Feb. 21, 1961 R. E. KNOCHE 2,972,433

APPARATUS FOR FEEDING LOOSE-LEAF METAL ARCHES

Original Filed Sept. 5, 1951 2 Sheets-Sheet 1

FIG. 1.

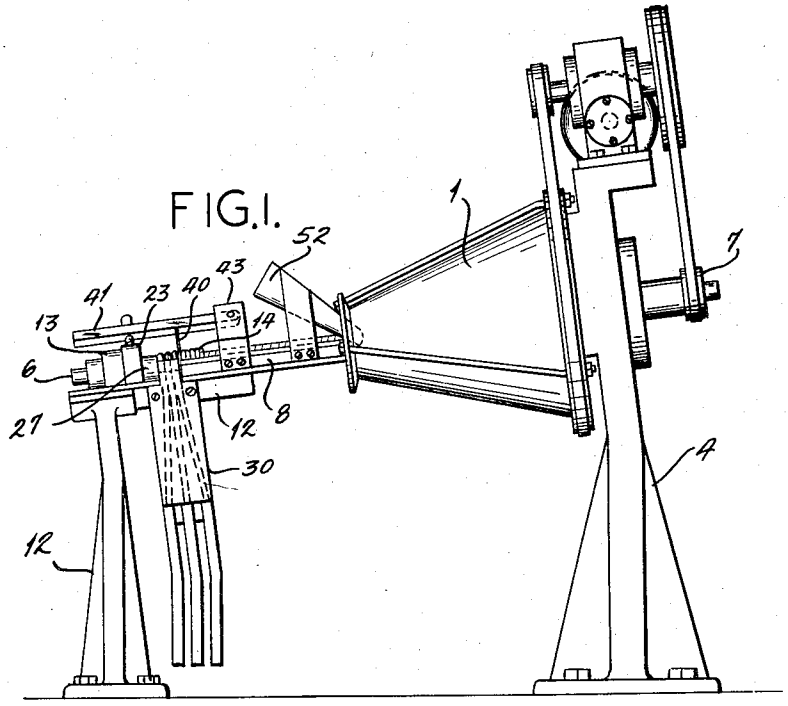


FIG. 3.

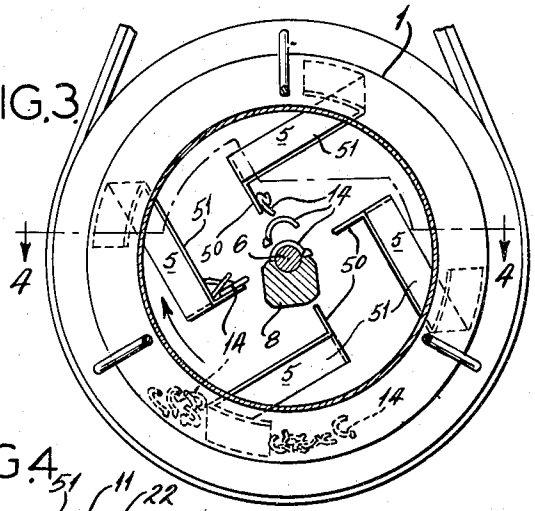
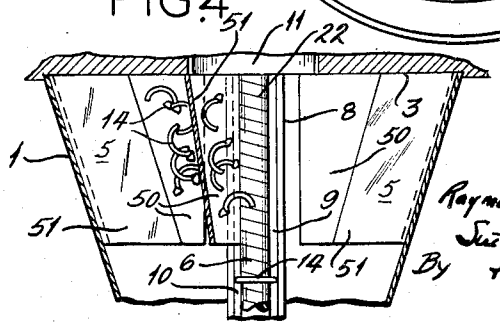


FIG. 4.



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APPARATUS FOR FEEDING LOOSE-LEAF METAL ARCHES

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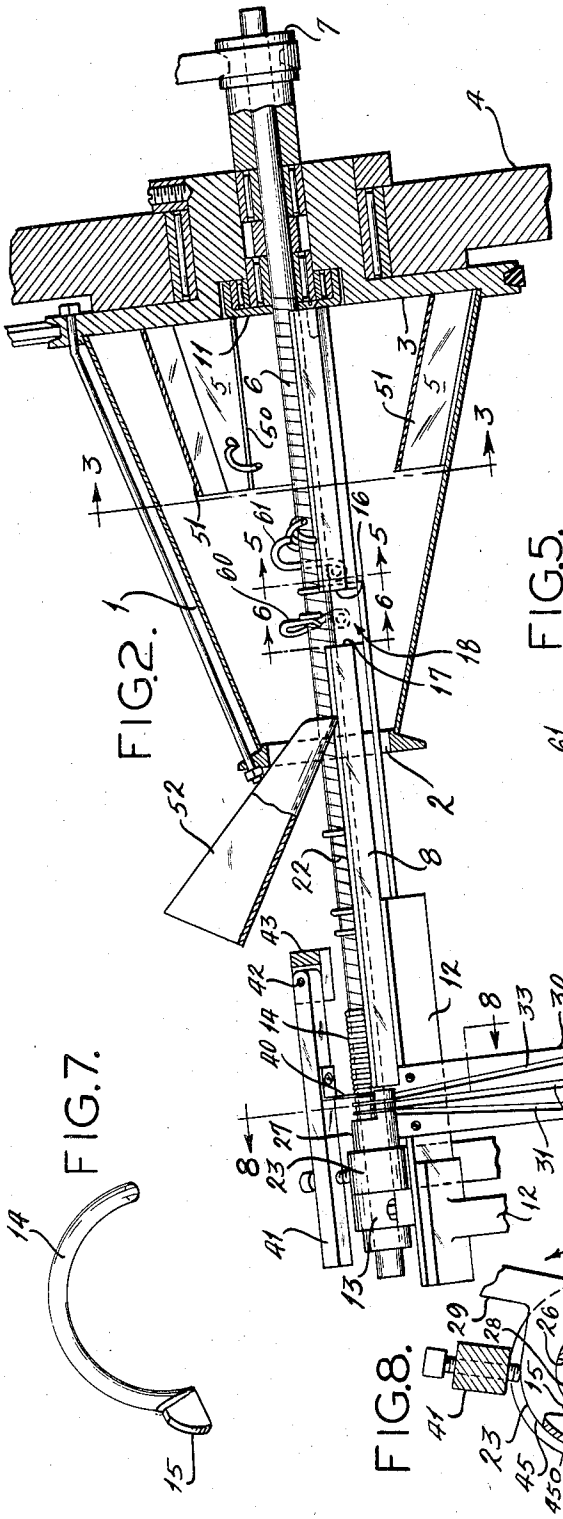


FIG. 2.

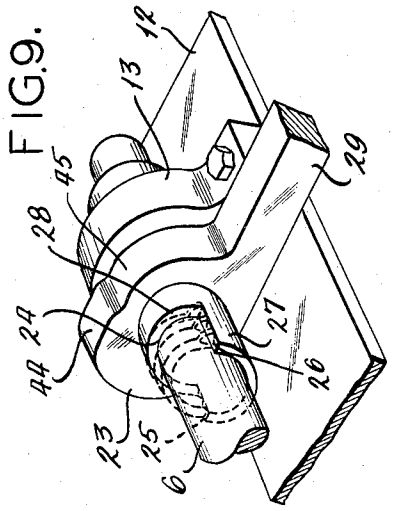


FIG. 9.

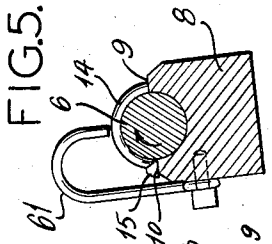


FIG. 5.

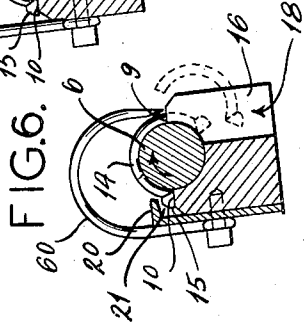


FIG. 6.

FIG. 7.

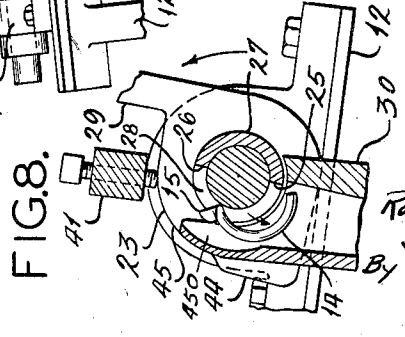


FIG. 8.

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APPARATUS FOR FEEDING LOOSE-LEAF METAL ARCHES

Raymond E. Knoche, Overland, Mo.

Original application Sept. 5, 1951, Ser. No. 245,137, now Patent No. 2,879,919, dated Mar. 31, 1959. Divided and this application Nov. 5, 1958, Ser. No. 772,139

5 Claims. (Cl. 221—160)

This invention relates generally to the manufacture of loose-leaf metals of the character employed in loose-leaf notebooks and particularly to an apparatus for automatically feeding such parts to a riveting machine as and when they are needed. This application is a division of my prior copending application, Serial No. 245,137, filed September 5, 1951, now Patent No. 2,879,919, granted March 31, 1959.

In the manufacture of loose-leaf metals, it is customary to rivet the so-called arches (which constitute respectively one-half of a ring) to a backing strip. The number of arches riveted to such a backing strip depends upon the number of rings in the notebook so that two such strips, each with the appropriate number of arches secured thereto, may be arranged side by side to provide the desired number of rings.

Suitable jigs have heretofore been provided for receiving and maintaining, in proper assembled relationship, such a strip and the appropriate number of arches while the latter are being riveted to the former as for example in a press.

Conventionally, the arches are inserted in such a jig manually one at a time; but during the last fifteen years, various efforts have been made to feed the arches automatically into such a jig. Such efforts have involved the provision of a barrel having internal baffles of relatively short extent, adapted to contain a supply of arches and to rotate about a horizontal axis. A plurality of shafts, corresponding in number to the number of arches intended to be riveted onto a given strip extended through the open end of the barrel in a downwardly and outwardly sloping direction. One or more chutes were arranged to intercept arches cascaded from the flanges within the barrel and direct those arches axially of the shafts to a position where they spilled upon the shafts. Each shaft then conveyed the arches on it to a chute leading the appropriate position in the assembly jig. To secure the proper orientation of the arches on the shafts aforesaid, and to eliminate from the shaft all such arches which were improperly oriented thereon, a mechanism was provided which involved a pair of rails extending longitudinally of each shaft and arranged so as to maintain the arches level and centered on the shaft, upon which they were riding; and one of the rails was interrupted so as to permit arches riding on the shaft in improper orientation to drop therefrom. Such dropping was accomplished under the force of gravity by virtue of the fact that while the body position of such arches is substantially circular, one end thereof is provided with a tail, the weight of which tends to cause the arch to cock on the shaft unless otherwise restrained. The rejector mechanism above-mentioned removed such restraint against rocking of arches whose tails extended in the wrong direction, and consequently permitted them to fall free of the shaft and return to the stock within the barrel.

Devices of the character above-described were not successful in commercial operation for two reasons. First,

the several shafts would not become uniformly loaded with arches, with the result that one or more of the chutes (into which the respective shafts fed) might be empty when it was desired to charge a jig. Secondly, the rejector mechanism was uncertain in its operation; when the shaft rotated in one direction, its tendency was to retain all of the arches on the shaft; and when it rotated in the opposite direction, its tendency was to discharge the properly oriented ones along with the improperly oriented ones.

The object of the present invention generally stated is to provide a device for picking up such arches from a bulk supply thereof, arranging them on a shaft in properly aligned series and rejecting from said shaft those arches which are improperly aligned.

Other objects will become apparent to those skilled in the art when the following description is read in connection with the accompanying drawings, in which:

Figure 1 is a view in side elevation of an automatic arch feeder constructed in accordance with the present invention;

Figure 2 is a longitudinal sectional view of the device shown in Figure 1;

Figure 3 is a sectional view taken along line 3—3 of Figure 2;

Figure 4 is a sectional view taken alongside line 4—4 of Figure 3;

Figures 5 and 6 are sectional views taken along line 5—5 and 6—6 respectively of Figure 2;

Figure 7 is a perspective view of one typical form of arch intended to be handled by the apparatus;

Figure 8 is a sectional view taken along line 8—8 of Figure 2, but showing the parts in ejecting position; and

Figure 9 is a perspective view of the ejector.

Generally stated, the invention contemplates the provision of a truncated conical receptacle arranged for rotation about its axis and having on the interior thereof a plurality of obliquely extending baffles, the inner edges of which are conformed so as to terminate substantially parallel with the axis of the receptacle and relatively close to such axis. In cross section, the said baffles are of trough shape, each having its radially outward portion departing substantially from radial relationship with the axis of the receptacle but terminating in a lip which extends in a direction substantially radial to the axis of the receptacle. The trough thus provided is open to dip and retain quantities of arches and carry them upward from the bottom of the receptacle toward the top thereof during rotation of the receptacle about its axis.

A conveying shaft driven for rotation about its axis, which is preferably concentric with the axis of the receptacle aforesaid, extends through the truncated end of the receptacle to a position between the inner edges of the several baffles aforesaid, and extends outwardly to a position remote from the receptacle. A pair of rails extends longitudinally alongside the shaft, and the upper surfaces thereof are arranged to make contact respectively with the ends of arches riding upon the shaft. At a position well within the truncated end of the receptacle, one of the rails is interrupted so as to permit arches whose tails are riding upon the interrupted rail to rock (under the influence both of gravity acting upon the tail, and of friction from the rotating shaft acting upon the body) about the axis of the shaft and free themselves, thus returning to the stock within the receptacle. The invention particularly contemplates, however, that the arches whose tails are riding upon the uninterrupted rail be retained in position on the shaft by depressing the uninterrupted rail so that it is out of level with the interrupted rail, immediately ahead of and at the interrupted section of the opposite rail. With such an ar-

rangement, and with the shaft rotating in a direction such as to tend to rock the arches riding thereon toward the interrupted section of rail, the properly oriented arches (i.e., those whose tails are resting on the uninterrupted rail) are held in position thereon, the extra weight of their tails, being disposed below the horizontal diameter of the shaft, restraining them against movement in the direction of rotation of the shaft. Alternatively, the uninterrupted rail may be provided with a part overhanging the tails of properly oriented arches riding on the shaft, but this arrangement introduces a friction between adjacent arches riding upon the shaft and thus restrains rejection of those which are improperly oriented.

Remote from the receptacle the shaft aforesaid is provided with an ejector mechanism fully described in my aforesaid parent application.

Having thus generally described the machine, reference may be had to the drawings for an illustrative embodiment thereof.

A truncated conical receptacle **1**, having an open end **2** and a closed end **3**, is mounted upon a suitable support **4**, and driven in rotation about its axis which in the embodiment shown slopes downwardly from horizontal. From the interior of the wall of receptacle **1**, a plurality of baffles **5** project so as to terminate adjacent and substantially parallel with the axis of rotation of receptacle **1**.

A conveyor shaft **6**, driven in rotation in the same direction as, but faster than, receptacle **1**, extends through the open end **2** of receptacle **1**, and through the closed end **3** thereof, said shaft being supported by support **4** and driven exterially thereof as through a pulley **7**. Beneath shaft **6**, a concave stationary bar **8**, having rail surfaces **9** and **10**, is arranged. The end of bar **8** adjacent bottom **3** of receptacle **1** is carried by a plate **11** which embraces shaft **6** and permits the latter to rotate freely therewithin while the bar **8** remains stationary. The outer end of bar **8** is carried by a suitable support **12**, which support likewise carries a bearing **13** for shaft **6**.

As clearly shown in Figure 5, the rail surfaces **9** and **10** of bar **8** are arranged with reference to shaft **6** so as to make contact with the opposite ends of an arch **14** riding on the shaft **6**. As clearly shown in Figures 5 and 7, the arch **14**, while in the main substantially circular, is provided at one end with a tail **15** which, when the arches are properly oriented on shaft **6**, makes contact with rail **10**. Arches whose tails **15** make contact with rail **9** are improperly oriented, and are rejected from shaft **6** within receptacle **1** by the arrangement now to be described. Bar **8** is cut away so as to eliminate rail **9** between positions **16** and **17**, shown clearly in Figure 2. The gap **18** thus provided in rail **9** permits improperly oriented arches riding on shaft **6** to rock in the direction of the arrow in Figure 6, and thus be dislodged from shaft **6**, falling back into the bottom of receptacle **1**. In order to minimize the probability that improperly oriented arches in being thus discharged from shaft **6** drag the then properly oriented arches, the invention contemplates that rail **10** be depressed below the level of rail **9** immediately ahead of (i.e., toward bottom **3**) position **16**, for a distance sufficient to permit the properly oriented arches to rock away from rail **9** before gap **18** is reached by them. This arrangement frees the improperly oriented arches to move in the opposite direction without dragging properly oriented arches with them. For added assurance that no improperly oriented arch shall pass gap **18**, a feeler **60** is mounted on bar **8** with its tip in the path of the tail on any improperly oriented arch (but clearing properly oriented arches). The tip of feeler **60** may be bent to cam downwardly any tails engaging it.

In order to prevent the arches riding on shaft **6** from over-riding each other, as they approach the gap **18**, a prong **61** is mounted on bar **8** with its free end overhanging shaft **6** at a clearance sufficient to pass but one arch. Immediately ahead of gap **18** and there-beyond toward the ejector to be described later, bar **8** may be provided on the side of rail **10** with a member **20**, which overhangs rail **10** and provides there-between a channel **21**, proportioned so as to accommodate tail **15** of one arch **14** at each increment of cross-section.

Shaft **6** may be, and preferably is, provided with a shallow groove **22** spiraled about the shaft in a direction tending to urge the arches **14** riding thereon out through the open end **2** of receptacle **1** as said shaft turns in rotation. Accordingly, the arches on shaft **6** are progressively moved outwardly from receptacle **1** toward an ejector now to be described.

At the end of shaft **6**, adjacent bearing **13**, an ejector **23** more specifically described in my aforesaid copending application is provided so as to eject the respective arches in multiple from the shaft into a multiple chute **30**, having three separate channels **31**, **32** and **33**. In order to restrain the advance of further arches during each operation of the ejector, the device is also provided with a gate **40** in the form of a thin strip of metal arranged to separate the arches which are in position on the ejector from those arches which are riding on shaft **6** immediately in advance of the ejector. In the embodiment shown the gate **40** is carried by an arm **41** pivoted at **42** to a lug **43** mounted on bar **8**. The forward end of arm **41** is normally (i.e., when the ejector is in the position shown in Figure 1) held in position such that the gate **40** is elevated out of contact with the advancing arches, but, when the ejector is operated, gate **40** falls into position ahead of that arch which is next to be accommodated by the ejector.

An important feature of the invention resides in the contour of the baffles **5**. As clearly shown in Figure 3, the baffles are trough-shaped, having their innermost section **50** extending substantially radially and their outward section **51** inclined so that its inner extremity is in trailing relationship with reference to the radius of the outer extremity thereof. Thus, between the sections **50** and **51**, a trough is provided which is open on the leading side of the baffle and hence scoops from the bottom of receptacle **1** a quantity of arches and transports them upwardly until they are cascaded over the lip section **50** toward shaft **6**. To assure that the greatest number of arches thus cascaded be caught by shaft **6**, the free edge of lip section **50** preferably extends very nearly parallel with the axis of shaft **6** and in as close as possible relationship thereto, which is to say that the edges of the baffles **5** just clear the exterior contour of bar **8**. The body portions **51** of the baffles **5** are arranged out of parallel relationship with the axis of receptacle **1** so as to incline in a direction such that the free ends thereof (toward end **2** of receptacle **1**) lead the opposite ends.

Any suitable chute **52** may be arranged to extend through open end **2** of receptacle **1** in laterally off-set relationship to shaft **6** so as to facilitate the periodic charging of receptacle **1** with a new supply of arches and without interrupting operation of the mechanism.

The operation of the devices may be briefly summarized as follows: A suitable charge of arches is deposited into receptacle **1** and by virtue of the conical shape thereof together with the inclination of baffles **5**, move toward the end **3**. As the receptacle **1** rotates, a substantial portion of the charge of arches is picked up by each of the baffles **5** and elevated to a position above shaft **6** where the charge of that baffle is cascaded toward and upon the shaft. A considerable proportion of the cascaded arches which lands astride shaft **6** (and others which land otherwise) will fall back into the bottom of a receptacle **1**. Some of the arches, which fall astride shaft **6**, will have their tails **15** extending in one direction, others in the other direction, but all are advanced down shaft **6** toward gap **8** where those arches

which are improperly oriented will be rejected, while the others proceed and are conveyed by shaft 6 to the ejector and are thereby ejected from shaft 6 in multiples, depending upon the number desired for simultaneous forwarding into a riveting jig.

While one complete embodiment of the invention has been described in detail, such embodiment is to be regarded as merely illustrative of the invention, and not to be considered as a limitation upon the invention. While in the drawings the ejector device has been illustrated as handling three arches at a time, it is to be understood that any desired number may be simultaneously ejected by appropriately increasing or decreasing the capacity of the ejector. Neither is the invention limited to the particular style or size of arch illustrated. It is to be distinctly understood, therefore, that such modifications, adaptations and variations and the substitution of equivalents for the several elements disclosed as may occur to those skilled in the art without departing from the spirit of the invention are, although not specifically described herein, contemplated by and within the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. In a device of the kind described, having an interiorly baffled tumbling barrel, a rotating shaft extending through the barrel and to a remote point outside thereof, and aligned rails extending alongside said shaft, one of said rails having a gap within the barrel, the improvement which comprises, the gaped rail being higher than the opposite rail adjacent said gap.

2. In a device of the kind described, having an interiorly baffled tumbling barrel, a rotating shaft extending through the barrel and to a remote point outside thereof, and aligned rails extending alongside said shaft, one of said rails having a gap within the barrel, the improvement which comprises, the gapped rail being higher than the opposite rail adjacent said gap, and means for rotating said shaft in a direction such that the top thereof moves toward said gapped rail.

3. In a device of the kind described having a tumbling barrel having an exterior wall, baffles extending substantially axially of and affixed to the inside of said exterior wall, a rotating shaft extending through the barrel and to a remote point outside thereof, and aligned rails extending alongside said shaft, the improvement which comprises, said baffles having an outward section inclined in trailing relationship with reference to the radius of the outer extremity thereof, said baffles each having a lip at its inward extremity forming a trough with the outward section of the baffle, and said lip having its free edge extending substantially parallel with and closely adjacent said shaft.

4. In a device of the kind described having a tumbling barrel for receiving a bulk supply of arches, said tumbling barrel having an exterior wall, baffles extending substantially axially of and affixed to the inside of said exterior wall, a rotating shaft extending through the barrel and to a remote point outside thereof, and aligned rails extending alongside said shaft, the improvement which comprises, said baffles having an outward section inclined in trailing relationship with reference to the radius of the outer extremity thereof, said baffles each having a lip at its inward extremity forming a trough with the outward section of the baffle, and said lip extending substantially radially of said shaft.

5. In a device of the kind described having an interiorly baffled tumbling barrel for receiving a bulk supply of arches, a rotating shaft extending through the barrel and to a remote point outside thereof, and aligned rails extending alongside said shaft, the improvement which comprises said shaft having means thereadjacent for selectively rejecting improperly oriented arches and means adjacent said shaft for retaining properly oriented arches thereon.

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