Jan. 17, 1939. C. D. TRUSSELL 2,144,581

RING BINDER AND METHOD OF MAKING THE SAME

Filed April 11, 1936

Fig. 1.

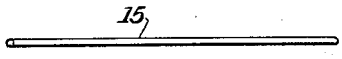


Fig. 2.

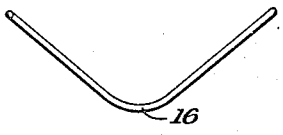


Fig. 3.

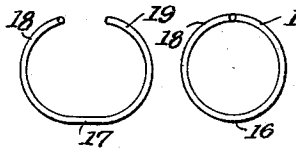


Fig. 4.

Fig. 5.

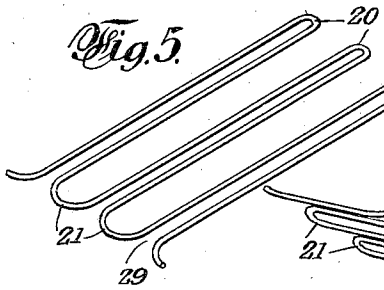


Fig. 6.

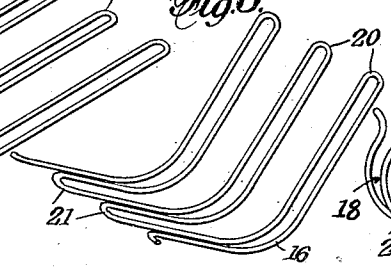


Fig. 7.

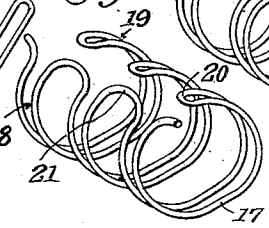
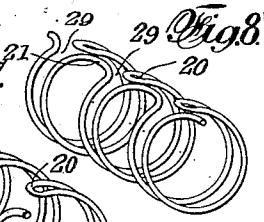


Fig. 8.



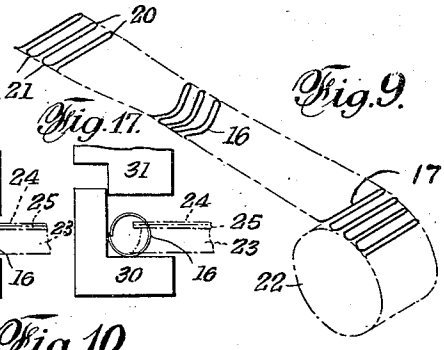


Fig. 9.

Fig. 15.

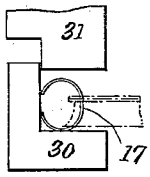


Fig. 16.

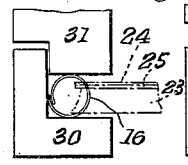


Fig. 17.

Fig. 10.

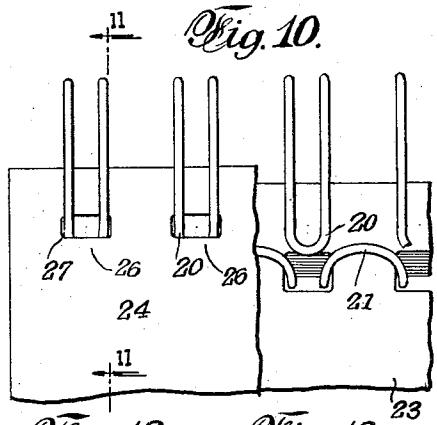


Fig. 11.

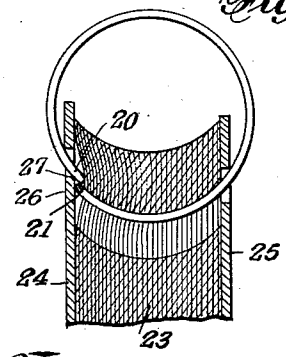


Fig. 12.

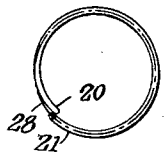


Fig. 13.

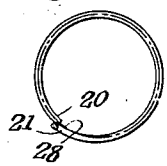
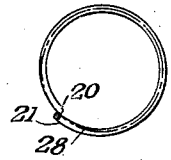


Fig. 14.



C. D. TRUSSELL
INVENTOR

BY Philip S. McKeen.
ATTORNEY

Patented Jan. 17, 1939 2,144,581

UNITED STATES PATENT OFFICE

2,144,581

RING BINDER AND METHOD OF MAKING THE SAME

Clarence D. Trussell, Poughkeepsie, N. Y., assignor to Trussell Manufacturing Company, Poughkeepsie, N. Y., a corporation of New York

Application April 11, 1936, Serial No. 73,839

17 Claims. (Cl. 281—25)

This invention relates to ring binders and particularly those of the type in which the leaves and if present, the covers, may be completely reversed through an arc of substantially 180°. For such results, it is desirable that the binder rings be substantially circular, at least throughout that portion traversed by the leaves or the covers in such movements.

A special object of the invention is to assure a proper roundness of these binder rings.

A related, important object is to produce binder rings of this character at low cost and by commercially practical and efficient manufacturing methods.

Another special object of the invention is to provide a construction in which the fillers may be readily inserted in the rings, while the latter are in an open condition and these rings be then quickly closed through the inserted material without bending the backs of the rings out of round.

Another object is to utilize a continuous length of wire bent in zig-zag fashion to form connected binder ring elements and to so form the same that the connecting portions of such binder rings will be concealed in the finished book form.

Other objects and the novel features of construction, combinations and relations of parts comprising the invention will appear or are set forth in the following specification.

The drawing accompanying and forming part of the specification illustrates the invention as embodied in several different forms, but it will be appreciated that the same may be further modified all within the true intent and broad scope of the invention as defined in the claims.

Figs. 1, 2, 3 and 4 are end or edge views illustrating successive stages in the formation of the binder rings.

Figs. 5, 6, 7, 8 are perspective views of the continuous binder ring strip in corresponding stages of formation.

Fig. 9 is a diagrammatic view illustrating the successive steps of forming the zig-zag strip, bending the same transversely to impart a bending arc for the ring closing operation and then flattening so that the strip may be coiled in reels for subsequent use.

Fig. 10 is a broken front view of a book made up with the binder but modified to the extent of having the tips of the ring elements offset with respect to the connecting loop portions to effect the concealment of the latter when the book cover is closed.

Fig. 11 is a broken sectional detail on substantially the plane of line 11—11 of Fig. 10, illustrating more fully this feature of concealment effected by the offsetting of the ring ends.

Figs. 12, 13, 14, are detail end views showing different ways of offsetting the ends of the binder rings.

Figs. 15, 16, 17 are broken and somewhat diagrammatic views illustrating the operation of closing the binder rings.

As first shown in Figs. 1, 2, 3, 4, a special feature of the invention is the imparting to the stock of a certain bend or curvature which the material will follow or adopt in the closing of the ring to the final form.

Fig. 1 illustrates a straight length of the ring material 15.

Fig. 2 shows this straight length of stock bent intermediate its ends on an arc 16, approximating that of the final ring shape.

Fig. 3 shows the intermediate previously rounded portion flattened out at 17, and the ends 18, 19, curved upon approximate arcs of the finished circle but separated for entry of the leaves and book covers.

Fig. 4 shows how, as the curved ends are brought together, the intermediate portion will resume the initially imparted curvature 16, to form a substantially perfect circle.

Instead of separate lengths, the rings may be connected in a continuous series as by shaping wire in the zig-zag fashion illustrated in Fig. 5, to form looped prongs 20, for the ring elements, connected at their bases by the wider loops 21. This stock material may then be indented longitudinally to give it the intermediate transverse curvature 16, Fig. 6. Then the ends may be rounded and the intermediate portion flattened as in Fig. 7, to place the whole series of partly formed rings in readiness to receive the filler. Finally, by suitable closing dies, the curved ends may be squeezed toward each other as in Fig. 8, to close the rings on the inserted matter.

The bending of the stock as described has the effect of providing a hinging section about which the material will bend in the ring closing operation and which effect persists even through and following a straightening operation such as that at 17, in Figs. 3 and 7. This hinging curvature is here shown located in the central intermediate portion of the ring element, but it will be appreciated that it may be located to one side or the other, or in fact, partly to both sides of the exact center, with the ring closing dies shaped and operating accordingly.

Fig. 9 illustrates how the transverse curvature

may be given the stock immediately as formed in the zig-zag machine and prior to being coiled. At the left, the stock is shown as it issues from the bending dies. It is then curved transversely at 16, and flattened at 17, into condition for winding up in a reel 22. Longer lengths of the preformed material may thus be put up in convenient form for shipment and storage. When required, these may be unwound and cut in flat binder strip lengths. These having the hinge curvature inherent therein only require the formation of the end curves, such as 18, 19, Figs. 3 and 7, after which they will close to the true circular form illustrated in Figs. 4 and 8.

Figs. 10 and 11 show the binder rings closed on interposed leaves 23, and book covers 24, 25, and illustrate the further feature of relatively offsetting the ends of the rings out of the true circular form to cause solid portions 26, of one cover (24) below the ring openings 27, to overstand and conceal the tips of the prongs 20 and the loops 21, connecting adjoining prongs.

This offset may be produced in various ways, thus by deflecting the ends of the prongs 20, inward beyond the true circle indicated at 28, in Fig. 12, or by bending the loops 21, connecting the base or root ends of the prongs outward beyond the true circle as in Fig. 13, or by bending both the tip and the base ends of the ring elements in opposite directions with respect to the true circle as indicated in Fig. 14. The terms employed herein have been used in a descriptive rather than in a limiting sense and the claims are to be read accordingly, except possibly as limitations may be imposed by state of the prior art.

By relatively offsetting the ends of the rings, any desired extent of overlap may be employed, whereas in the complete circular formation shown in Figs. 4 and 8, the amount of overlap may be limited to the extent which the convergent or pointed ends of the doubled prong elements will enter between the divergent spaces 29, at the base ends of these prongs. In offsetting the ring ends, the deformation is preferably confined to the end portion or portions of the rings so as to leave the back portions of the rings truly circular in form and hence suited to the free movement of the leaves and covers in swinging back from one side of the book to the other. The end portions may be bent to the same radii as indicated in Fig. 3 and the extreme ends subsequently be bent to give them a certain extent of offset, but if desired, the end portions 18, 19, may be bent initially on different radii, so as to produce the desired offset effect when the rings are closed on the interposed sheets. The necessary steps may be performed in different order than described and the claims setting forth the invention should be so considered. Similarly, the terms employed are to be construed in a descriptive rather than in a limiting sense. Thus by the expression "wire" any material of that character suited to the present purpose is intended to be included.

The wire usually employed is quite thin, on the order of from .026 to .034 inch. To prevent the relatively large diameter rings of this thin wire from bending and becoming deformed as from shipment in the mails, this wire will usually be approximately three-quarters hard. Wire of this hardness has enough spring in it to require a considerable overlap in the closing operation to leave it as a completely closed ring. This is particularly so, because of the fact that in the closing operation, the presence of the sheets prevents the rings from being definitely held and guided. The operation then is as indicated in Figs. 15, 16, 17. The first of these shows the open rings located in the corner of a lower L-shaped die 30; Fig. 16 shows the upper closing die coming down and bending the rings closed to an extreme overlapping condition and Fig. 17 shows the upper die retreating and the rings springing back to the normal desired amount of overlap. This same springy character enables the rings to recover from heavy pressure or other deforming forces which may be applied to the finished bound books.

What is claimed is:

1. The method of forming a binder ring, which comprises bending the intermediate portion of a substantially straight length of ring stock approximately to the curvature of the ring to be formed, rounding the ends and bending the intermediate part of the stock back to substantially the original condition and then bending the intermediate portion back to approximately its first bent curvature.

2. The method of forming a binder ring, which comprises bending part of a substantially straight length of ring stock approximately to the curvature of the ring to be formed, substantially straightening this bent portion and bending the balance of the length to approximately the curvature of the desired ring shape and then bending the first bent portion back to substantially its original curvature.

3. The method of forming a binder ring, which comprises bending the intermediate portion of a length of ring stock out of the curvature of the ring to be formed, bending end portions of the length to the approximate curvature for the ends of the finished ring and then bending the previously bent intermediate portion to the approximate arc of the ring and in a direction to bring the curved ends toward each other.

4. The method of making a ring binder, which comprises bending a wire in zig-zag shape to form doubled prong elements connected by spacing loops, transversely bending the intermediate portion of a strip of such material, bending other portions of the strip to the approximate ring curvature and then bending the first bent portion in a direction to bring the second bent portions toward each other in a ring closing direction.

5. The method of making a ring binder, which comprises bending a wire in zig-zag shape to form doubled prong elements connected by spacing loops, imparting a ring shaped curvature to the intermediate portion of a length of such strip, rounding the end portions and flattening the intermediate portion of the ring forming prongs and again curving the intermediate portion to bring the rounded end portions into ring formation relation.

6. The method of forming material for ring binders, which comprises bending a wire in zig-zag shape to form doubled prong elements connected by spacing loops, transversely bending the intermediate portion of said zig-zag strip and then flattening said strip and reeling the same in coiled formation.

7. The method of forming material for ring binders, which comprises bending a wire in zig-zag shape to form doubled prong elements connected by spacing loops, transversely bending the intermediate portion of said zig-zag strip and then flattening said strip and reeling the same in coiled formation, unwinding and cutting the coiled strip in binder lengths, curving the ends of the prongs toward each other and then bending the previously bent intermediate portions of said

cut lengths to close the curved ends into ring formation.

8. The method of making a ring binder, which comprises forming a hinge bend in a length of binder ring material, substantially straightening the length and curving the balance of the same to the approximate ring shape and again bending the first bent portion to bring the curved end portions into overlapping and radially offset relation.

9. As a new article of manufacture, a wire strip of zig-zag ring binder material in substantially flat condition, but having an intermediate weakened hinge section produced by the bending of the same to curved form and the re-bending back to the substantially flat condition.

10. The method of making a binder ring which includes the steps of forming a hinge bend in a length of binder ring material, substantially straightening that portion of the material in which said hinge bend is located and bending the ends of the length of material toward each other and then bending said previously bent portion back to approximately the curvature of the hinge bend first formed therein.

11. The method of forming a binder ring which includes the steps of bending the intermediate portion of a length of ring stock to approximately the curvature of the ring to be formed and curving the end portions toward each other and bending the intermediate portion back to substantially the original condition to leave the ends separated to receive a filler.

12. The method of forming a binder ring which includes the steps of bending the intermediate portion of a length of ring stock to approximately the curvature of the ring to be formed and curving the end portions toward each other, bending the intermediate portion back to substantially the original condition to leave the ends separated to receive a filler and finally bending said initially bent intermediate portion back to approximately its first bent curvature to bring the curved ends toward each other to complete the ring.

13. As a step article of manufacture, a binder ring in incomplete C-shape form having curved ends separated to receive a filler and an intermediate connecting portion having a hinge section incorporated therein by the bending of same to curved form and rebending back to substantially flat shape with the curved ends in the separated relation described.

14. The method of making a ring binder which comprises bending the intermediate portion of a length of binder ring forming wire in opposite directions to localize a hinging portion therein and bending the end portions of said length of wire toward each other and in the plane of said hinge forming bending whereby bending of said hinging portion in one direction will bring the bent end portions of the wire toward each other and bending of said wire at said hinging portion in the opposite direction will separate said end portions.

15. The method of manufacturing material for ring binders, which comprises bending a wire in zig-zag shape to form doubled prong elements connected by spacing loops, transversely bending the intermediate portion of said zig-zag strip and then flattening said previously bent intermediate portion of the strip to thereby localize a hinging section in said intermediate portion of the strip.

16. As a step article of manufacture, a relatively flat strip of zig-zag bent binder ring forming wire having a hinging section incorporated in the intermediate portion by the bending and rebending of said intermediate portion in opposite directions.

17. As a new article of manufacture, open binder rings connected together in spaced substantially parallel relation and having end portions curved on substantially similar arcs of a common circle and having intermediate straightened connecting portions with bending sections localized therein by the bending of said portions to substantially the same curvature as said curved ends and the re-bending of said intermediate portions to the straightened condition required to separate the curved ends in readiness to receive a filler of perforated sheets.

CLARENCE D. TRUSSELL.