Oct. 27, 1936. A. E. PETERSON 2,058,718

BINDER

Filed May 31, 1935 2 Sheets-Sheet 1

Fig. 1

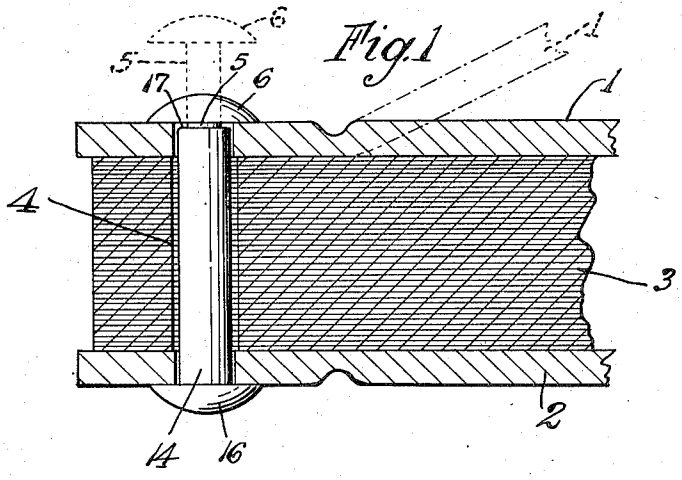


Fig. 2

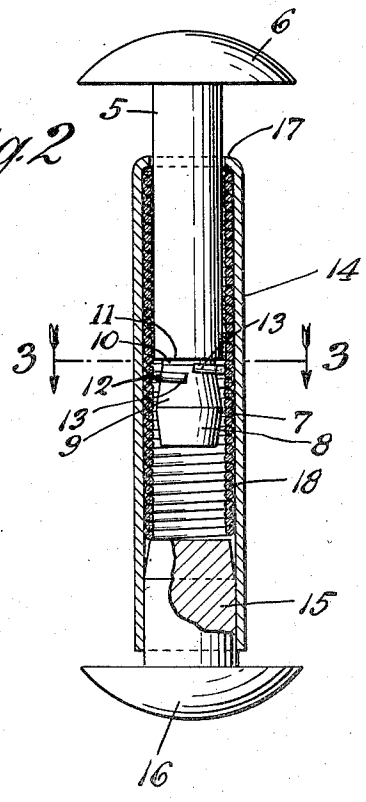


Fig. 4

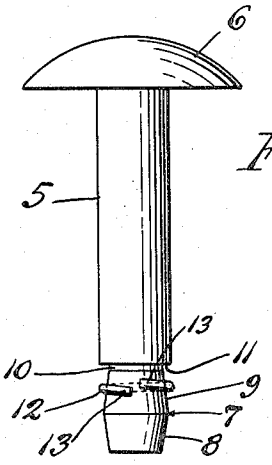
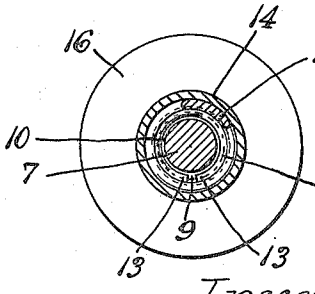


Fig. 3



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BINDER

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Fig. 5

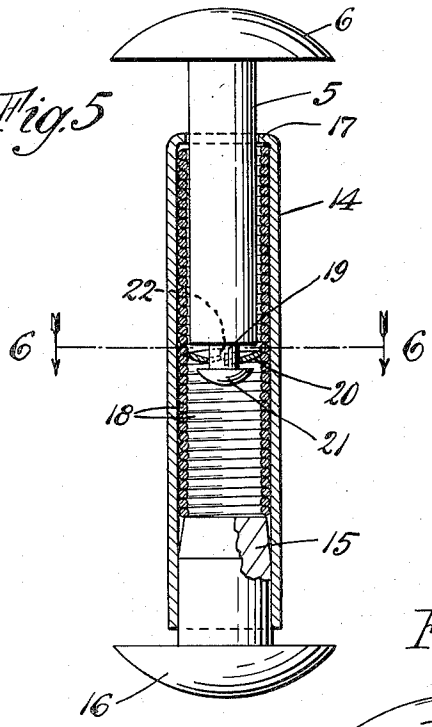


Fig. 6

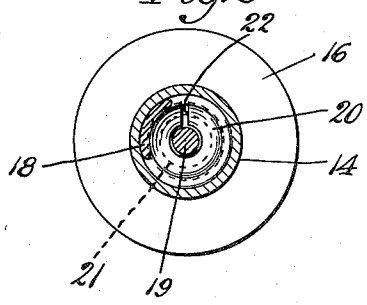


Fig. 8

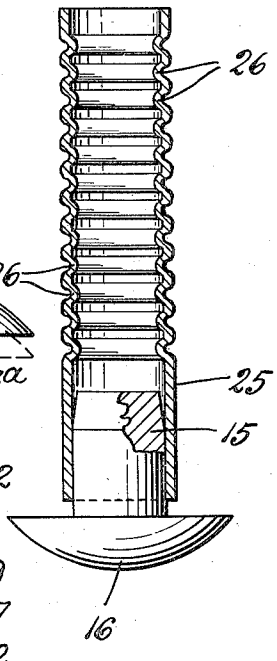


Fig. 9.

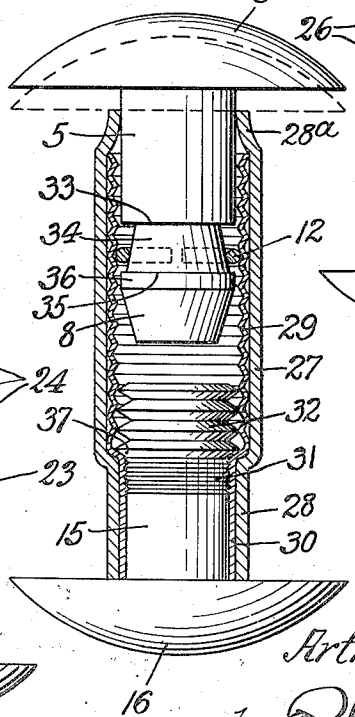
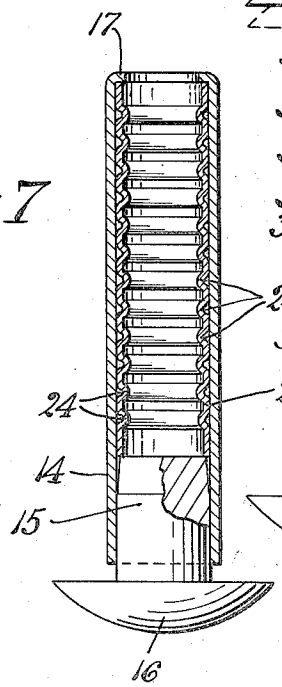


Fig. 7



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Patented Oct. 27, 1936 2,058,718

UNITED STATES PATENT OFFICE

2,058,718

BINDER

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Application May 31, 1935, Serial No. 24,210

22 Claims. (Cl. 85—4)

This invention relates to a fastener. In one form it is particularly adaptable for use as a binder for fastening together a plurality of sheets. One common use for such binders is in fastening together correspondence or in binding together the sheets of a book although it may be used as a fastener in any association and is not limited to use as a binder for books or for sheets.

One object of the invention is to provide a binder which is cheap and strong and which may be readily forced together and resists separation. Another object is to provide a binder in which the parts may be progressively forced closer and closer together and in which separation is prevented. Another object is to provide a binder in which the parts may be forced together irrespective of their relative positions of rotation and in which they automatically resist separation.

Other objects will appear from time to time in the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:—

Figure 1 is a section through a book in which the fastener is used;

Figure 2 is a longitudinal sectional view on an enlarged scale, showing the fastener parts assembled;

Figure 3 is a transverse section taken at line 3—3 of Figure 2;

Figure 4 is an elevation of the inner member of the binder;

Figure 5 is an elevation with parts in section and parts broken away, illustrating a modified form of penetrating member and a modified form of lock upon it;

Figure 6 is a transverse section, taken at line 6—6 of Figure 5, showing the locking member in plan;

Figure 7 is a longitudinal cross section illustrating a modified form of liner;

Figure 8 is a longitudinal section of a modified form of surrounding member;

Figure 9 is a view generally similar to Figures 2 and 5, showing a further modified form.

Like parts are designated by like characters throughout the specification and drawings.

The form illustrated in Figures 1 to 4, inclusive, will be described first.

1 and 2 are backs or covers between which a plurality of sheets 3 may be assembled. The sheets are preferably provided with perforations 4 through which the binder is inserted or within which it is pushed.

The binder comprises inner and outer members. The inner member comprises a shaft 5 to which is preferably fixed an enlarged head 6. At its opposite end the shaft 5 is provided with a reduced portion 7 which, at its outer end, is tapered as at 8 and which is oppositely tapered as at 9, the taper 9 being inclined and reduced in the direction of the main portion of the shaft 5. A flattened or untapered part 10 may or may not be provided between the taper 9 and a shoulder 11, which is formed on the adjacent untapered and unreduced end of the shaft 5.

An engaging member 12 is preferably positioned about the taper 9 and in the form shown the engaging member comprises a spring ring which may be made of wire or other suitable material and has adjacent ends preferably laterally offset as at 13—13. The diameter of the member 12 is such that while it is loose for some slight up and down movement along the taper 9, it will not escape from the taper.

The outer or enclosing portion of the binder comprises a tubular member 14 which may be closed at one end by a rivet-like member 15 having an enlarged head 16. The rivet penetrates into the open end of the member 14 and is riveted, swedged, welded or otherwise permanently fixed to the tubular member 14 so as to close it. For some purposes it may be desired to omit the enclosing member 15, 16 or to alter its shape but ordinarily it is preferable to use it.

At its opposite end the member 14 is slightly inturned as at 17 to retain a coiled wire member 18. This member, in the form shown, is made of relatively thin coiled wire and may be so proportioned that it preferably extends from the inner end of the rivet or closure 15 and abuts against the inturned edges 17 of the tubular member 14, thus forming a continuous series of locking notches or ridges from end to end of the open interior of the tubular member 14. If desired, the interior of this member 14 might be provided with a roughened interior in any desired manner. Where a coiled wire such as the member 18 is used, it will be of such length that when inserted in the member 14 each wire coil is fully in contact with the adjacent coil so that there is substantially no yielding or spring action. Instead of the coiled wire to provide a suitable engaging surface for the interior of the member 14, some other form of insert, roughened on its interior, might be used.

In Figures 5 and 6 a modified form of penetrating or interior member is illustrated. It may be used with any one of the various forms of

surrounding members shown. In the form of Figures 5 and 6 the shaft 5 has a head 6 similar to that shown in Figures 2 and 4 but is otherwise different. It is preferably provided with a reduced portion 19 which has positioned upon it a concavo-convex washer 20. The reduced portion 19 is then riveted over as at 21 in any suitable form to prevent withdrawal of the lock member 20 or to prevent accidental removal. The lock member may be in the form of a spring washer split as at 22 and it is ordinarily so proportioned that there is some separation between the two adjoining ends.

The coiled wire 18 forms in effect a liner inserted and seated within the surrounding member 14 and this liner furnishes a roughened interior to co-operate with either of the locking members such as the spring ring 12 or the washer 20. While a liner of coiled wire is shown, it is merely one of a number of different types of liners which might be used and there is shown in Figure 7 a modified form of liner. As shown it comprises a tube 23, roughened as at 24. The roughening, as there shown, takes the form of grooves or depressions, rolled or pressed into the material of the liner 23. This results in a roughening of the interior. As shown the grooves are not in the form of a thread but they might equally well be so made and any form of grooves, thread or indentations, continuous or discontinuous, may be made in the liner to produce a roughening on its interior.

This liner is inserted into the main outer member 14 and fixed therein in any desired manner. It may be held in place as the coiled liner is, at one end by the inturned edges 17 of the tube 14 and at the other end by the rivet 15. Whatever its form and however it is positioned within the member 14, it serves as a liner which is roughened on its interior for engagement with one or another of the locking means provided on the penetrating member. While in Figures 1 and 7 the liner is shown as a continuous member extending from end to end of the tube 14, it might be discontinuous and a plurality of liners or roughening elements might be inserted.

In Figure 8 the liner has been dispensed with and the outer or main tubular surrounding member is itself so shaped as to provide roughening on its interior. As shown, instead of the tube 14, a tube 25 is used and it is rolled or otherwise deformed to provide corrugations 26. As shown these are a series of ring-like grooves which deform not merely the exterior but the interior of the tube so as to produce roughness on its interior. A rivet 15 with a head 16 is preferably used in this form of the invention just as in the earlier form illustrated in Figures 1 and 2. As in the case of the liner shown in Figure 7, so in the case of the main tube shown in Figure 8, the depressions which produce the interior roughening may be of any shape, being spiral, similar to a thread, or shaped as a series of rings or as a series of depressions of any shape or arrangement.

It will be realized that whereas I have herewith shown and described a practical operative device, nevertheless many changes might be made in the size, shape, number and disposition of parts without departing from the spirit of my invention and I wish, therefore, that my showing be taken as in a sense diagrammatic.

In particular the roughening produced by rolling, pressing, punching or otherwise deforming the main surrounding tube or its liner, may be of any size or shape. Perforations may be used instead of the deformations and if the perforations are of the right size and shape they engage the locking member, either directly by their shape or by inwardly projecting burrs or other parts formed about the perforations.

In the modified form of Fig. 9 an outer tubular member 27 is used. It is preferably reduced at one end as at 28 and as at 28a at the other end, and contains a corrugated or roughened liner 29 which is also reduced as at 30. In this form, as differentiated from the earlier shown forms, the liner extends substantially the full length of the outer tubular member and is in contact with and engages the member 15. The member 15 is notched, corrugated or threaded as at 31 and when the parts are assembled the liner and the outer tubular member are pressed into the notching or threading and to some extent the metal of these parts is deformed so that they are held tightly to the part 15. The member 15 may have a notched or roughened extension 32 or this may be omitted, but however made, a shoulder 37 is formed between the portions 31 and 32 on the plug member 30 and when the outer tubular member and the inner liner are crimped or otherwise pressed against the plug, they conform to it and in particular conform to the shoulder and are themselves shouldered about it as shown particularly in Figure 9.

In the form of the invention shown in Fig. 9, the inner head of the member 5, while generally the same as that shown in Figures 2 and 4, differs in detail from them. The outer end of the member is tapered as at 8, as in the earlier forms. The member is reduced to provide a shoulder 33 and an outwardly flaring inclined portion 34 terminating at a second shoulder 35. Between the inclined portion 34 and the inclined portion 8 may be a flattened portion 36. The ring 12 is positioned about the inclined portion 34 in the same manner as the ring 12 is positioned about the inclined portion 9 in Figures 2 and 4.

In the form of Fig. 9, when any attempt is made to separate the binder, the first effect is to pull out the shaft 5, thus crowding the ring 12 tighter on the inclined portion 34 and forcing the ring tightly into the corrugations of the liner 29. If this is carried to an extreme the ring 12 comes against the shoulder 35 and further movement of the parts is prevented.

The use and operation of my invention are as follows:

When parts are to be fastened together the tubular member 14 is inserted in perforations in the parts until its head, if one is present, bears against the outer surface of the outermost part or one side of the pile. The inner member 5 is then inserted in the tubular portion. As it is driven inward the spring or engaging member 12 contacts the ridged or roughened inner surface of the member 18 and is forced downwardly along the taper 9 until it rests against the shoulder 11. As the member 5 is further driven into the member 14, the spring will be slightly compressed upon itself, and thus it permits further inward movement of the member 5. This movement is continued as far as desired and in the form of the invention shown in Figure 1, will be continued until the head 6 bears against the outermost sheet or cover.

If relative outward separating movement of the parts is attempted or if the springing of the sheets themselves tends to cause such movement, the engaging member 12 remains in engagement with the ridged or roughened interior 18 and as the

member 5 moves outwardly the spring or engaging member 12 then rides upwardly on the taper 9 and so its diameter is increased as it is forced to expand by the taper. Hence instead of permitting separation of the parts, as the pull is increased the engaging member 12 is caused to expand until it achieves a positive lock engaging the coiled wire 18 with a firm grip and entirely preventing separation of the parts.

With the modified form of Figures 7 and 8, the penetrating member of Figures 2 and 4 is used just as described above. When inserted the locking member 12 contacts the roughening in whatever form it may be present, and slides down the inclined part 9 so that it is not in locking contact with the roughening and insertion may be continued. Upon reverse movement of the parts, however, the locking member 12 is moved outwardly along the incline 9 and is forced into locking contact with the roughening and thus separating movement of the penetrating and the receiving parts is prevented.

In the same general manner the locking part as illustrated in Figures 5 and 6 engages the roughening to permit insertion and to prevent withdrawal. While in the form illustrated in Figures 5 and 6 the reduced portion 19 of the member 5 is straight, it might be tapered. Ordinarily the taper is not necessary, due to the shape of the locking member 20. When the parts are inserted the locking member 20 contacts the roughening on its rounded portion. The effect of further insertion is to compress the locking member and to force the adjacent edges toward each other to reduce the width of the split 22. When withdrawal or separation of the parts is attempted the opposite side of the member contacts the roughening and further withdrawing movement tends to spread the member, separating the adjacent edges and increasing the width of the split 22 and so accomplishing the locking and preventing separating movement.

Where a roughened liner such as the coiled wire of Figures 2 and 5 is used and the concavo-convex washer of Figures 5 and 6 is used, it is preferable to bend the washer so that its two edges which bound the split 22 are slightly offset. Thus the periphery of the washer is given a slightly helical shape to correspond to the helical shape of the coiled wire and to insure a uniform engagement between the periphery of the washer and the coiled wire. For some purposes this is not necessary but it insures a more nearly uniform and complete engagement. If the shape of the roughening is not helical, for example as in Figs. 7 and 8, then the washer need not be bent to helical shape. Its ends bounding the split 22 need not be offset.

I claim:

1. In combination in a binder, a tubular member, roughened on its interior, a penetrating member adapted to be moved into the tube and provided with a head having a tapered portion, convergent away from the forward end of said penetrating member, and a split spring ring positioned about the taper, the said ring having a normal size causing it forcibly to contact the roughened interior surface of the tubular member when the penetrating member is inserted therein.

2. In combination in a binder, a tubular member, a coiled wire fixed within it, a penetrating member adapted to be moved into the tube and provided with a head having a tapered portion, convergent away from the forward end of said penetrating member, and a split spring ring positioned about the taper, the said ring contacting the wire when the parts are assembled one within the other.

3. In combination in a binder, a tubular member, a coiled wire within it, extending substantially from end to end of it, a penetrating member adapted to be moved into the tube and provided with a head having a tapered portion, convergent away from the forward end of said penetrating member, and a split spring ring positioned about the taper, the said ring contacting the wire when the parts are assembled one within the other.

4. In combination in a binder, a tubular member, roughened on its interior, a penetrating member adapted to be moved into the tube and provided with a head having a tapered portion, convergent away from the forward end of said penetrating member, a shoulder at the rear end of the taper, and a split spring ring positioned about the taper, the said ring having a normal size causing it forcibly to contact the roughened interior surface of the tubular member when the penetrating member is inserted therein.

5. In combination in a binder, a tubular member, a helical wire fixed within it, a penetrating member adapted to be moved into the tube and provided with a head having a tapered portion, convergent away from the forward end of said penetrating member, a shoulder at the rear end of the taper, and a split spring ring positioned about the taper, the said ring contacting the helical wire when the parts are assembled one within the other.

6. In combination in a binder, a tubular member, a helical wire fixed within it, a penetrating member adapted to be moved into the tube and provided with a head having a tapered portion, convergent away from the forward end of said penetrating member, and a split spring ring positioned about the taper, the said ring contacting the helical wire when the parts are assembled one within the other.

7. In combination in a binder, a tubular member, a helical wire fixed within it, extending substantially from end to end of it, a penetrating member adapted to be moved into the tube and provided with a head having a tapered portion, convergent away from the forward end of said penetrating member, and a split spring ring positioned about the taper, the said ring contacting the helical wire when the parts are assembled one within the other.

8. In combination in a binder, a tubular member roughened on its interior, a penetrating member adapted to be moved into the tube and provided with a head having two tapered portions, one convergent away from the forward end of said penetrating member and the other convergent towards it, and a split spring ring positioned about the first said taper, the said ring having a normal size causing it forcibly to contact the roughened interior surface of the tubular member when the penetrating member is inserted therein.

9. In combination in a binder, a tubular member, a wire coil fixed within it, extending substantially from end to end of it, a penetrating member adapted to be moved into the tube and provided with a reduced head having two tapered portions, one convergent away from the forward end of said penetrating member and the other convergent towards it, a shoulder at the rear end of the first said taper, and a split spring ring positioned about the first said taper, the said

ring contacting the wire coil when the parts are assembled one within the other.

10. In combination in an attaching means, a generally hollow surrounding member and a penetrating member adapted to be moved into said hollow member, a friction liner secured in the interior of the hollow member, said penetrating member having an engaging portion comprising a rearwardly tapered head, an engaging part movably mounted on said head adapted by reason of the taper when the penetrating member is moved into the surrounding member, to be moved to the thinner rear part of the tapered head to prevent locking and when the parts are moved in the opposite direction to be wedged outwardly along the thicker forward part of the taper to be moved into locking contact with said liner.

11. In combination in an attaching means, a generally hollow surrounding member and a penetrating member adapted to be moved into said hollow member, a friction liner secured in the interior of the hollow member, said penetrating member having an engaging portion comprising a rearwardly tapered head, an expansible engaging part movably mounted on said head, adapted by reason of the taper when the penetrating member is moved into the surrounding member, to be moved to the thinner rear part of the tapered head to prevent locking and when the parts are moved in the opposite direction to be wedged outwardly along the thicker forward part of the taper to be expanded into locking contact with the interior of said liner.

12. In combination in an attaching means, a generally hollow surrounding member and a penetrating member adapted to be moved into said hollow member, a friction liner secured in the interior of the hollow member, said penetrating member having an engaging portion comprising a rearwardly tapered head, an engaging part movably mounted on said head, adapted by reason of the taper when the penetrating member is moved into the surrounding member, to be moved to the thinner rear part of the tapered head to prevent locking and when the parts are moved in the opposite direction to be wedged outwardly along the thicker forward part of the taper to be moved into locking contact with the interior of said liner.

13. In combination in an attaching means, a generally hollow surrounding member and a penetrating member adapted to be moved into said hollow member, a friction liner secured in the interior of the hollow member, said penetrating member having an engaging portion comprising a rearwardly tapered head, an engaging part movably mounted on said head adapted by reason of the taper when the penetrating member is moved into the surrounding member, to be moved to the thinner rear part of the tapered head to prevent locking and when the parts are moved in the opposite direction to be wedged outwardly along the thicker forward part of the taper to be expanded into locking contact with said liner.

14. In a binder, a generally hollow member adapted to engage a penetrating member, the hollow member comprising a tubular part, a head closing one end and a coiled wire mounted within and extending substantially throughout the open length of the tubular member.

15. In combination in an attaching means, a generally hollow surrounding member and a penetrating member adapted to be moved into said hollow member, an interiorly roughened sleeve positioned within and lining the interior of the hollow member, an engaging portion on said penetrating member, comprising a rearwardly tapered head and an engaging part movably mounted on it, adapted by reason of the taper when the penetrating member is moved into the surrounding member, to be moved to the thinner rear part of the tapered head to prevent locking and when the parts are moved in the opposite direction to be wedged outwardly along the thicker forward part of the taper to be moved into locking contact with the interior of the sleeve.

16. In combination in a binder, a tubular member, a penetrating member adapted to be moved into the tube, and provided with a head having a tapered portion, converging away from the forward end of the penetrating member and terminating in a rear shoulder, and a split ring positioned about the taper, said ring having a normal size causing it forcibly to contact the interior of the tubular member when the penetrating member is inserted therein.

17. In combination in a binder, a tubular member, a roughened liner positioned within said member, and a head comprising a roughened shaft and a laterally extending portion, the roughened shaft positioned within the liner and the tubular member, the two being pressed into the roughening of the shaft.

18. In combination in a binder, a tubular member, a roughened liner positioned within said member, and a head member comprising a shouldered shaft and a laterally extending head portion, the shouldered shaft positioned within the liner and the tubular member, the two being shaped to conform to it and to its shoulder and being shouldered about its shoulder.

19. In a binder the combination of a tubular metal member of substantially cylindrical form with means for providing a head on one end of said member, a serrated metal lining inside of said tubular member, an inter-connecting headed member having a stem, said stem being provided with an expansible annular member mounted thereon, and said stem having a camming surface adjacent said annular member, said camming surface being formed to permit said annular member to recede from said serrated metal lining when the stem moves into the tubular member and to force the annular member into engagement with said serrated metal lining when the stem moves in the opposite direction.

20. In a binder the combination of a tubular metal member of substantially cylindrical form with means for providing a head on one end of said member, a serrated metal lining inside of said tubular member, an inter-connecting headed member having a stem, said stem being provided with an expansible annular member mounted thereon, and said stem having a camming surface adjacent said annular member, said camming surface being formed to permit said annular member to recede from said serrated metal lining when the stem moves into the tubular member and to force the annular member into engagement with said serrated metal lining when the stem moves in the opposite direction, said means comprising a metal member having a threaded body adapted to be engaged by said serrations and having a head.

21. In a binder the combination of a tubular metal member of substantially cylindrical form with means for providing a head on one end of said member, a serrated metal lining inside of said tubular member, an inter-connecting headed member having a stem, said stem being provided

with an expansible annular member mounted thereon, and said stem having a camming surface adjacent said annular member, said camming surface being formed to permit said annular member to recede from said serrated metal lining when the stem moves into the tubular member and to force the annular member into engagement with said serrated metal lining when the stem moves in the opposite direction, said lining being secured in said tubular member by pinched formations on said tubular member at each end.

22. A binder comprising a tubular member of substantially cylindrical form, a sleeve secured therein formed of relatively light metal and with circumferential grooves formed in the metal of the sleeve, an interconnecting headed member having a stem, and a split ring mounted on the stem, said stem having a camming surface adjacent said annular member adapted to engage the split ring and force same against the grooved surface provided by the sleeve to prevent withdrawal of the headed member after it is inserted in the tubular metal member.

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