Feb. 14, 1939. A. J. SCHOLTES 2,147,357

MULTIPLE DISK EXPANSION ANCHOR

Filed July 22, 1938 2 Sheets-Sheet 1

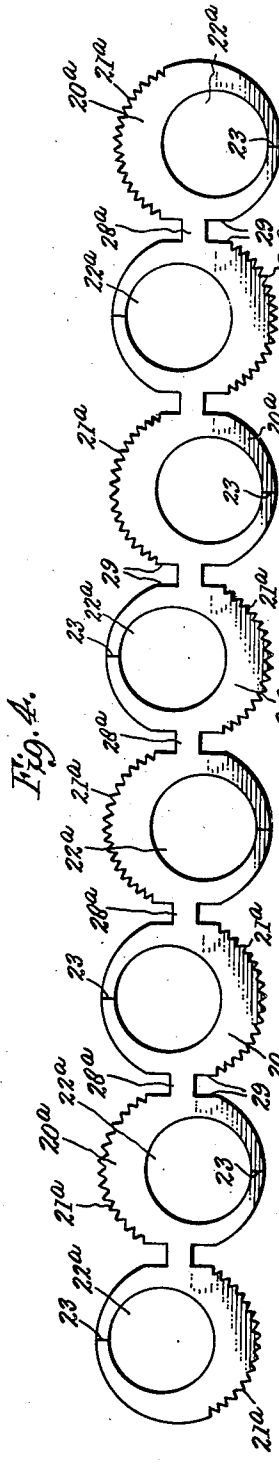

Fig. 4.

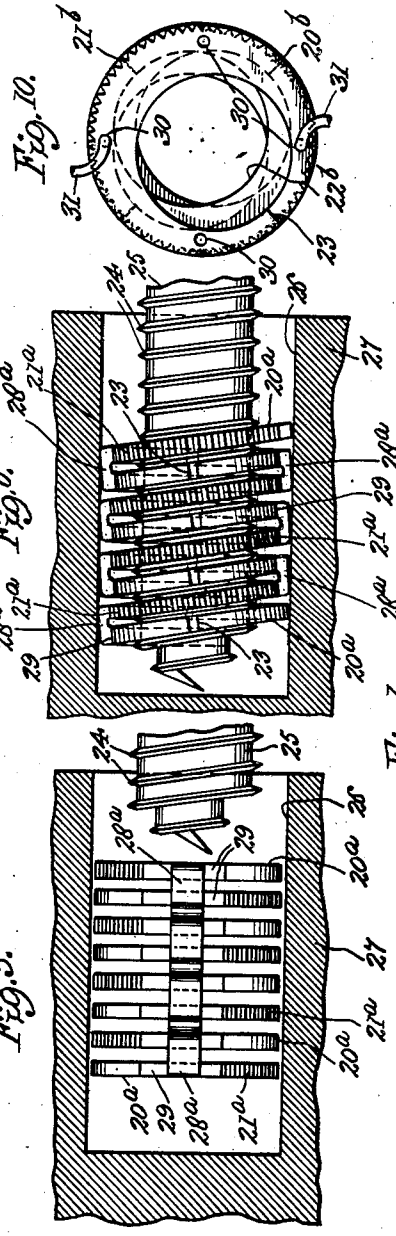

Fig. 5.

Fig. 6.

Fig. 10.

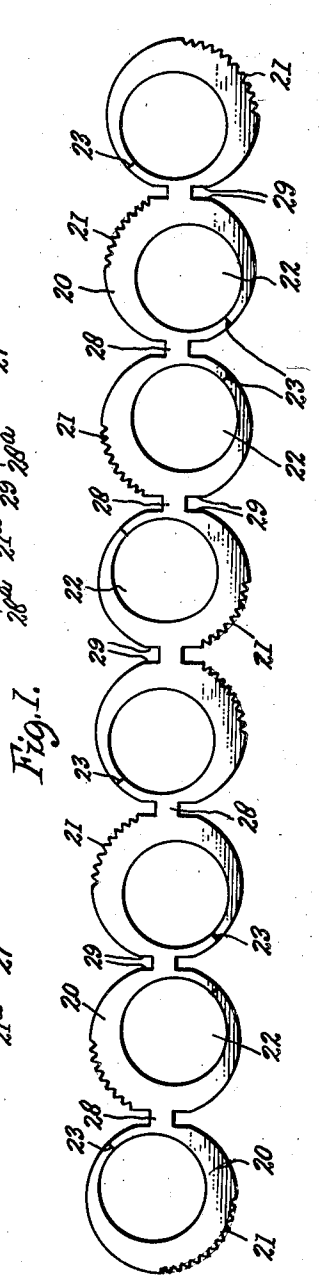

Fig. 7.

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Feb. 14, 1939. A. J. SCHOLTES 2,147,357

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Filed July 22, 1938 2 Sheets-Sheet 2

Fig. 7.

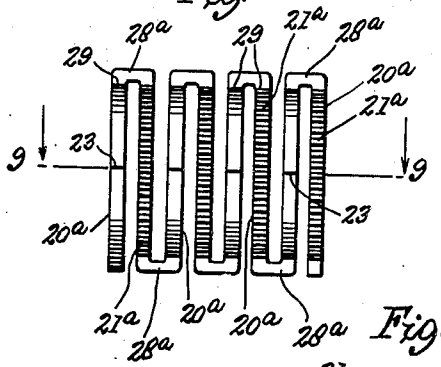


Fig. 8.

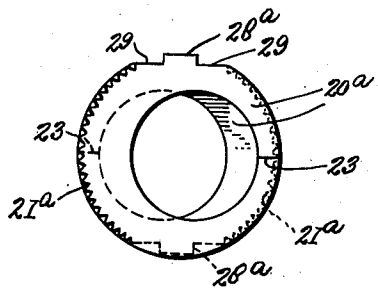


Fig. 2.

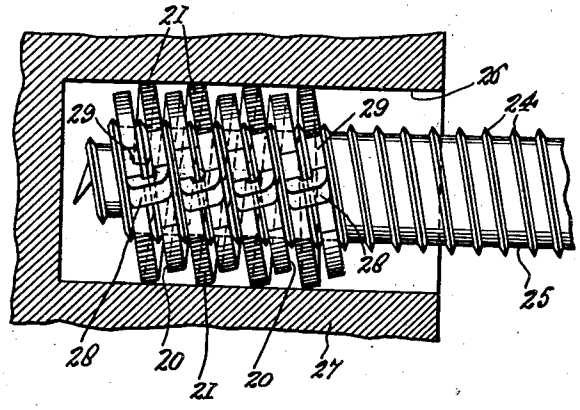


Fig. 9.

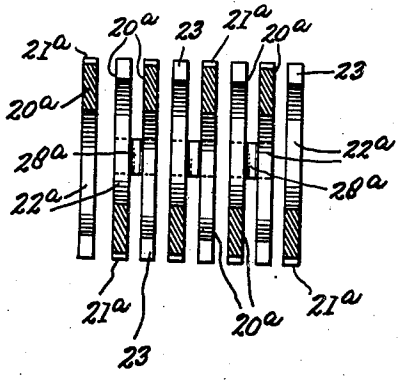
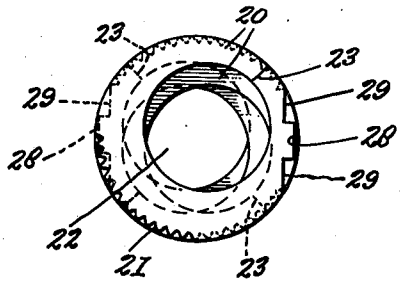


Fig. 3.



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MULTIPLE DISK EXPANSION ANCHOR

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Application July 22, 1938, Serial No. 220,825

9 Claims. (Cl. 85—2.4)

The present invention relates to screw or bolt anchors, and more particularly to an improved construction of expansion shield for use with lag screws or the like to hold the screws firmly in openings in masonry and like building structures, and to form a metal thread in wood structures, especially in the manufacture of furniture.

An object of the present invention is to provide an expansion anchor or shield of this type which may be constructed of sheet metal disks capable of econmical manufacture, which will not easily break, and which may be made in desired lengths and is susceptible of various adjustments or modified constructions to adapt the shield to various conditions met with in the mounting of lag screws and the like in the faces of walls.

Another object of the invention is to provide an expansion shield or anchor of this type which may be constructed from a single blank stamped with relatively movable portions initially held together in substantially cylindrical form for insertion in a hole or opening in the face of a wall and wherein the sections are adapted to be eccentrically displaced by the insertion of a lag screw or the like for expanding the device against the walls of the hole and thus firmly bind and wedge the lag screw in the hole in the wall.

One of the objects of this invention is to provide an anchor for lag screws used in the manufacture of furniture, an instance of which being the securing of table legs to the frame of the table without the use of nuts and the usual cross boring to accommodate the nuts. The anchor of this invention after once being expanded into the wood remains as a part of the wood structure and performs the same function as the nut but without its disadvantages.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a plan view of one form of blank from which one form of the expansion shield or anchor may be constructed, the form providing sections expanding from at least four sides of the shield.

Figure 2 is a side elevation of the shield constructed from the blank of Figure 1 disposed in an opening and having a lag screw mounted therein.

Figure 3 is an end elevation of the shield or anchor prior to insertion of the lag screw.

Figure 4 is a plan view of a modified form of blank from which a modified form of the expansion shield or anchor may be constructed, and wherein the shield expands at diametrically opposed points.

Figure 5 is a side-elevation of the modified form of the expansion shield constructed from the blank in Figure 4 and inserted in a hole, showing the end of a lag screw about to enter the shield.

Figure 6 is a like view but taken axially at right angles to the showing in Figure 5, the lag screw being engaged in the shield and the latter expanded against the wall of the opening.

Figure 7 is a detail side elevation of the modified form of the expansion shield or anchor taken in initial position ready for insertion in the hole, the view being taken at the same axial angle as shown in Figure 6.

Figure 8 is an end elevation of the expansion shield shown in Figure 7 prior to expansion of the sections.

Figure 9 is a longitudinal section taken through the modified shield or anchor on the line 9—9 of Figure 7, and

Figure 10 is an end elevation of another modified form of shield or anchor constructed of a plurality of independent disks wired together in desired axially angular positions.

Referring now to the drawings and first to the form of the invention shown in Figures 1, 2 and 3, the expansion shield or anchor comprises a plurality of disk sections 20 provided at one side with peripheral teeth or serrations 21 adapted to form a suitable gripping surface for the peripheral edge of the disk. Opposite the serrated peripheral section 21, each disk 20 is provided with an oppositely and diametrically offset central opening or aperture 22 so that each disk 20 is provided with a relatively wide side portion supporting the serrated face 21 and a relatively narrow opposite portion defining the opposite side of the opening 22. This narrow portion of the disk may be slitted as at 23 to permit the adjacent or abutting ends of the ring shaped disk to twist into offset relation as the inner marginal edge of the opening 22 follows the bottom of the thread 24 of a lag screw 25 or the like, as shown to advantage in Figure 2. The slit or cut 23 of the disk also admits of the expansion of the latter as the lag screw 25 advances through the disk so that the disk may engage snugly about and bind upon the surface portion of the lag screw 25 between the threads 24 thereof.

The disks 20 are adapted to be assembled together to form the shield or anchor, and in such relation that the serrated peripheral or gripping portions 21 of the disk are disposed substantially uniformly about the anchor, or in other desired axially angular relation to effect a gripping or binding of the shield against the wall 26 of an opening in a masonry structure 27, as shown in Figure 2, to afford a firm grip or anchorage of the

shield in the opening, and for thus supporting rigidly against axial strain the lag screw **25**, or the like.

In one form of the invention, shown in Figures 1, 2 and 3, the disks **20** are of desired number and are stamped into a single blank with the disks **20** disposed axially in sequence with respect to their gripping edges or surfaces **21**, and the disks are connected together in such series arrangement by reduced neck or connecting portions **28** integral with the adjacent disks and extending between the adjacent edges thereof. It will be noted that the disks **20** are cut away as at **29** at opposite sides of the neck portions **28**, and the neck portions are adapted to be bent at substantially right angles at the opposite ends thereof on the lines of the shoulders **29** so that the necks when bent do not project beyond the edges of the circles of the outer edges of the disks, as shown in Figure 3, and so as to hold the disks together as a unit. The neck portions **28** are also given desired length so as to space the disks **20** apart when folded into the form of a shield, and such spacing is adapted to conform substantially to the lead of the thread **24** of the lag screw. As will be noted from comparing Figures 2 and 3, the disks **20** are bent back and forth on their connecting portions **28** throughout the series of disks to provide an anchor or shield of desired length, and of course the shield may be reduced in length or size by sheering off one of the neck portions **28** at the desired point so as to leave a desired number of the disks **20** in the shield structure.

These connecting or neck portions **28** are of sufficient width to inherently maintain the disks **20** in their normal positions ready for use and at the same time not to offer resistance to the required deformation incident to the relative radial movements of the disks when operated by the lag screw to lock or clamp the shield against the wall **26** of the opening.

As the openings **22** in the disk are offset with respect to the axis of the disk, the group of disks when assembled present a series of angularly offset openings **22**, as shown in Figure 3, but with sufficient space through the axis of the shield for the introduction and reception of the forward end of the lag screw **25**.

With reference to Figure 2, in use, it is only necessary to freely insert a shield or anchor of this construction within an opening in the face of a wall **27**, and then to introduce the lag screw **25**. The forward end of the lag screw, being reduced in diameter, engages in the axial opening in the shield and, as the lag screw is turned, the threads **24** thereof engage and take into the spaces between the disks **20**. The inner marginal edges of the disks engage in the throats or bottoms of the threads **24**, as shown in Figure 2, so that the lag screw when turned is advanced inwardly through the shield and at the same time the disks **20** are moved consecutively in the directions of their gripping edges **21** against the sides of the wall **26**, depending upon the direction of offset of the openings **22**. The result is that the gripping peripheral surfaces **21** of the disks engage and embed in the surfaces of the sides of the wall **26** and the shield is thus firmly bound and locked in the opening of the wall **27**. The larger the number of disks **20** employed, the greater will be the holding strength of the shield or anchor and the disks **20** are disposed relatively close together so that there will be no tendency for the canting or distortion of the lag screw **25** during its threading into the shield and when under supporting strain.

The gripping surfaces or edges **21** may be of any desired circumferential length so as to more or less extend continuously around the anchor, and depending upon the number of the disks **20** in the anchor to obtain the required holding and supporting grip against the wall **26** of the opening.

Referring now to the modified form of the invention shown in Figures 4 to 9, the disks **20a** are of substantially the same construction as the disks **20** with the exception that the serrated or gripping surface edges **21a** thereof are circumferentially longer than the corresponding edges **21** of the disks **20**. The gripping surfaces **21a** extend about substantially one-half of the disks **20a**. The disks **20a** are adapted to be spaced apart angularly, with respect to the axis of the shield, approximately half a turn or 180 degrees apart, so that when the shield is expanded the gripping surfaces **21a** will engage against the inner wall **26** of the opening at substantially opposite points and alternately throughout the row of disks. This insures a firm and stead grip of the anchor or shield within the wall opening.

As shown in Figure 4, the disks **20a** are connected in series by the connecting or neck portions **28a** and the gripping surfaces **21a** are spaced circumferentially about the shield at substantially 180 degrees apart so that the combined surfaces **21a** provide a substantially continuous spiral toothed or serrated gripping thread at the exterior of the shield to engage substantially continuously in spiral form with the inner wall **26** of the opening.

Each disk **20a** is provided with a central opening **22a** which is offset from the axis of the disk diametrically opposite to the respective gripping surface **21a** so that as the lag screw **25** is fed or turned up through the modified form of shield, the disks **20a** are shifted radially with respect to their openings **22a** for concentrically aligning the latter upon the lag screw and projecting their gripping surfces **21a** radially in the directions determined by the positions of the respective disks **20a** in the shield structure.

It is apparent that any suitable number of the disks **20** and **20a** may be employed and that the respective gripping surfaces **21** and **21a** thereof may be of any desired circumferential length and may be located in any relative position about the disks to afford the desired number of gripping points about the shield. In all forms of the invention the shield may be made up of any number of the disks according to the depth of the hole in the wall **27**, and in accordance with the weight to be sustained upon the lag screw **25**.

In Figure 10 is shown an end elevation of another modified form of shield or anchor which is made up of a plurality of similarly constructed disks **20b**. Each disk **20b** is provided at one outer peripheral side with a gripping surface **21b** of desired circumferential length. The disk **20b** is provided with a central opening **22b** which is offset diametrically from the gripping surface **21b** to the desired extent, depending upon the radial distance through which the disk is to be displaced in tightening up the anchor or shield, similar to the constructions of Figures 1 and 4. Each disk **20b** is provided with four transverse openings **30** which are spaced at ninety degrees apart and are adapted to be registered in different combinations, similar to the combination formed by the shield in Figure 9, as the disks are angularly off-

set about the axis of the shield to the desired extent. Two wires **31** are threaded through two of the opposed openings **30** diametrically opposed to each other for holding the disks yieldingly in line and the wires **31** have the same function in holding the disks together as the neck portions **28** and **28a** of the invention, and admit of the radial displacement or movement of the disks when the lag screw **25** is turned into the anchor. Of course any other suitable means may be employed for yieldingly holding the disks in initial position so as to build up an anchor or shield of desired length and which admits of the relative movement in radial directions of the disks under action of the lag screw.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What is claimed is:

1. An expansion anchor for lag screws, comprising a plurality of disks, each disk having an eccentric opening therethrough and a peripheral gripping edge at the wider side of the disk opposite the opening, said disks adapted to be placed in a wall opening with the wider sides of the disks spaced about the wall of the opening and adapted to receive a lag screw through their central openings, whereby the lag screw is adapted to axially aline the openings and radially shift the disks to bind the gripping edges of the disks against the wall of the opening.

2. A multiple disk expansion device comprising a plurality of aligned disks adapted for insertion in an opening of a support, each disk having an eccentric opening therein, means for yieldingly retaining said disks in superposed aligned relation with the centers of their respective openings disposed in relative axially angular offset relation to provide a relatively small axial opening through the device and dispose the wider sides of the disks in spaced relation about the wall of the opening, said device adapted to receive a stem with a tapered portion in said axial opening for aligning the openings of the disks about the stem and edgewise displacing said disks to bind the wider sides of the same between the wall of the opening in the support and said stem.

3. A lag screw anchor, comprising a plurality of disks, each disk having a gripping edge at one side and an eccentric opening near its opposite side diametrically opposite the gripping edge, retaining means for holding the discs in predetermined relative axially angular relation to dispose the wider sides with the gripping edges spaced about the periphery of the anchor, said disks adapted to receive a lag screw through the eccentric openings to align the latter about the lag screw and radially shift the disks for projecting the gripping edges to bind in an opening of a support.

4. A lag screw anchor comprising a blank composed of a series of disks interconnected with neck portions bent at opposite ends in opposite directions to dispose the disks in spaced apart superposed relation, said disks having gripping edges consecutively at opposite sides and having eccentric openings disposed opposite to the gripping portions, whereby introduction of a lag screw through the openings in the disks is adapted to align the openings and radially project the gripping edges of the disks in opposite directions throughout the series of disks for expanding the same in the opening in a support.

5. A lag screw anchor comprising a blank composed of a series of disks interconnected by neck portions, said blank being bent upon the neck portions to overturn the disks consecutively and reversely one upon the other throughout the series and provide a cylindrical structure for insertion in the opening in a support, each disk having a peripheral gripping edge and an opening through the disk diametrically opposite the edge, whereby threading of a lag screw through the openings of the disks is adapted to align the openings about the lag screw and radially project the wider sides of said disks in the direction of their gripping edges for projecting the latter against the wall of the support opening.

6. A lag screw anchor comprising a plurality of disks, each disk having a gripping edge at one side and an eccentric opening toward its opposite side and provided with equally distanced spaced apart small openings concentrically disposed with respect to the axis of the disk, said disks adapted to be superposed in predetermined axially angular relation to dispose the gripping edges about the sides of the anchor, and retaining means threaded through some of the aligned small openings of the disks to hold the same in assembled relation, said disks adapted to receive a lag screw through the eccentric openings thereof for aligning the openings and radially shifting the disks to project the gripping edges thereof beyond the surface of the anchor.

7. A multiple disk expansion and contraction device for exerting radial pressure upon two coaxial objects, comprising a plurality of interconnected and axially aligned disks for positioning within the outer one of said coaxial objects, each disk having an eccentric opening therethrough for the reception of the inner one of said coaxial objects, whereby force applied radially upon the disks by said objects effects independent radial movements of the disks in the directions of their wider sides and causes the device to expand against the outer object and to contract upon the inner object.

8. An anchor for a lag screw, comprising a plurality of disks adapted to be placed in a support opening, each disk having a centrally offset opening therethrough of a diameter to threadedly receive a lag screw and having a gripping peripheral edge at its wider portion diametrically opposite the opening, said disks being disposed with their wider portions spaced about the axis of the anchor whereby the lag screw in passing through the disk openings is adapted to aline the openings and radially shift the disks to project the gripping edges thereof against the sides of the wall of the opening.

9. An anchor for a lag screw, comprising a plurality of disks each having an eccentric opening therethrough and a gripping edge at its wider side, means for holding the disks in alinement as a unit with their wider sides spaced about the axis of the anchor for insertion in an opening in a support, said disks adapted to receive a lag screw through the openings therein for axially aligning the disk openings and radially shifting the disks into offset relation to one another to bind the gripping edges against the wall of the support opening.

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