the bed 14 of the press and have horizontally disposed tracks 25 which fit in grooves 26 in the shuttle bars for slidably supporting the bars against tilting movement and preventing movement thereof transversely of the strips 10. The shuttle bar 21 is connected by suitable linkage 28 to a cam 30 on the crank shaft 15 and is reciprocated thereby through a predetermined stroke equal to the distance between successive perforations 11 in the strips 10. The linkage 28 (Fig. 3) comprises a pair of links 31 connected to opposite ends of the shuttle bar and to arms 32 which are fixed to a rock shaft 33 journalled in brackets 34 mounted on the bed 14 of the press. An arm 35 fixed to the rock shaft 33 is connected to one end of a vertically disposed link 36, the upper end of which is pivotally connected to a lever 37 which in turn is pivotally supported at 38 and is actuated by the cam 30 through a cam follower rod 39. Thus, in response to each revolution of the crank shaft 15, the shuttle bar 21 is reciprocated through its horizontal feeding stroke. The cam 30 is shaped with diametrically opposed concentric portions 41 to provide predetermined intervals of dwell for the shuttle bar 21 at each end of its stroke.

A plurality of connector pins 44 mounted for movement with the shuttle bar 21 are raised during the dwell at one end of the stroke of the shuttle bar into the perforations 11 in the strips and serve to connect the strips for movement with the shuttle bar to the other end of its stroke, where the connector pins are lowered to disconnect the strips from the shuttle bar. The connector pins 44 are fixed to a connector bar 45 and the upper ends of the connector pin pass through apertures in the shuttle bar. The connector bar 45 is secured at its ends to a pair of vertical guide rods 46 which are slidably mounted in vertical guide apertures in the shuttle bar 21 and serve to connect the bar 45 for horizontal movement with the shuttle bar and guide it for vertical movement relative thereto. Springs 47 move the connector bar 45 upwardly and yieldably maintain it in its upper position, the springs 47 being supported in U-shaped bracket 48 connected at their upper ends to the shuttle bar 21.

At their upper ends the guide rods 46 are provided with rollers 54 which are adapted to be engaged by a pair of depressing members 55 yieldably mounted on the ram 16 for vertically reciprocating the connector bar 45 and the pins 44 at opposite ends of the stroke of the shuttle bar 21. Horizontal lower surfaces 56 on the depressing members 55 are engageable with the rollers 54 for maintaining the connector pins 44 in their lower position during the return stroke of the shuttle bar 21. The depressor members 55 are connected to the ram 16 by a plurality of headed guide rods 57 for vertical movement therewith and for movement relative thereto and the members 55 are stressed to their normal lower position as shown in Fig. 7 by springs 58. As the ram 16 is lowered, the presser members 55 move downwardly therewith and engage the rollers 54 and move the connector bar 45 downwardly to the position shown in Fig. 7 to disengage the pins 44 from the strip 10, at which time the depressor members 55 engage stops 60 which arrest their downward movement while the ram 16 continues its movement to the bottom of its stroke during which additional movement the ram moves relative to the depressor members 55.

To aid in raising the connector bar 45 when the shuttle is moved to its retracted or starting position as shown in Fig. 6, a pair of camming arms 62 are provided. These arms are pivotally mounted on supporting block 63 mounted on the bed 14 and are urged upwardly to their normal position as shown in Fig. 7 by springs 64 and rods 65. As the shuttle bar moves to its retracted position (Fig. 6) the connector bar 45 will engage the inclined surfaces of the arms 62, which will stress the con-

nector bar upwardly and aid the springs **47** in raising it and the pins **44** thereon when the depressor members **55** are carried upwardly by the ram **16**.

The components are arranged so that the feeding mechanism operates as follows: If we assume that the crank shaft **17** is rotating and the shuttle bar **21** has been moved to its retracted position (Fig. 6), then, during the interval of dwell thereof, the ram **16** moves upwardly and lifts the depressor members **55** from the rollers **54** on the connector bar **45**, which is actuated by the springs **47** from its lower position to its upper position and carries the connector pins **44** into the perforations **11** in the strips **10** as shown in Fig. 6. As the crank shaft **15** continues its rotation the cam **30** and the linkage **28** causes the shuttle bar to move forward and feed the strips **10** one step, during which the ram **16** moves upwardly to its uppermost position and then starts moving downwardly so that as the shuttle bar reaches the end of its forward stroke the depressor members **55** engage the rollers **54**, and during the interval of dwell of the shuttle bar the depressor members depress the connector bar **45** to its lower position to disengage the connector pins **44** from the strips **10** (Fig. 7). As the crank shaft **15** continues its rotation, the cam **30** and the linkage **28** causes the shuttle bar **21** to return to its retracted position, during which return movement the connector bar is held in its lower position with the pins **44** disengaged from the strips **10** by the depressor members **55** which are spring held against the stops **60**, and the ram continues its downward movement to the bottom of its stroke and then moves upwardly. At the time the shuttle bar **21** reaches its retracted position (Fig. 6) and dwells for an interval, the ram **16** has reached a point where the headed pins **57** pick up the depressors **55** and allow the connector bar **45** and the pins **44** to move to their upper position with the pins **44** engaging the strips **10** in the next set of perforations **11** therein in position to advance the strips and repeat the cycle of operation as the crank shaft continues rotating.

It will be understood that during the intervals between the step by step feeding movements of the strips **10**, the strips are acted on by dies and other components of the apparatus to form them into predetermined shapes and assemble them with other parts into a composite article as disclosed in the aforementioned patent.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In a mechanism for feeding a plurality of strips having spaced perforations therein, a shuttle bar for supporting a plurality of strips, means for reciprocating said shuttle bar through a predetermined stroke longitudinally of the strip and for providing an interval of dwell at each end of the stroke, a connector member mounted on the bar for movement therewith and for transverse vertical movement relative thereto toward and from the strips, a plurality of pins on said connector member engageable in the perforations in the strip for imparting movement to the strips, and means for moving said connector member toward the strips at one end of the stroke of said shuttle bar to move the connector pin into engagement with the strips at the beginning of a stroke and for lowering said connector member at the other end of the stroke to move the pins out of engagement with the strips at the end of the stroke.

2. In a mechanism for feeding a plurality of strips having uniformly spaced perforations therein, a shuttle bar for supporting a plurality of strips, means for reciprocating said shuttle bar through a predetermined horizontal stroke longitudinally of the strip and for providing an interval of dwell at each end of the stroke, a connector member mounted on the shuttle bar for reciprocable movement therewith and for vertical movement relative thereto, a plurality of pins on said connector member engageable in the apertures of the strip, and means for raising said connector member at one end of the stroke of said shuttle bar and for lowering said connector member at the other end of the stroke to move the connector pins into the perforations of the strips at the beginning of a feeding stroke of the shuttle bar and to move them out of the perforations at the end of the stroke.

3. In an apparatus for fabricating multi-part articles from a plurality of strips having uniformly spaced perforations therein, the combination of a shaft, a shuttle bar for supporting the strips thereon, means actuated by said shaft for reciprocating the shuttle bar through a predetermined stroke equal to the distance between successive perforations in said strips, a connector member having a plurality of pins engageable in the perforations in said strips, means mounting said connector member on said shuttle bar for movement therewith and for reciprocable movement relative thereto toward and away from the strips thereon, and means operable under control of said shaft for moving said connector member to an upper position with the pins in engagement with said strip at one end of the stroke of the shuttle bar and for lowering the connector member to a lower position with the pins disengaged from the strips at the other end of the stroke.

4. In an apparatus having a bed, a ram and a crank shaft connected to the ram for reciprocating it relative to the bed for fabricating multi-part articles from a plurality of strips having uniformly spaced perforations therein, the combination therewith of a shuttle bar for supporting the strips thereon, guide members on the bed for supporting the shuttle bar for horizontal movement in a direction parallel to said strips, means including a cam on said crank shaft and linkage interconnecting the cam and the shuttle bar for reciprocating the shuttle bar through a predetermined stroke equal to the distance between successive perforations in said strips and providing an interval of dwell at each end of said stroke, a connector member having a plurality of pins engageable in the perforations in said strip, means mounting said connector member on said shuttle bar for horizontal movement therewith and for vertical recriprocable movement relative thereto, resilient means for raising said connector member to an upper position with the pins in engagement with said strip in the perforations thereof, depressor members for moving the connector member to a lower position with the pins disengaged from the strips, means for yieldably mounting the depressor members on the ram for vertical movement therewith, and stops for arresting the movement of the depressor members at a predetermined position, the arrangement of parts being such that the depressor member serves to depress the connector pins and disengage them from the strips during the dwell at one end of the stroke of the shuttle bar and to effect the raising of the connector pins into engagement with the strips during the dwell at the other end of the stroke.

5. In an apparatus having a bed, a ram and a crank shaft connected to the ram for reciprocating it relative to the bed for fabricating multi-part articles from a plurality of strips having uniformly spaced perforations therein, the combination therewith of a shuttle bar for supporting the strips thereon, guide members on the bed for supporting the shuttle bar for horizontal movement in a direction parallel to said strips, means including a cam on said crank shaft and linkage interconnecting the cam and the shuttle bar for reciprocating the shuttle bar through a predetermined stroke equal to the distance between successive perforations in the strips and providing an interval of dwell at each end of said stroke, a connector member having a plurality of pins engageable in the apertures in said strip, a pair of rods on

said connector member slidably supported on said shuttle bars for mounting said connector member on said shuttle bar for horizontal movement therewith and for vertical movement relative thereto, resilient means for raising said connector member to an upper position with the pins in engagement with said strips, depressor members engageable with said rods for moving the connector member to a lower position with the pins disengaged from the strips, means for yieldably mounting the depressor members on the ram for vertical movement therewith into engagement with said rods when the shuttle bar arrives at the end of its stroke, and stops for arresting the movement of the depressor members when the connector member has been depressed to its lower position, said depressor members having flat horizontal surfaces for holding said rods and the connector member in said lower position during the return stroke of the shuttle bar.

6. A feeding apparatus for strips having spaced perforations comprising a shuttle bar for supporting a strip and reciprocable longitudinally to the strip, said bar having an aperture therein over which the strip is fed, a pin mounted to reciprocate with said bar and move vertically relative thereto for projecting through the aperture in the bar, means for reciprocating said bar, and means for moving the pin through the aperture and perforation in the strip on the forward stroke of the bar and to retract the pin from the aperture upon the rearward stroke of the bar.

References Cited in the file of this patent

UNITED STATES PATENTS

2,779,590 Seastrom ---------- Jan. 29, 1957