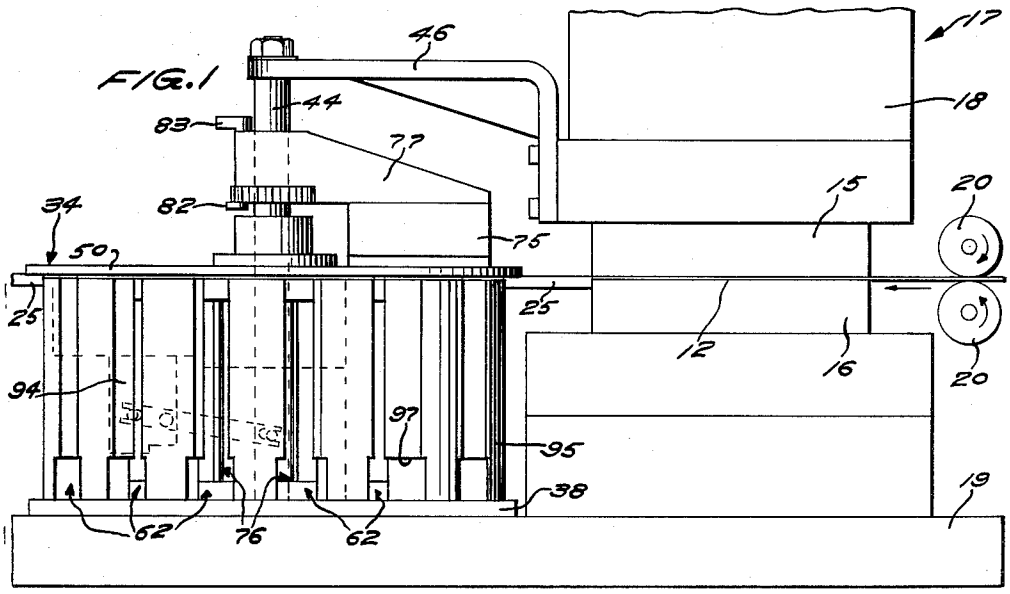
Dec. 26, 1961 N. H. SWANSON 3,014,601

DEVICE FOR STACKING ARTICLES PUNCHED FROM STRIP STOCK

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FIG. 1



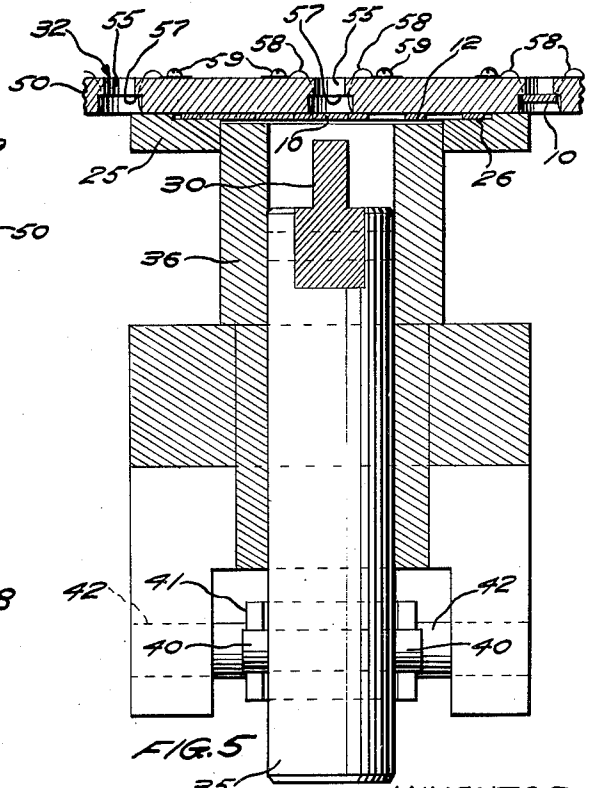




FIG. 5

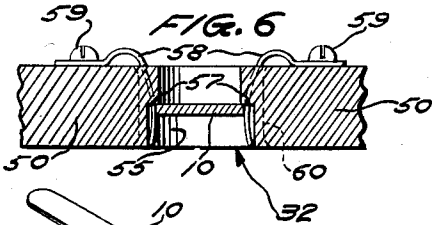



FIG. 6

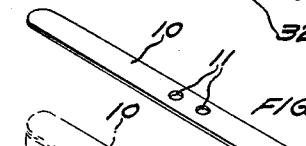



FIG. 7

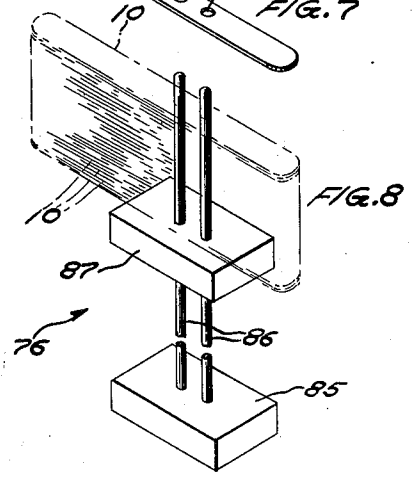



FIG. 8

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DEVICE FOR STACKING ARTICLES PUNCHED FROM STRIP STOCK

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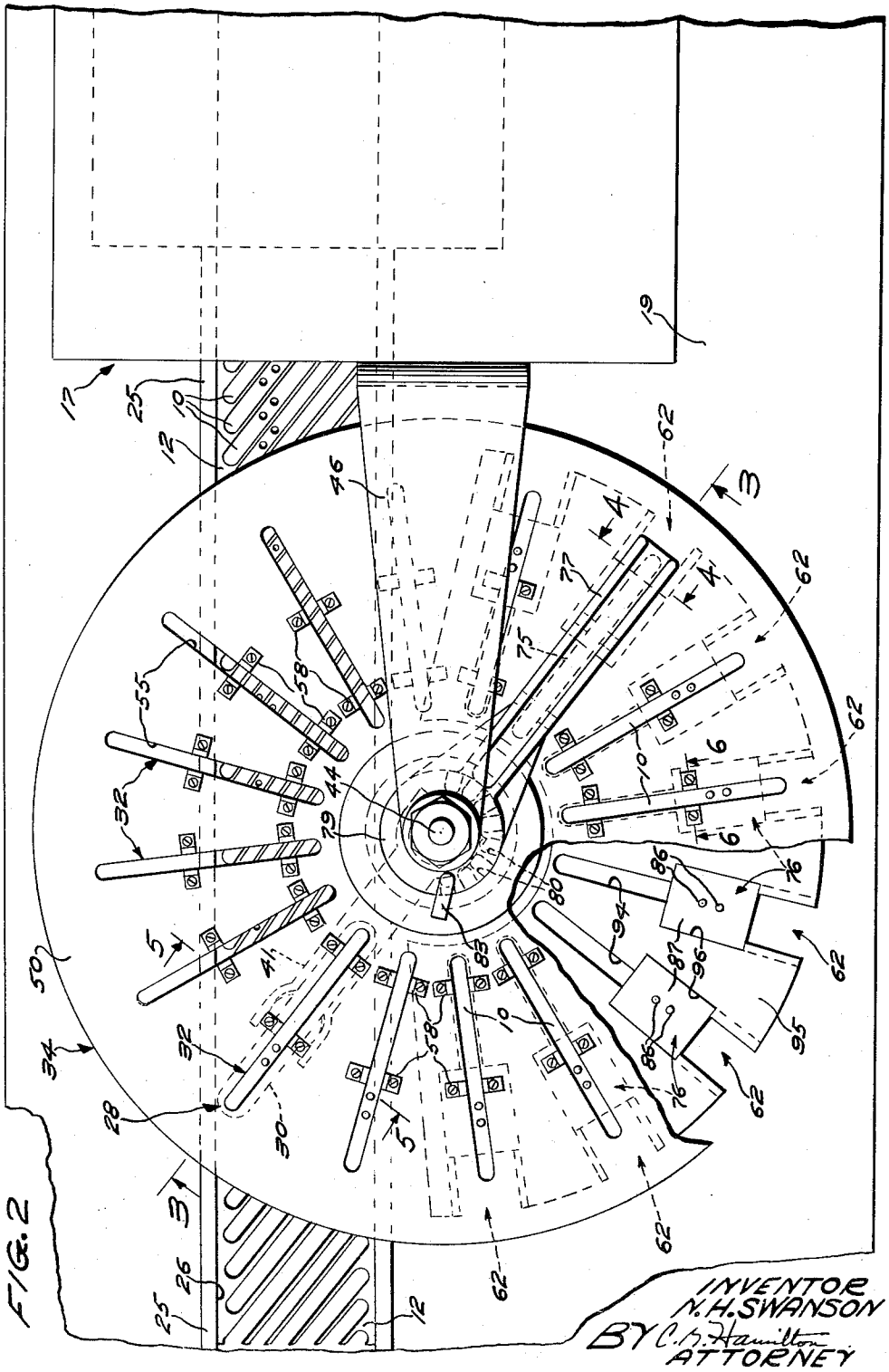



FIG. 2

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DEVICE FOR STACKING ARTICLES PUNCHED FROM STRIP STOCK

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FIG. 4

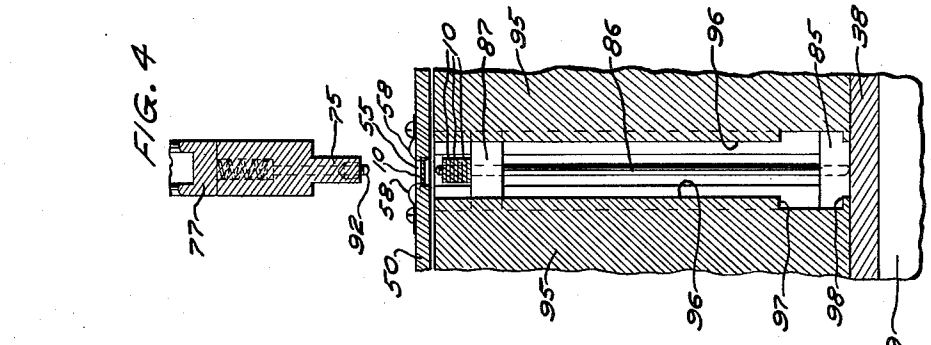
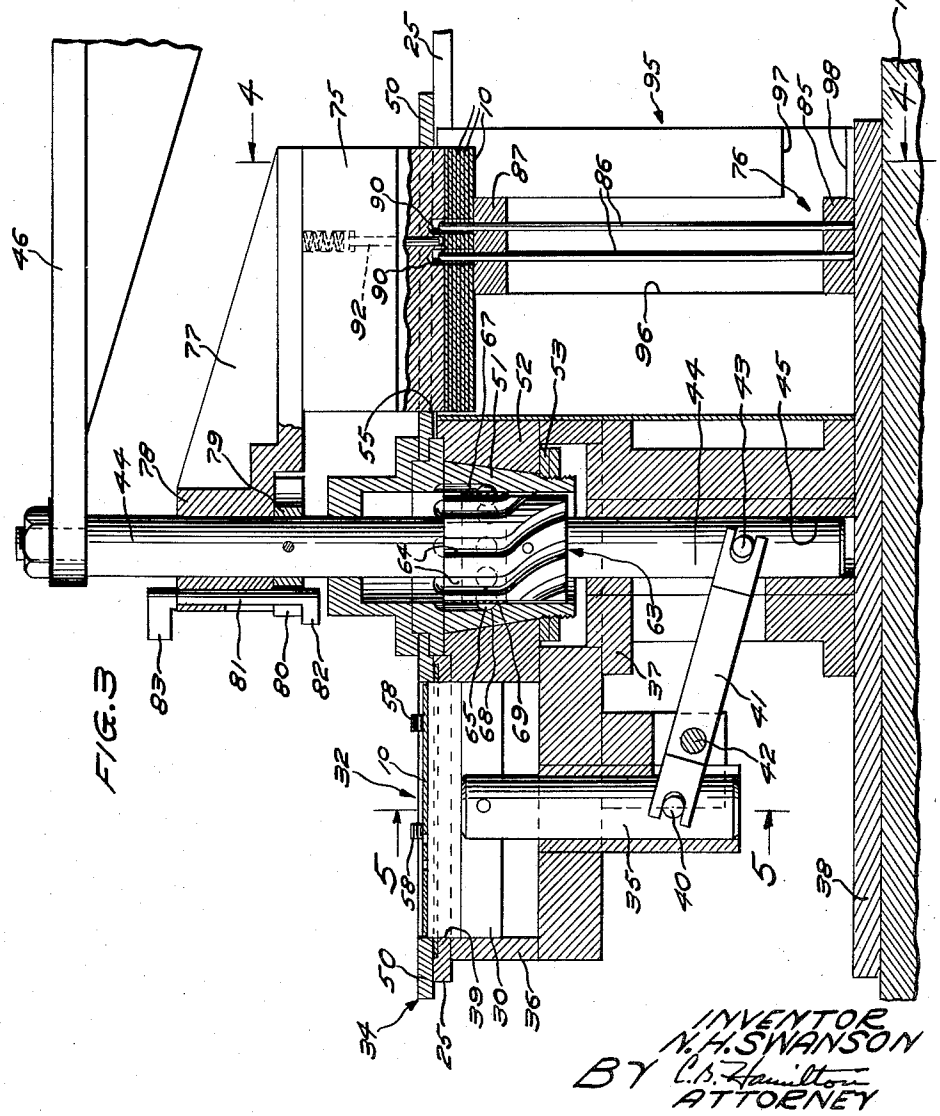


FIG. 3



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3,014,601

# DEVICE FOR STACKING ARTICLES PUNCHED FROM STRIP STOCK

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Filed Apr. 9, 1958, Ser. No. 727,418
8 Claims. (Cl. 214—8)

This invention relates to an article-stacking mechanism and more particularly to a device for stacking flat-spring terminals punched from strip stock.

An object of this invention is to provide a new and improved device for stacking flat articles punched from strip material.

Another object of this invention is to provide a device which may be attached to and actuated by a punch press for stacking flat articles blanked from strip stock and pressed back into the apertures in the strip stock by the punch press.

A device illustrating certain features of the invention may include a guide for supporting strip stock as it leaves a punch press which punches flat articles from the strip and pushes them back into the apertures therein. As successive flat articles are advanced with the strip to a transfer station, a plunger disposed below the guide pushes the flat articles upwardly from the strip into holders on a carrier which is disposed above the guide and is indexed in timed relation to the punch press to carry the articles from the transfer station to a stacking station where a plunger, operable in timed relation to the punch press, pushes the articles from the holder into a magazine disposed below the carrier at the stacking station. A plurality of stacking stations are provided in which magazines are placed, and the plunger for pushing the flat articles from the carrier is manually movable from one to the other of the stacking stations to effect the stacking of the articles in successive magazines.

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

FIG. 1 is a front elevational view of the article-stacking device attached to a machine for punching flat articles from a strip and pushing them back into the apertures therein;

FIG. 2 is an enlarged plan view of the stacking device and a portion of the machine to which it is attached;

FIG. 3 is a vertical cross sectional view of the device taken on line 3—3 of FIG. 2 and showing the article ejecting plunger in its lower position;

FIG. 4 is a fragmentary vertical sectional view of the device taken on lines 4—4 of FIGS. 2 and 3 showing the the article ejecting plunger in its upper position;

FIG. 5 is an enlarged fragmentary cross sectional view taken on lines 5—5 of FIGS. 2 and 3;

FIG. 6 is an enlarged fragmentary cross sectional view through the article carrier showing a flat article being supported in a holder thereon;

FIG. 7 is a perspective view of a flat article which may be stacked by the present device; and

FIG. 8 is a perspective view of an article-supporting magazine in partial filled condition.

The present stacking mechanism is designed to stack articles 10 (FIG. 7) in the form of flat spring terminals



which are shown in simplified outline and have perforations 11, a pair in each article. The articles 10 are blanked from a strip 12 (FIG. 2) by a compound punch 15 and die 16 of a punch press 17 having a reciprocable ram 18 to which the punch 15 is secured and having a bolster plate 19 to which the die 16 is secured. Feed means including rollers 20 are provided for feeding the strip step by step in timed relation to the actuation of the press, and the compound punch and die serves to form the perforations 11, punch the articles 10 from the strip, and push them back into the apertures in the scrap portion of the strip so that as the strip is advanced step by step from the press the articles 10 are carried along therewith.

The stacking device comprises a guide 25 in the form of a flat plate having a flat shallow groove 26 (FIGS. 2 and 5) for supporting the strip 11 and the article 10 as they are advanced from the punch press to a transfer station 28 (FIG. 2). A transfer plunger 30 is provided at the transfer station for pushing successive articles 10 upwardly from the strip 11 into holders 32 on a rotatable carrier 34 positioned above the guide 25. As viewed from above, the plunger 30 conforms generally to the outline of the article 10 and is mounted on the end of a rod 35 for vertical movement in guide portion 36 of a frame 37 of the stacking device. The frame 37 has a base plate 38 and is mounted on the bolster plate 19. An aperture 39 in the guide member 25 provides clearance for movement of the plunger 30. At its lower end the rod 35 is pivotally connected by a pin and slot connection 40 to one end of a lever 41 which is pivotally supported on a pin 42 mounted on the frame 37. The other end of the lever 41 is pivotally connected by a pin and slot connection 43 to an actuating rod 44 supported for sliding movement in a bore 45 of the frame 37. At its upper end, the rod 44 is connected to a bracket 46 which is secured to the reciprocable ram 18 for imparting reciprocation to the actuating rod 44 and the transfer plunger 30.

The carrier 34 is in the form of a disc 50 which has a composite hub 51 with a conical outer surface and is rotatably supported in a bearing 52 of the stacker frame 37. A pair of lock nuts 53 lock the hub 51 and the disc 50 against upward displacement. The holders 32 of the carrier 34 comprise elongated slots 55 conforming generally to the outline of the articles 10 and disposed radially about the rod 44 in equally spaced relation to each other. The slots 55 are smaller at the top portion of the disc to provide horizontal shoulders 57 (FIGS. 5 and 6) against which the articles 10 are moved by the pusher 30 and yieldably retained by two pairs of leaf springs 58—58 which engage the side edges of the articles. The upper ends of the springs 58 are secured to the top of the disc 50 of the carrier by screws 59 and the curved downwardly directed free ends of the springs are disposed in slots 60 in the disc for receiving the articles therebetween.

Means are provided for indexing the carrier 34 to move successive holders 32 into alignment with the transfer station 28, where the articles 10 are transferred by the pusher 30 into the holders 32, and for advancing the holders 32 and the articles 10 therein step by step into a plurality of stacking stations 62 (FIG. 2). The indexing means comprises a cylindrical cam member 63 fixed to the actuating rod 44 and disposed within the cylindrical aperture in the hub 51 of the carrier. The cam member 63 has a plurality of upwardly directed

grooves 64 of semi-cylindrical cross section in the periphery thereof equal in number to the number of holders 32 on the carrier. Engaging the cam grooves 64 are a plurality of metal balls 65 which also engage and ride in cam grooves in the hub 51 of the carrier, which grooves include short grooves 67 extending vertically upwardly from an annular groove 68. An annular retaining sleeve 69 frictionally engaging the cam member 63 has apertures for retaining the balls 65 in horizontal relation to each other. The cam grooves 64 in the cam member 63 have a vertically disposed upper portion and a helical lower portion and the components of the indexing mechanism operate in response to vertical movement of the rod 44 and the cam member 63 to carry the balls upwardly to the ends of the vertical grooves 67 and impart an indexing movement to the carrier 34 to advance the holder 32 one increment. On the down stroke of the actuating rod 44 and the cam 63, the balls 65 are moved from the vertical grooves 67 into and circumferentially around in the annular groove 68 to another position in alignment with the adjacent vertical grooves 67 without imparting any rotary or indexing movement to the carrier 34. This indexing mechanism is of the type more fully disclosed in the N. H. Swanson Patent No. 2,556,010.

A stacking pusher 75 is provided for pushing the articles 10 from the holdlers 32 on the carrier into magazines 76 at the stacking stations 62. The pusher 75 is fixed to an arm 77 which has an apertured hub 78 rotatably mounted on the rod 44. The hub 78 rests on a collar 79 which is fixed to the rod 44 and has a plurality of locking notches 80 in the periphery thereof. The pusher 75 is adapted to be swung into operative position above any of the stacking stations 62 and to be locked therein by a locking pin 81 which is mounted for vertical movement in an aperture in the hub 78 and is moved into one of the notches 80 in the collar 79. The locking pin 81 has a laterally bent end 82 which may be turned under portions of the collar 79 to prevent upward displacement of the arm 77 and the pusher 75, and the pin has a handle 83 fixed to the upper end thereof by means of which the locking pin 81 may be turned to move the end 82 thereof from its locking position to its neutral position in alignment with the slot 80 whereby the locking pin 81 may be raised above the collar 79 and the pusher arm 77 turned to position the pusher 75 above a selected stacking station 62, after which the locking pin 81 may be lowered and then turned to lock the arm 77 and the pusher 75 in the selected station.

Each of the magazines 76 comprises a base 85 in the form of a rectangular block having a pair of rods 86 secured thereto and extending upwardly therefrom in parallel and spaced relation to each other for receiving the perforated articles 10. An article-supporting member 87 in the form of a rectangular block similar to the base 85 has a pair of apertures 88 therein and is slidably mounted on the rods 86 for supporting the articles 10 thereon against tilting movement. The member 87 engages the rods 86 with sufficient friction to prevent free falling movement thereof and of the articles 10 supported thereon, and thus prevents the possibility of the articles falling into oblique positions and binding on the rods. A magazine 76 is supported on the base 38 in each of the stacking stations 62 with the rods 86 in vertical alignment with the perforations 11 of articles 10 supported above the magazine in the holders 32 of the carrier 34. The article-supporting member 87 of the magazine is moved to the upper ends of the rods where it is frictionally held for receiving and supporting the articles 10 as they are pushed from the carrier onto the rods 86 of the magazine.

Clearance recesses 90 are formed in the pusher 75 to accommodate the upper ends of the rods 86 and a spring pressed pin 92 mounted in the pusher 75 urges



the article 10 downwardly and insures the disengagement of the article from the pusher as the pusher moves upwardly after having ejected the article from the carrier. As successive articles 10 are pushed from the carrier onto the magazine 76, the supporting member 87 is moved successively downwardly until the magazine is full and the supporting member 87 is disposed in close proximity to or in engagement with the base 85 at which time or prior thereto the pusher 75 may be shifted to another stacking station having an empty magazine therein.

The stacking stations 62 are formed as vertical, radially extending slots 94 in an arcuately shaped housing 95 mounted on the base 38 of the stacker and extending upwardly into close proximity with the carrier 34. The slots 94 in the member 95 provide clearance for vertical movement of the articles 10 and the slots have an intermediate portion forming a rectangular vertically disposed guideway 96 for receiving the magazine 76 therein and for guiding the article-supporting member 87 for vertical movement therein. Longitudinally disposed shallow grooves 97 in the walls of the housing on opposite sides of the outer portion of the slots 94 adjacent to the base 38 of the stacker frame form a guideway for movement of the magazine horizontally into and out of operative position in the stations 62 when the article-supporting member 87 is down in engagement with the base 85 of the magazine. The shoulders or ribs 98 formed on lower side walls of the member 95 at each station 62 lock the base 85 of the magazine in operative position and prevent its lateral displacement radially outwardly from the stacking device. After a magazine has been filled with the flat articles 10 and the supporting member 87 is in engagement with the base 85, the magazine with the parts 10 stacked thereon may be removed by raising the base sufficiently to clear the shoulder 98 after which it is moved horizontally outwardly from housing 95 through the horizontal grooves 97. An empty magazine 76 with the supporting member 87, in its lower position in engagement with the base 85 may be placed in operative position in a stacking station by sliding the member 87 and the base 85 horizontally through grooves 97 into the vertical guideway 96 and resting the base 85 of the magazine on the base 38 and then moving the article-supporting member 87 to its upper position.

It is to be understood that the above-described arrangements are simply illustrative of the application 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 punch press for punching flat springs with a pair of apertures in each spring from a strip, pushing the spring back into the strip and feeding the stock therefrom, the combination therewith of a guide for supporting the strip and for positioning successive flat springs therein at a transfer station, a carrier disposed above said guide at the transfer station and having a plurality of holders for yieldably retaining the flat springs therein, means operable in timed relation to the punch press for indexing said carrier to advance the holders successively into the transfer station and into a stacking station in spaced relation to the transfer station, means operable in timed relation to the punch press for pushing the flat spring upwardly from the strip at the transfer station into a holder on the carrier, a magazine at said stacking station for receiving the springs ejected from said carrier, and means operable in timed relation with said press for ejecting the springs from the holders on said carrier into said magazine, said magazine comprising a base member having a pair of rods extending upwardly therefrom and engageable in the apertures of the springs for receiving the ejected springs thereon, and a member slidably mounted on the rods for supporting the ejected springs and having a frictional engage-

ment with the rods to prevent free falling movement thereof and of the springs supported thereon.

2. A device attachable to a punch press for stacking articles punched from a strip and pressed back into the strip by the punch press and advanced step by step from the punch press, comprising a guide for supporting the strip as it is advanced and for supporting successive articles in the strip in a predetermined transfer station, a carrier having a plurality of holders for releasably supporting the articles therein, a frame for mounting said carrier for rotary indexible movement above said guide, an actuating rod supported for vertical movement in said frame means along the axis of said carrier, means for connecting said rod to said punch press for reciprocable movement therewith, a plunger for pushing an article from the strip at said transfer station into a holder on the carrier, indexing means actuated by said rod for indexing said carrier to advance successive holders to the transfer station and to a stacking station, a pusher at the stacking station for ejecting an article from the carrier, means responsive to the movement of the actuating rod for reciprocating the plunger and the pusher to effect the transfer of an article from the strip to the carrier at the transfer station and the ejection of an article from the carrier at the stacking station, and means at said stacking station for supporting the ejected articles in stacked relation to each other.

3. A device attachable to a punch press for stacking articles punched from a strip of material and pushed back into the strip by the punch press and advanced step by step from said punch press, comprising a guide for supporting the strip as it is advanced intermittently from the punch press and for supporting the articles in the strip successively in a predetermined transfer station, a carrier having a plurality of holders for releasably supporting the articles, frame means for mounting said carrier for rotary indexible movement above said guide, an actuating rod supported for vertical movement in said frame means along the axis of said carrier and connectible to said punch press for reciprocable movement therewith, means actuated by said rod for indexing said carrier to advance successive holders into the transfer station and to advance the holders and the parts therein successively into a plurality of stacking stations, a plunger at said transfer station for pushing an article from the strip into a holder on said carrier, means connected to the actuating rod for reciprocating said plunger, a pusher for ejecting the articles from the holders on said carrier, means mounting said pusher for reciprocable movement with said actuating rod and for oscillatable movement thereon, means for locking said pusher-supporting means at various positions to selectively align the pusher with said stacking stations, and removable means at said stacking stations for supporting the articles in stacked relation to each other.

4. In an apparatus for punching articles from a strip, pressing them back therein and advancing the strip and articles step by step, the combination therewith of an article-stacking device comprising a guide for guiding the strip along a predetermined path and for supporting successive articles therein in a predetermined transfer station, a rotatable carrier having a plurality of holders for releasably supporting the articles therein, mounting means for supporting the carrier for rotary movement above the guide at the transfer station, an actuating rod supported for reciprocable movement on said mounting means and through said carrier along the axis of rotation thereof and connectible to the apparatus for actuation thereby, a plurality of magazines for supporting the articles in stacked relation, means on said mounting means for locating the magazines in predetermined stacking positions below the carrier and the path of movement of the holders thereon, indexing means responsive to the actuation of said rod for indexing the carrier to advance the holders successively to the transfer station and to the stacking stations, means responsive to the actuation of the rod for moving an article from the strip at the transfer station into a holder on the carrier, a pusher for ejecting an article from a holder into a magazine, means for mounting the pusher on the rod for reciprocation therewith and for oscillatable movement thereon from one stacking station to another, and means for locking said pusher in various positions to selectively align the pusher with said stacking stations.

5. In an article-stacking device having a plurality of stacking stations, a carrier having a plurality of article holders, mounting means for supporting said carrier for rotary movement about an axis, an actuating rod supported on said mounting means for reciprocable movement along said axis, means for reciprocating the rod, means actuated by said rod for indexing said carrier to advance said holders to successive stacking stations, a member for ejecting an article from a holder at a stacking station, means at said stacking stations for receiving the articles ejected from the carrier, and means for mounting said ejecting member on the rod for reciprocation therewith and for oscillatory movement thereon so that said ejecting member may be selectively aligned with the stacking stations.

6. In an article-stacking device having a plurality of stacking stations, a carrier having a plurality of holders for releasably supporting the articles thereon, mounting means for supporting the carrier for rotary movement about a vertical axis, an actuating rod supported on said mounting means for reciprocable movement along said axis, means for reciprocating the rod, means actuated by said rod for indexing said carrier to advance said holders to successive stacking stations, a pusher for ejecting an article from a holder at a stacking station, means for mounting the pusher on the rod for reciprocatory movement therewith and for oscillatory movement thereon into various positions in alignment with said stacking stations, and means for releasably locking said pusher on said rod in said positions.

7. In a device for stacking articles having a pair of apertures therein, a base, a carrier mounted on said base for feeding successive articles to a stacking station, means at said stacking station for ejecting the articles downwardly from said carrier, a magazine for receiving the ejected articles, said magazine having a first block with a pair of rods extending upwardly therefrom and engageable in the apertures of the articles for receiving the articles thereon, a movable block yieldably mounted on the rods and capable of supporting the articles thereon for intermittent downward movement relative to the rods without tilting and binding, and a hollow positioning member on said base having a vertical guideway for positioning said first block with the rods in alignment with the apertures in an article in said stacking station and providing clearance for vertical movement of said movable block, said positioning member having a vertical slot of less width than said guideway extending laterally from said guideway for the movement of the rods and the articles laterally from said positioning member, said slot having a portion of increased width for the lateral movement of the blocks to and from the vertical guideway.

8. In a device for stacking articles having a pair of apertures therein, a base, a carrier mounted on said base for feeding successive articles to a stacking station, means at said stacking station for ejecting the articles downwardly from said carrier, a magazine for receiving the ejected articles, said magazine having a first block with a pair of rods extending upwardly therefrom and engageable in the apertures of the articles for receiving the articles thereon, a movable block yieldably mounted on the rods and capable of supporting the articles thereon for intermittent downward movement relative to the rods without tilting and binding, and a hollow positioning member on said base having a vertical guideway for positioning said first block with the rods in alignment with the apertures in an article in said stacking station and providing clearance for vertical movement of said movable block, said positioning member having a vertical slot of less width than said guideway extending laterally from

said guideway for the movement of the rods and the articles thereon laterally from said positioning member, said slot having a portion of increased width for the lateral movement of the blocks to and from the vertical guideway, said portion of said slot of increased width being spaced slightly above said base to provide a portion of the positioning member for retaining said first block in said guideway when said first block rests on said base and permitting lateral removal of said magazine when said blocks are in engagement with each other and are raised into registration with said portion of said slot of increased width.




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