Nov. 22, 1955 F. S. SCHADE 2,724,386

LOCK CONSTRUCTION FOR LOOSE LEAF BINDER

Filed Feb. 26, 1953 2 Sheets-Sheet 1

FIG. 1.

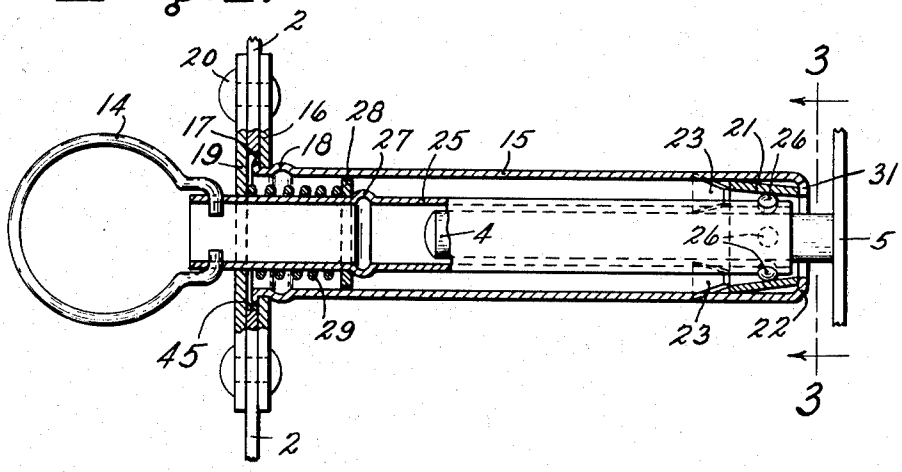


FIG. 3.

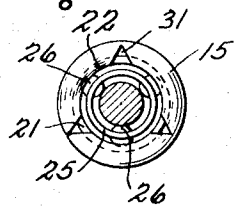
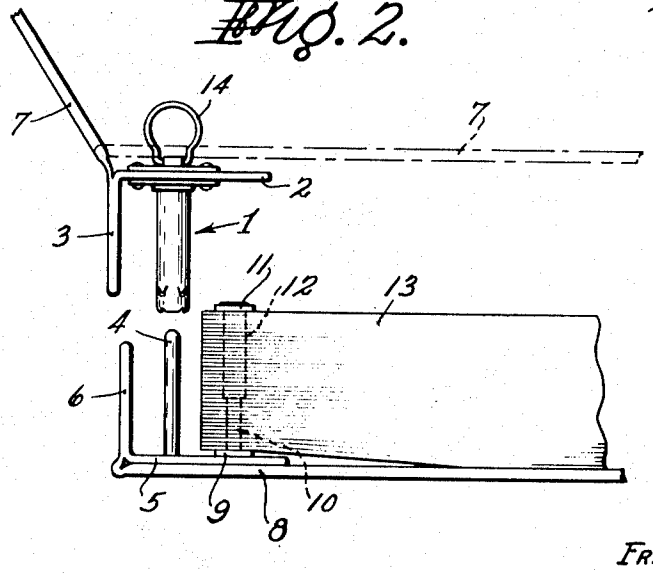


FIG. 2.



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Nov. 22, 1955 F. S. SCHADE 2,724,386

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Filed Feb. 26, 1953 2 Sheets-Sheet 2

Fig. 4.

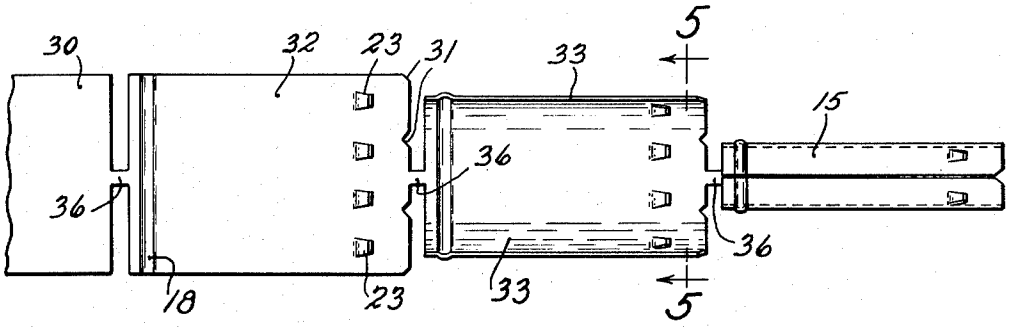


Fig. 5.

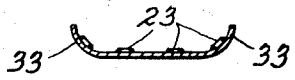


Fig. 6.

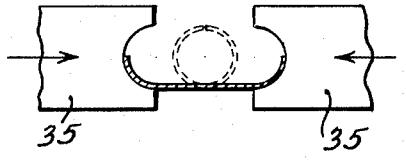


Fig. 7.

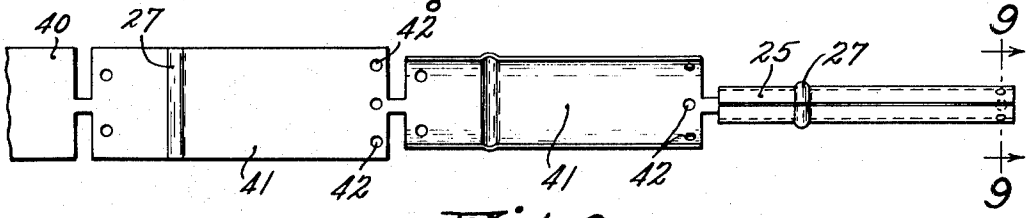


Fig. 8.

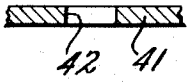


Fig. 9.

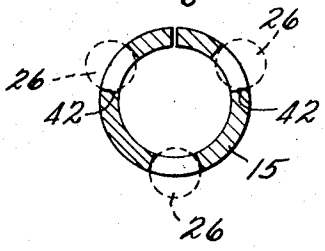
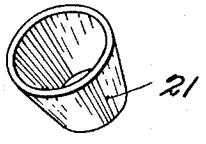


Fig. 10.



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LOCK CONSTRUCTION FOR LOOSE LEAF BINDER

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Application February 26, 1953, Serial No. 339,068
1 Claim. (Cl. 129—13)

This invention relates to improvements in a loose leaf binder lock construction of the type adapted to releasably hold the covers of a binder as in certain types of post binders. Examples of the type of binder and particular socket lock construction with which the present invention is concerned may be seen in Patent No. 1,869,790, dated August 2, 1932, and in Patent No. 2,308,363, dated January 12, 1943.

As shown by the said patents a ball wedging clutch device is mounted in fixed relation to one cover of a binder and is employed to releasably grip an elongated post oppositely fixed to the other cover whenever the post is inserted in the device. The lock is tubular in form having a cylindrical casing provided at its outer end with a conical wedge shaped interior wall portion. In the casing a tubular ball carrier is slidably retained with a plurality of balls circumferentially arranged and carried by the walls of the carrier adjacent the wedge shaped portion. The carrier is spring pressed outwardly toward the wedge portion and thus the balls are wedged inwardly of the carrier wall. The post of the opposite cover of the binder is received in telescopic relation by the tubular carrier, automatically pushing the balls apart and the carrier inwardly against the action of the spring. Withdrawal of the post in the opposite direction is resisted by the wedging action of the balls against the post to lock the same in the socket. Unless the carrier is lifted away from the wedging surface to permit the balls to loosen their grip on the post the carrier will maintain the locked condition.

An object of the present invention is to provide a novel construction of this type of locking means which is not only rugged and durable while of considerably lighter construction but is also considerably cheaper in construction and adapted to effect substantial economies in methods of manufacture.

Another object of the invention is to provide a socket lock construction which incorporates a separate wedging element secured within the tubular casing in which the ball carrier is movable.

Still another object is to provide improved methods of manufacture of the socket lock and parts thereof and in this connection the preferred method of making the assembly will be fully disclosed.

These and other objects and advantages will be apparent from the following description together with the accompanying drawings, in which:

Fig. 1 is a sectional view of the new socket lock construction with post inserted;

Fig. 2 is a side view of a binder assembly with the top and bottom covers in separated position;

Fig. 3 is a view on line 3—3 of Fig. 1;

Fig. 4 is a plan view showing the preferred steps in the formation of the tubular casing of the lock;

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

Fig. 6 is a sectional view similar to Fig. 5 showing dies to complete the tubular formation of the casing;

Fig. 7 is a view similar to Fig. 4 showing steps in the formation of the ball carrier;

Figs. 8 and 9 are enlarged sections to show detail of the ball carrier construction; and

Fig. 10 is an enlarged view of the separate wedge element.

Referring to Fig. 2 for the operation of the socket lock in the binder, the lock assembly 1 as a unit is fixed to a horizontal flange 2 of an upper binder back section 3. The

post 4 is fixed to a horizontal flange 5 of lower back section 6. Upper cover 7 is hingedly secured to the back section 3 and lower cover 8 is similarly secured to section 6. The covers 7 and 8 may be swung to open or closed binder position as will be readily understood, the particular hinge construction being for purposes of illustration only.

On lower horizontal flange 5 inwardly of post 4 is a filler pack bar 9 secured thereto and from which spaced binder posts extend as the single post indicated at 10. A removable bar 11 with socket posts 12 spaced similarly to posts 10 is provided for telescopic relation with posts 10 with the filler pack 13 of loose leaf sheets held between the bars.

In locked condition the socket lock 1 is telescopically received on locking post 4 and the back sections 3 and 6 are held against separation by the locking mechanism gripping the post as will be more specifically described. The flange 2 overlies the removable bar 11 holding the posts 10 and 12 bound together with the sheets of the filler pack threaded on the posts. For removal of the loose leaf pages the handle 14 of the lock mechanism is pulled upwardly loosening the grip of the lock on the post. The lock thus releases the post permitting withdrawal of flange 2. The bar 11 with posts 12 can then be removed for insertion or removal of separate pages. The operation of this type of binder and the various forms of the same are well known to those in the trade.

Details of the new lock mechanism may be seen by the sectional view of Fig. 1. An outer tubular casing 15 is secured at its inner end in an opening of a small mounting plate 16. The inner end of the tube is turned over the edges of the opening as at 17 and the plate is held between the turned edges 17 and an annular bead or rib 18 spaced from said edges. This holds the plate in rigid relation with casing 15. Plate 16 and a plate 19 are secured with the flange 2 therebetween as by rivets as at 20 and the assembly of the lock is thus affixed to flange 2.

At the outer end of the casing a frusto-conical wedge shaped element 21 is held interiorly at said end. The narrowed portion of the wedge is at the entrance to the casing. The open end of the casing is restricted by lips inwardly turned at 22 to provide an outer retaining edge for wedge 21. The wedge 21 is held between these lips and a plurality of circumferentially spaced tongues 23 spaced from the end and turned inwardly to form a seat for the larger end of the wedge.

Longitudinally disposed in the tube 15 is the post receiving socketed ball carrier 25. The carrier at the inner end of the tube projects through an opening in plate 19 and is provided with opposite holes to receive the inwardly directed ends of the handle 14. At its other end a series of circumferentially spaced openings are provided. In each is carried a ball 26. The balls 26 have a greater diameter than the thickness of the carrier wall and accordingly extend both inwardly and outwardly thereof. The balls provide the lock connection between the post 4 and the surface of the conical wedge 21 when the post is inserted. The carrier is normally spring pressed towards the outer end of the casing with the balls inwardly cammed by the wedge surface to grip a post 4 against withdrawal from its socket. The manual lifting of the carrier 25 by handle 14 releases wedging pressure against the balls and permits the post to slide freely in the socket for removal therefrom.

Spaced from the inner end of the carrier 25 is an annular bead or rib 27 against which a washer 28 is seated to provide an abutment for a compression spring 29. Spring 29 is compressed between the washer and the inner side of plate 19 so that the ball carrier is normally biased toward locking position with the balls 26 cammed by the wedge element 21.

It is to be noted that the construction of the lock device

as described in connection with Fig. 1 may be manufactured by simplified and novel methods and since it is one of the primary objects of this invention to produce a more economical structure, a preferred method of making the mechanism will be described in detail and the various improvements discussed.

In Figs. 4, 5 and 6 steps in making the tubular casing **15** of Fig. 1 are shown. This part in separate form before assembly is shown at the right of Fig. 4. It will be noted the tube has been shaped from a piece of flat sheet metal stock as from a flat band **30** of indefinite length shown at the left of Fig. 4. The initial operation on the band is a blanking and stamping step. The band is cut to length, the bead or rib **18** is stamped, the tongues **23** are pierced and bent, and a series of nicks **31** are cut at the forward edge of the blank. The flat blank at this stage is identified by the numeral **32**. The next operation is a partial bending of the edges toward a cylindrical form. In section the blank after this step is indicated in Fig. 5 and shows the edges as at **33** partially turned toward each other. The final formation to tubular shape and the turning of opposite side edges **33** together is shown by Fig. 6. As shown the partially turned edges of the blank are received in the semi-cylindrical faces of forming dies **35**. The dies are brought together pressing the two sides of the blank into the cylinder indicated in dotted line position. As the formation of the tube **15** is preferably accomplished in step by step formation at successive work stations the blanks are connected by tabs as at **36**, the casing tube **15** being cut off after it leaves the dies **35**.

The ball carrier **25** is preferably formed in a similar manner as in Fig. 7 from a flat band **40** of strip stock. The stamped and punched blank for this part is shown at **41**. It is of a width suitable for the desired circumference of the carrier which is shown in cylindrical form at the right of Fig. 7.

It is to be noted as shown by the enlarged section of Fig. 8 that openings **42** for reception of the balls **26** in the finished assembly can be straight punched holes formed at the same time rib **27** is impressed in blank **41**. When turned to tubular form the walls of the carrier are brought from the flat into cylindrical form. In bending said walls the metal of the outside surface is stretched and that of the inner surface is slightly contracted. As a result the edges of the openings **42**, as may be seen by the enlarged view of Fig. 9, are flared at the outer carrier wall and constricted at the inner carrier wall. Thus when assembled as in Fig. 1 the balls **26** are free for movement outwardly of the carrier wall but are prevented from falling inwardly thereof when the post is removed from the socket.

The conical wedge **21** shown by Fig. 10 is a piece of hardened sheet steel preferably of high carbon content. It is formed by deep drawing of a piece of flat metal stock into cup shape and punching out the bottom of the cup. The wedge element **21** because of its function in locking the balls against the post is the only part of the mechanism which requires a hardening treatment.

In assembling the parts formed as described the casing **15** is fitted with wedge **21** by inserting the wedge in the open end thereof and seating it against the tongues **23**. The lip portions at **22** are then bent inwardly against the narrow end of the wedge to form a retaining shelf for the same. It will be seen that the nicks at **31** are provided to allow the deformation of such end edge portions and as shown by Fig. 3 with the opening of the tube **15** restricted to hold the wedge and center a post **4** for insertion in the end of the carrier.

The assembly of Fig. 1 is completed by affixing plate **16** to the inner end of the casing **15**, placing the plate against the underside of flange **2** and inserting the subassembly of a ball carrier with balls **26**, washer **28**, spring **29**, plate **19** and handle **14** into position. The plates **19** and **16** embrace the flange to center the carrier end portion in the opening **45** of the flange and the rivets **20** are suitably fixed to hold the assembly rigid with the flange.

A durable socket lock construction is thus provided by forming the majority of parts from ordinary sheet metal stock and without the necessity of comparatively expensive grinding and machining operations on any of such parts. The assembly is thus more easily made and handled and the construction is of considerably lighter weight in the finished article.

In providing the encasement of the separate wedging element **21**, which as previously described is the only part requiring special hardening treatment, the need for providing a hardened end piece to be threaded on the tube, or in the alternative hardening the entire casing tube, is eliminated. Devices now on the market are provided with threaded end pieces as in the Patent No. 2,308,363 above referred to. The improved construction of the present disclosure in addition to eliminating such comparatively expensive threading operations, also eliminates any need to provide against accidental separation of a wedge element from the assembly when the binder is being subjected to long hard use.

What is claimed is:

In loose leaf binder mechanism having a pair of cover portions with a locking post extending from one of said portions and a releaseable locking member extending from the other portion for telescopically receiving said post and for locking engagement therewith, said locking member including an outer tubular casing and in slidable relation therewith a movable inner tubular ball carrier having a post receiving socket with a plurality of balls mounted in the wall of said carrier adjacent the post receiving end of said socket and casing, for wedging engagement with a conical wedge surface encircling said carrier adjacent said balls and movement inwardly of the inner socket wall in rolling contact with said post on inward movement of the post into the socket and for wedging contact with the post on movement of the post outwardly of the socket, and yieldable means normally urging said carrier for wedging said balls inwardly of the socket wall; that improvement which comprises said outer tubular casing being of sheet metal having a wall of uniform thickness throughout its length and, open at each end with its side wall split longitudinally thereof, said inner tubular ball carrier being similarly formed of sheet metal of uniform wall thickness, and a hardened steel wedge element of frusto-conical form having a wall of uniform thickness and positioned at the post receiving end of said outer casing to supply said conical wedge surface, said tubular outer casing at its post receiving end having integrally deformed and inwardly directed flanged lips engaging the end edges of the reduced end of said element, and spaced inwardly of said lips circumferentially arranged spaced tongue members deformed from the metal of the casing inwardly of the inner wall thereof engaging the edges of said element at the enlarged end thereof and seating said wedge element wholly within said tubular casing for operative engagement with the balls of said carrier tube inwardly adjacent said post receiving end, the end of said carrier tube, in wedged position of the balls lying inwardly of said post receiving end of the outer casing.

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