Mav 10, 1938. C. D. TRUSSELL 2,117,262

MANUFACTURE OF RING BINDERS

Filed April 2, 1937

Fig. 1.

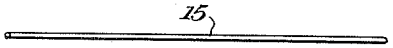


Fig. 2.

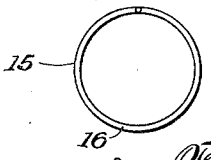


Fig. 3.

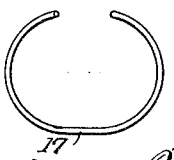


Fig. 4.

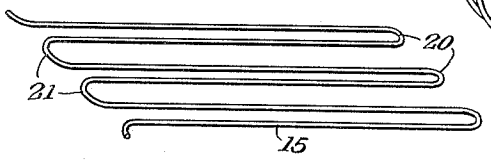


Fig. 5.

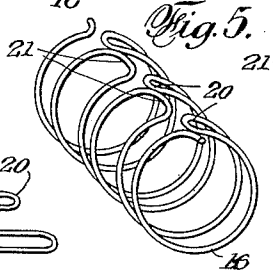


Fig. 6.

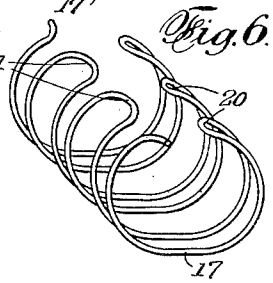


Fig. 9.

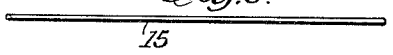


Fig. 7.

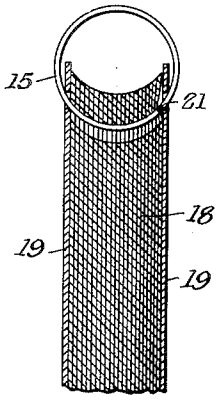


Fig. 8.

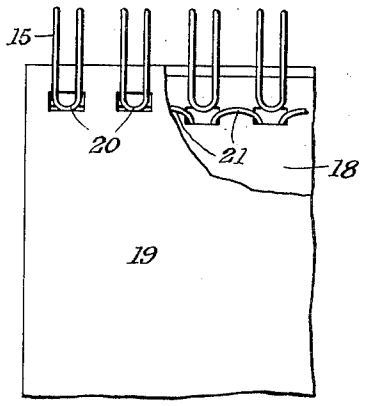


Fig. 10.

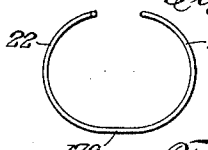


Fig. 11.

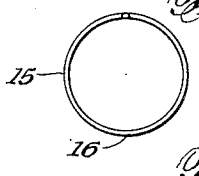


Fig. 12.

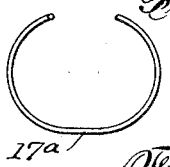
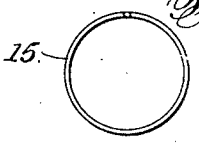


Fig. 13.



C. D. TRUSSELL
INVENTOR

BY Philip S. McKean
ATTORNEY

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MANUFACTURE OF RING BINDERS

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

Application April 2, 1937, Serial No. 134,483

4 Claims. (Cl. 140—88)

The invention disclosed herein relates to the manufacture of ring binders, particularly those of the completely reversible type, in which it is desirable that the rings be perfectly circular to enable the complete reversal of the leaves or pages.

Special objects of the invention are to effect a true roundness of the binder rings and to accomplish this practically, efficiently and at low cost.

More specific objects and the novel features of the invention by which the various objects are attained are set forth or will appear in the course of the following specification.

The accompanying drawing illustrates different preferred embodiments of the invention, but as such illustration is primarily for purposes of disclosure, it will be understood that modifications and changes may be made, all within the true intent and broad scope of the invention as hereinafter defined and broadly claimed.

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

Figs. 4, 5 and 6 are perspective views showing corresponding stages in the formation of the rings from a continuous binder ring strip.

Figs. 7 and 8 are broken sectional and front views respectively of one of the completed binders.

Figs. 9, 10, 11, 12 and 13 are edge views illustrating a modification in the series of steps first disclosed.

The first group of views, Figs. 1 to 7, illustrate the novel feature of forming a hinging portion in the ring stock, which will bend accurately to the desired curvature in the final, ring closing operation.

In Fig. 1, there is shown a straight length of the ring forming stock **15**.

Fig. 2 shows the straight length of ring material bent into complete circular form on an arc **16**.

Fig. 3 shows the circularly bent material flattened intermediate the ends of the same at **17**, to impart a desired extra bendability to this section and to spread the ends of the ring apart ready to receive the material to be bound.

Fig. 7 shows how after the leaves and covers **18**, **19** are in position, the rings may be closed and how in such operation they will bend back to substantially the same cylindrical arc **16**, initially given in Fig. 1.

The rings, instead of being separate elements may be connected together in a continuous series as by shaping wire in the zig-zag fashion illustrated in Fig. 4, to form double strand looped prongs **20**, for the ring elements connected together at their base ends by wider loops **21**. This relatively flat stock material may then be bent up into the completely circular form illustrated in Fig. 5. By thus completely "rounding" the rings, the material is "set" in approximately the desired final shape and usually with a certain amount of "overlap" at the ends of the rings, with the convergent tips of the prong elements entering the divergent spaces at the bases of the prongs, Figs. 5 and 8.

In the next operation, as shown in Fig. 6, the backs of the rings, intermediate the ends are relatively flattened, as at **17**, and this has the effect as above indicated of imparting an extra degree of flexibility to these particular portions of the rings and of spreading the ends of the rings ready to receive the material to be bound. The result of such bending back and forth along the line **17**, is to cause this intermediate portion to give way in a progressive hinge action, with the material assuming substantially the same as the original curvature, as the ends of the rings come together over the inserted material. In this closing action, the non-weakened curved end portions act as levers, producing a progressive bending of the intermediate weakened portion. Thus only a relatively light closing pressure is required and the closing operation is effected without mis-shaping the rings in any way.

In some cases, the curved side or end portions of the rings may be formed prior to and as a step separate from the bending to form the hinging section.

Thus as shown in Figs. 9 to 13, the end portions of the straight ring stock may first be bent up to their final curvature as indicated at **22**, Fig. 10, leaving the intermediate so-called hinging section relatively straight as at **17*a***, and as the next step, this flat intermediate part be bent to the proper arc as at **16**, Fig. 11.

The structure then corresponds to the complete ring formation shown in Figs. 2 and 5, but with the special hinging arc separately impressed therein. Then when this arcuate intermediate portion is relatively flattened as at **17*a***, Fig. 12, a very definite flexibility is imparted to this portion, causing it to return naturally to the true ring shape shown in Fig. 13, as the ends are brought together in closing the rings upon the inserted matter.

The bending of the end portions of the rings first has the advantage of fixing the proper curvature for these parts at the start of the bending

operations and leaving them set in this initially curved shape throughout the balance of the operations. The bending back and forth to relatively flex the intermediate hinging portions does not alter the shape originally given the end portions and this hinge forming bending simply puts the structure in condition to close readily and accurately to the desired circular final ring shape.

While the invention has been disclosed in its application to the formation of binder rings of one particular form of construction, it will be clear from the foregoing that it is applicable as well to the formation of binder rings of various other constructions.

What is claimed is:

1. The method of making a ring binder which comprises bending the end portions of a generally straight length of binder ring forming material substantially on arcs of a common circle toward but separated from each other, then similarly bending the intermediate portion of said material on an arc forming substantially the remainder of the same common circle to bring the bent ends together into substantially complete continuous and uninterrupted circular ring formation, then relatively straightening said intermediate portion to separate the bent ends and to form a localized hinge bending portion between said ends and finally rebending said intermediate hinge portion substantially on the arc it was first bent to again bring the bent ends together in completed substantially circular ring formation.

2. The herein disclosed method of making a ring binder, which comprises first bending the end portions of a length of binder ring forming material toward each other on curves approximating arcs of the completed ring structure, then bending the intermediate portion of said material between said final bent end portions on substantially the same curvature to localize a freer bending section therein and leaving said intermediate portion bent in a direction to separate the first bent end portions, entering perforated sheet material to be bound between said separated end portions and finally bending said freer bending intermediate portion on substantially the same original curvature and in a direction to bring the initially bent curved end portions into complete ring forming relation extending through the perforations in said perforated sheet material.

3. The herein disclosed method of making a ring binder, which comprises bending a series of connected substantially parallel lengths of binder ring material into overlapping ended substantially circular shape, then bending the intermediate portions of the circularly bent lengths, between the overlapping ends in the reverse direction to spread the circularly bent end portions and separate the ends thereof and finally re-bending said intermediate portions in the first direction to again bring the ends together in the overlapping relation first produced.

4. The method of making a ring binder, which comprises bending lengths of binder ring material connected in substantially parallel relation into substantially circular form, then bending intermediate portions of said connected lengths of substantially circularly bent material between the ends of the same in the opposite direction to separate the previously bent ends and form intermediate hinge bending portions therein and then re-bending said connected lengths of material at said localized hinge bending portions in a direction to again bring the bent ends together into completed ring formation.

CLARENCE D. TRUSSELL.