METHOD OF MAKING TOGGLE PLATE RING BINDER MECHANISMS

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This invention relates to improvements in the method of making ring binder constructions and has for an object to provide an improved and more economically made flat toggle plate type of mechanism with its paper holding prongs.

The present application is related in some aspects to the method shown in my prior Patent No. 2,384,134, granted September 4, 1945. The differences in the disclosures will be apparent as the detail of the present method is set forth.

A principal object of the invention is to assemble all of the parts of a toggle plate mechanism for the ring binder construction in a convenient arrangement of method steps and to provide for the working and shaping operations with a minimum of handling for final assembly work in furnishing a finished product.

A ring binder assembly having the flat toggle plate type of mechanism is well known as of the highest quality because of its high operating efficiency and although comparatively expensive, its use in binders is widespread. The new method herein disclosed has for a principal purpose to substantially reduce the costs of manufacture of this well known type of toggle mechanism over prior methods.

Another object is to provide a form of ring toggle plate which has particular advantages in construction as will be more particularly pointed out in the following detailed description of the invention.

In the drawings:

Fig. 1 shows a pair of flat toggle plate bands arranged in spaced parallel relation with the first forming operations indicated thereon;

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Fig. 1 shows a pair of flat toggle plate bands arranged in spaced parallel relation with the first forming operations indicated thereon;

Fig. 2 is a view showing ring wire material as fed transversely and assembled with relation to the plates;

Fig. 3 is a view on line 3—3 of Fig. 2;

Fig. 4 is a fragmentary view showing a first forming operation on the lateral extensions of the ring wires;

Fig. 5 is a view on line 5—5 of Fig. 4;

Fig. 6 is a view similar to Fig. 4 to show the final forming of the ring halves;

Fig. 7 is a view showing the cuts made on the inner wire portions as one of the final steps in the method;

Fig. 8 is a view of a completed toggle plate mechanism cut to length and mounted in a spring plate indicated by the dot-dash lines;

Fig. 9 is a view on line 9—9 of Fig. 8 to show details of operation; and

Fig. 10 is a diagrammatic view indicating work station arrangement for the preferral order of method steps.

The method commences with the feeding of two flat toggle plate bands 1 and 2 positioned in parallel spaced relationship at a first work station. The plates are preferably in the form of indefinite lengths of continuously fed ribbons of flat band stock such as is commonly used in binder constructions of this type, although separate lengths of stock, corresponding to the exact lengths of toggle plate dimension desired, may be provided. The spacing between the two plate bands may also be varied. I prefer to have the spacing between 1 and 2 as small as possible consistent with convenient accessibility for shaping tools as will be described. I have found a spacing of one eighth of an inch to be satisfactory in a commercial application of the method. Thus a minimum of wire stock is lost in the final cutting operation as will be explained.

At the first work station the initial operations are performed on a "feed" length of the parallel plate bands or on a separate length thereof. The "feed" length or length of band stock intermittently advanced at each station for successive forming operations is shown in the drawings as one suitable for use for the manufacture of a three ring toggle mechanism. It is defined by the transverse lines a and b of Fig. 1. The feed length dimensions may of course be varied and as will be appreciated the relative spacing and number of rings desired may also be varied.

At this station in each plate are formed correspondingly spaced projections as at 3. The metal of the plate surface is here shown as deformed by upsetting the same in positions spaced longitudinally as may be desired for location of the ring halves in the completed assembly. The projections of one plate are raised directly opposite those of the other plate to align complementary pairs of projections. Also at this station two indented notches 4 are cut in the inner edges of each plate 1 and 2 in alignment between the oppositely positioned projections. The purpose of the notches will be later described.

Toggle nubs 5 are also formed as by swaging the metal of each plate on the inner edges thereof adjacent each position desired for placement of the ring prongs. It will be noted that nubs 5 of each plate are adjacent corresponding notches 4 with the nubs of plate 1 being oppositely placed with respect to those of plate 2. In the final assembly the nubs, being on each side of the rings, will thus securely hold the edge to edge relation of plates 1 and 2 during manipulation of the toggle mechanism in opening and closing the ring prongs, all as will be readily understood by those skilled in the art.

Semi-circular indentations, as notches 6, are also preferably cut at this station in opposite inner edges of the plates 1 and 2 adjacent the two outer ring positions. Openings for the usual rivets used in mounting the final ring plate assembly to a binder casing are thus provided.

At a second work station ring stock from indefinite lengths is fed transversely under the plates 1 and 2 at the three positions shown for location of the rings. The wires 7 may be of a predetermined length if desired. I prefer indefinite lengths as most convenient. They are passed under the plates with a predetermined transverse "feed" length to line up the free ends thereof evenly at one side of the plates. In this position with cross wires 7 laid against the projections 3 the wires are fixed to the projections as by spot welding operations performed simultaneously at the six locations shown. The inner ends of the wires are preferably cut off following the spot welding step, if fed from an indefinite supply, so that the extension of the wires at that side of the plates will correspond to the extension at the other side. It will be realized, of course, that if staggered ring halves are
desired, the feeding and cutting operations can be varied for the particular circumstances. It will be noted in the drawings that in the views illustrating the formed successive operations, the bottom surface of the toggle plate, as it will be finally assembled, is uppermost in the figures shown. I prefer this position because of the more convenient accessibility to various parts of the assemblies during bending and forming operations.

At a third station the wire extensions beyond the outer sides of the plates are partially formed into ring halves by bending them as indicated at 8 by Figs. 4 and 5. The first bending operation is also preferably accompanied by joint trimming operations on the free ends of the wires so as to provide mating ends 9 on each complementary ring half. The extensions might be finally formed at this third station but I prefer to prevent an undue strain on the wire by successive operations, the fourth operation being indicated by Fig. 6.

It will be noted, as shown by Fig. 5, that in the bending operation of partially forming the die for the ring halves, the wire is bent from the center of the projected position of plates 1 and 2. The provision for a spot welding attachment on the projection thus assures no deformation of the flat toggle plate in bending the wire. Not only is the wire free to bend, but the raising of the wire above the surface of the plate makes necessary the formation only of a substantially semi-circular ring half 10 as will be apparent from Fig. 6. This is of advantage in the detail of the method in that prior constructions have most universally required an angular bending near the point of attachment to the plate as in the case of ring halves inserted through the plate or embedded therein. With the formation of wire in the present invention a simpler bending operation with automatic machinery is made possible.

At the fifth and final work station the separation of the two plates 1 and 2 with their ring halves 10 completely formed is accomplished and the "feed" length of the two plates is cut off. The separation of the plates is preferably done by a cutting tool which enters the space provided by the oppositely positioned notches 4 and shears the wire off adjacent the inner side of each projection. In this manner the inner ends 11 of the ring halves are then set back from the inner edges of the plates. As the two plates simultaneously are assembled with their ring wires are separated and cut to "feed" length they are matched for assembly in the usual spring plate 12 as shown by Fig. 8.

It will be apparent from Fig. 9 that the set back inner end 11 of the ring wires serves a useful purpose in avoiding any contact of the facing ends during operation of the toggle plates. The inner plate edges themselves are in contact and in being manipulated to open and close the rings the plates travel across center for toggle operation. In ring closed position the plates are inclined downwardly toward the mating edges and the wires are accurately swung towards each other on the plates. With cut back inner ends 11 they will be spaced sufficiently to permit full closure of the outer mating ring ends 9. This will be appreciated from the position of Fig. 9.

The method steps outlined for each of the operations needed to form the mechanism may of course be varied to a considerable degree without departing from the spirit of the invention. As an example, the nibs 5 and eyelet notches 6 might be formed at any time prior to the final assembly work of the mechanism. It would also be possible to cut the inner extensions of the wire between the spaced plates and the plate notches 4 in one cutting operation. I prefer to make the separate cuts as described and in the order named as lighter tools may be used and a nester sheared edge is obtained.

To briefly summarize the method steps to make the improved product reference is made to the diagrammatic view of Fig. 10. The toggle plate bands 1 and 2 may be guided in spaced relation through the work stations 1 to 5, being advanced intermittently the predetermined distance of a "feed" length while the operation described for each station are successively performed. At station 1 all the necessary work on the plate structure itself is done. The projections 3, nibs 5, eyelet notches 6, and indented notches 4 are formed by appropriate tools while the two plate lengths, which will be matched in a final toggle assembly are held by suitable positioning guides. At station 11 the cross wires 7 are transversely fed and cut off from the supply while spot welding apparatus simultaneously fixes the wires to the plates on the projections 3. At station 11 the forming bend in the extension is made and in this position with the end tips of the wire relatively widely spaced the joints 9 may be formed by a tool moving horizontally across the ends from the inside of the curve. The final ring half bending formation is made at station 14 and the separating cut made at station 15 by a cutting tool to sever the two matching plate assemblies.

In providing a "feed" length for a three ring binder toggle mechanism the end rings of adjacent feed lengths in the band are spaced exactly twice the length of an end portion of a toggle plate so that no waste piece results in cutting off to length. It will be realized that details of measurement may be worked out for any desired number of rings to minimize waste in practicing the invention. It will be clear from considering the structure made according to the new method that a high-grade quality article for ring binder mechanisms has been disclosed. One of the particular features of the new construction will be apparent from the enlarged view of Fig. 3. As there shown the projection 3 raised from the surface of the plate has had the transversely registered wire 7 spot welded at its center. It will be seen that the heat of the weld operation depresses the surface of the projection centrally so as to form a reinforcing abutment 13 on each side of the wire 7. Such construction gives added strength at the point of ring attachment to the plate. The shoulder abutment prevents any lateral thrust tending to rock or roll the ring at the point of attachment and provides a sturdy rugged mechanism for high operating efficiency in the finished assembly.

What is claimed is:

1. A method of making flat toggle plate ring binder mechanisms which comprises intermittently feeding by steps equal to the length of one of said mechanisms a pair of flat toggle plate bands of indefinite length in side by side parallel relation past successively arranged work stations, and at said stations between said steps preforming said bands by providing small complementary projections raised upwardly of the upper band surfaces and equally spaced longitudinally on each band, and recessing the inner edges of said bands between each pair of complementary oppositely positioned projections by cutting indented notches in alignment with said projections; feeding ring wires simultaneously across said bands in registration with each said pair of complementary projections and recessed notches with the end portions of said wires extending outwardly of the projections; spot welding said wires to said projections while heating the weld to partially sink the wires into said projections; bending the outer end portions of each wire into complementary ring half form and making half joints at the outer ends thereof; cutting the inner portions of wire between each said pair of complementary projections by severing the wires immediately adjacent the inner recessed edges of said indented notches; providing toggle plate nibs along the inner edges of said plates; and finally severing the bands the length of each said feed step.

2. In a method of making flat toggle plate loose leaf ring binder mechanisms having a pair of parallel ring bearing plates with their inner side edges held in contiguous relation for toggle operation, the steps of intermittently feeding two flat plates of band stock in parallel...
closely spaced relation past successive work stations and
at said stations deforming at equally spaced intervals on
said bands and at oppositely located central portions
thereof the metal of the band upwardly of the surface to
provide raised projections, cutting recessed notched in-
dentations in the inner edges of each band in alignment
with and between each pair of oppositely located pro-
jections, spot welding single lengths of transversely dis-
posed ring wires to each said pair of projections, form-
ing mating ring halves from the wire portions outwardly
of said projections, and then cutting away the inner por-
tions of said wires between each pair of projections ad-
jaent the inner recessed edges of said aligned notches.

References Cited in the file of this patent

UNITED STATES PATENTS

966,807 Dawson --------------- Aug. 9, 1910

974,892 Lachman --------------- Nov. 8, 1910
1,085,089 Lachman --------------- Jan. 20, 1914
1,589,124 Dawson --------------- June 15, 1926
1,948,603 Watson --------------- Feb. 27, 1934
2,051,617 Newman --------------- Aug. 18, 1936
2,055,273 Adams --------------- Sept. 22, 1936
2,061,676 Schade --------------- Nov. 24, 1936
2,368,730 Schade --------------- Feb. 6, 1945
2,384,134 Schade --------------- Sept. 4, 1945
2,385,883 Schade --------------- Oct. 2, 1945
2,399,062 Schade --------------- Apr. 23, 1946
2,435,848 Schade --------------- Feb. 10, 1948
2,552,076 Wedge --------------- May 8, 1951