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C. D. TRUSSELL

LOOSE LEAF BINDER AND ITS MANUFACTURE

Filed July 16, 1924

Fig. 1.

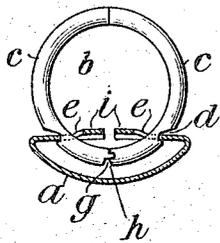


Fig. 2.

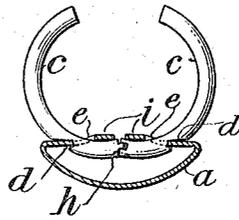


Fig. 3.

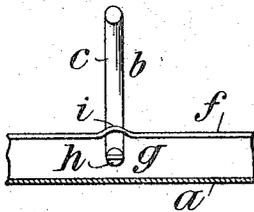


Fig. 6.

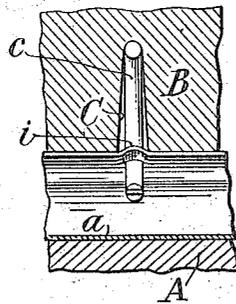


Fig. 5.

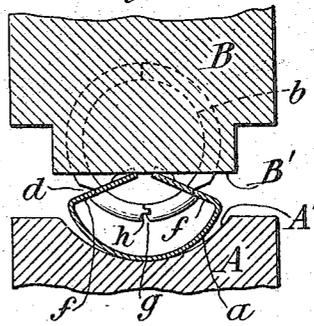


Fig. 4.

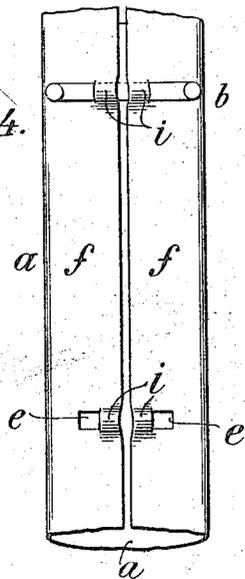
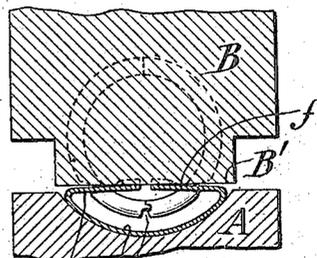


Fig. 7.



f) a) g) INVENTOR :  
Clarence D. Trussell,

By Attorneys,

Cramer, Myers & Manley

# UNITED STATES PATENT OFFICE.

CLARENCE D. TRUSSELL, OF POUGHKEEPSIE, NEW YORK, ASSIGNOR TO TRUSSELL MANUFACTURING COMPANY, OF POUGHKEEPSIE, NEW YORK, A CORPORATION OF NEW YORK.

## LOOSE-LEAF BINDER AND ITS MANUFACTURE.

Application filed July 16, 1924. Serial No. 726,290.

*To all whom it may concern:*

Be it known that I, CLARENCE D. TRUSSELL, a citizen of the United States of America, residing in Poughkeepsie, in the county of Dutchess and State of New York, have invented certain new and useful Improvements in Loose-Leaf Binders and their Manufacture, of which the following is a specification.

This invention relates to loose-leaf books or binders of the ring type, being an improvement on the constructions set forth in my Patent No. 880,053, dated February 25, 1908.

Binders of the construction set forth in said patent are well adapted to small books having rings or closed prongs of very small diameter, and made of relatively thick wire, but some difficulty has been experienced in constructing such books with rings of much larger diameter because the thickness of the wire to suit leaves of the standard punching cannot exceed about one-eighth inch, which makes the prongs so slender that they cannot be effectively stopped by merely their mutual abutment to limit the opening movement.

The present invention provides an improved construction applicable to any size of ring and any thickness of wire, and which affords the requisite stability in the open position.

The present invention also provides a mode of manufacture of loose-leaf books or ring binders of the type having mating half-ring members engaged by a resilient back plate having inturned wings. According to this mode, the prongs or half rings are assembled in annular form and temporarily engaged with the corresponding recesses in the inturned wings of the spring plate, and the parts are subjected to pressure between dies, whereby while the rings are held in place the wings are pressed downward or flattened, and thereby given a resilient set, which causes them to press the half rings or prongs together with a sufficient stress to insure the necessary resilient snap action of the rings in opening and closing.

The accompanying drawings show the preferred construction embodying this invention, and illustrate the mode of manufacture.

Figure 1 is a transverse section through

the spring plate, showing the mating prongs closed together to form a complete ring;

Fig. 2 is a similar view showing the prongs opened apart to discharge or receive the leaves;

Fig. 3 is a longitudinal mid-section of Fig. 1;

Fig. 4 is a fragmentary plan showing a portion of the spring plate for holding two rings, one of which is in section, the other being omitted;

Fig. 5 is a transverse section of the spring plate and dies, showing the first step in the method of manufacture;

Fig. 6 is a vertical section transverse to Fig. 5;

Fig. 7 is a similar section to Fig. 5, showing the final step.

The general construction of the binder is the same as set forth in Patent No. 880,053, and comprises generally a spring back plate *a* and two or more rings *b b*, each formed of two mating prongs or half rings *c c*. These prongs are hinged together where their lower ends abut, and have notches *d* which engage openings *e* in the inturned wings or flanges *f f* of the back plate. The hinging of the rings is best accomplished by forming them respectively with a tongue and groove connection *g* affording a rocking joint, their portions below this joint being beveled off at *h* to form abutting stop faces.

Instead of forming the spring back plate with narrow inturned wings, these wings having open notches for receiving the notched prongs, as heretofore, the wings are made wider, so that they approach to within a limited distance of one another, and instead of being notched they are punched through with openings *e*, and the integral metal *i* between these openings and the edges of the wings is utilized to serve as an abutment or limiting stop for checking the opening movement of the prongs, as shown in Fig. 2. To enable the prongs to open widely enough, it is preferable to arch upward the portions *i*, as best shown in Fig. 3.

The proportions shown are those suitable for rings of one-inch internal diameter made of one-eighth inch wire. In the closed position shown in Fig. 1, the free ends of the prongs abut. In the open position as in Fig. 2, the hinged ends strike up against the under sides of the arched portions *i*, and at the

same time their faces *h* abut to co-operate in forming a stop.

Ring books of the general construction herein discussed are the simplest type of ring books made, and are sold at a very low price, so that it is important to manufacture them with the utmost economy. The inserting of the prongs or half rings in place on the spring back plates so as to be in their final operative form, is a difficult operation, requiring to be performed by hand, and being so slow as to be unduly expensive. To reduce the cost of manufacture I have devised the method which will be described with reference to Figs. 5, 6 and 7. The back plate is first struck up from spring metal in suitable dies to the shape shown in cross-section in Fig. 5, that is to say, with its wings sloping upward at a considerable angle, and with its spring back curved to a much smaller radius than in the final form. The spring back plate is grasped by a suitable tool and sprung open to separate its wings, and held thus while the mated prongs or half rings are put in place, so that upon the release of the wings their notches engage with the outer margins of the orifices *e*, which hold the prongs temporarily in place. The plate with the two or more pairs of prongs thus assembled is then placed between dies A and B, the lower one A of which has a concave recess A' in its upper face, while the upper die B has a flat bottom face B' and deep recesses C, the latter being shaped to readily receive and conform to the mated prongs or rings. Figs. 5 and 6 show the upper die brought partly down so that these recesses engage and hold the rings. Fig. 7 shows the upper die fully brought down, the die operation being instantaneous, being performed by a single blow of the upper die, which is best carried in the movable head of a punching press. In this operation the flat under face B' of the upper die bears down upon the upturned wings and flattens them down to nearly or quite the same plane, at the same time flattening the back portion of the spring plate into conformity with the concave face A', all as shown in Fig. 7. This flattening of the wings brings their bearing engagement with the notches in the prongs closer together, so that when released they press inwardly with greater force on the prongs, thus exerting a strong tension to give the divided rings a tense snap action. The squeeze given by this operation creates a sharper bend where the wings join the curved back,

and gives both the back and wings, as well as the intervening bends, a sharp set, which materially stiffens the spring plate and increases its resiliency. The set thus imparted is such that when the upper die is lifted, the wings fly up scarcely any, the plate and prongs then having the permanent form shown in Figs. 1 and 2. The plate thus holds the prongs pressed tightly together in their closed position, while in their open position it holds them open by reason of their contact faces having risen into line with, or above alignment with, the approaching active faces of the margins of the openings.

The construction and operation shown and described are those preferred according to my invention, but these may be varied or modified as may be suggested by one skilled in the art and within the scope of the appended claims.

I claim as my invention:

1. A loose-leaf binder comprising mating prongs and a spring-plate having inbent wings formed with openings, the prongs passing through said openings, having rocking engagement with the margins thereof, and having their inner end portions adapted to abut the wings to limit their opening movement.
2. A binder according to claim 1, the wing margins within their openings being indented upward where they engage with the abutting portions of the prongs.
3. A binder according to claim 1, the inner end portions of the prongs formed with a tongue and groove rocking connection, and with angular faces adapted to abut in the open positions of the prongs.
4. The method of making a loose-leaf binder comprising half-ring prongs and a spring back-plate having inturned wings, consisting in forming the plate with its wings upturned, mounting the prongs united as rings in position against the upturned wings of said plate, and pressing down the wings to flatten them downwardly to or beyond their final form to give them a resilient set.
5. The method of claim 4, the pressing means being dies, the one having a concave face receiving the back-plate, and the other having a bending face engaging the wings, and having recesses receiving the united prongs.

In witness whereof, I have hereunto signed my name.

CLARENCE D. TRUSSELL.