

Mar. 6, 1923.

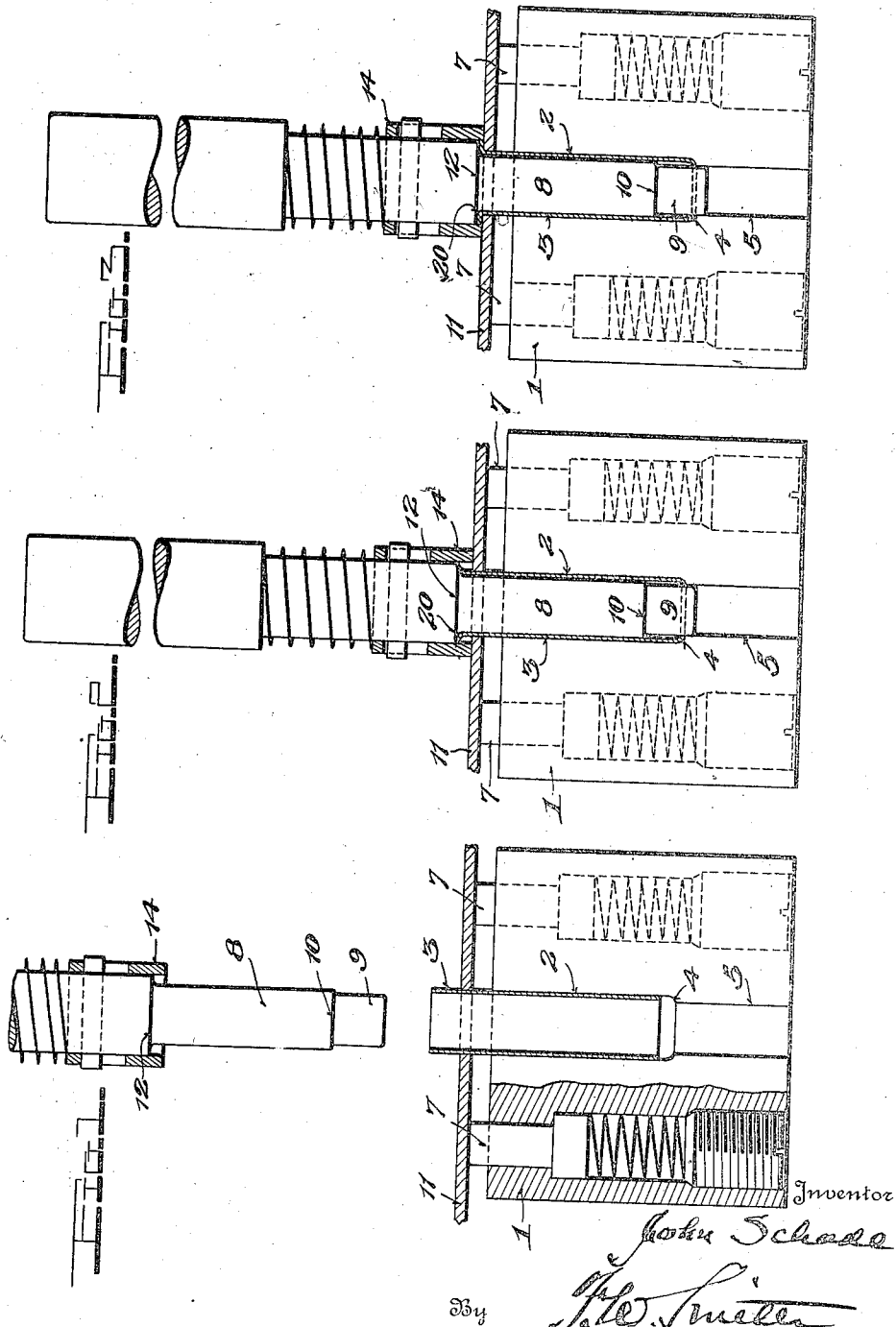
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1,447,520

FASTENING TUBULAR POSTS TO LOOSE LEAF LEDGERS

Filed Jan. 28, 1922

2 sheets-sheet 1



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UNITED STATES PATENT OFFICE.

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FASTENING TUBULAR POSTS TO LOOSE-LEAF LEDGERS.

Application filed January 28, 1922. Serial No. 532,418.

To all whom it may concern:

Be it known that I, JOHN SCHADE, a citizen of the United States, residing at the city of Holyoke, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Fastening Tubular Posts to Loose-Leaf Ledgers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain new and useful improvements in method of and means for fastening tubes, and pertains more particularly to means for securing the ends of the telescoping tubular parts to the two sides of loose ledgers, which parts are secured at their inner ends to the side plates of the ledger sections and are for the accommodation of the loose leaves.

These tubes are so thin that they have heretofore been secured with great difficulty, since the common method employed has been to turn a shoulder on the end of the tube which is then fitted in a hole in the side plate and finally spun or riveted, but the great objection to this method is that the shoulder must be very small and the tube necessarily is very thin and consequently weak at the point of fastening. This usual method of securing the tube has resulted in a large percentage of breakage, and also necessitates a milling operation for the purpose of forming the shoulder aforementioned.

The primary object of the present invention is to overcome all of the above objections, and to provide a means of fastening, which not only avoids weakening of the tubes resultant from the milling operation, but on the contrary strengthens same at the point of fastening.

The invention further aims to provide means and a method which can be expeditiously practiced and which avoids a separate operation on the tube, as instanced by the milling operation above noted.

In the drawings:

Figure 1, is a side elevation of the die, and punch, parts being broken away and in section and showing a blank in the die and in the side plate of a ledger side section at the first step or stage of the operation;

Figure 2, is a like view at the second stage of the operation;

Figure 3, is a like view at the third stage of the operation;

Figure 4, is a like view of the final operation;

Figure 5, is a view similar to Figure 4 of a tube having a squared end as distinguished from the rounded ends of Figures 1 to 4, and

Figure 6, is a top plan view of the die.

In proceeding in accordance with the present invention, a die 1 is employed having a chamber 2 for receiving the blank 3, the chamber having a rounded shoulder 4 and a reduced lower part 5, the die being made in two separable parts or sections as depicted in Figure 6. Each die part or section is equipped with spring pressed plunger 7 for a purpose later to be described. A punch 8 formed for attachment to a power press (not shown) is employed and has a reduced lower end 9 forming a shoulder 10, and also has a rounded shoulder 12 located at the upper end of the punch, a spring tensioned retaining ring 14 surrounding the shoulder 12.

The blank 3 as illustrated in Figure 1, is cut to the desired length from ordinary metal tubing and is placed in the die in the position depicted in Figure 1, and projects through an aperture provided therefor in a side plate 11 of one of the ledger sections. The press is then operated to lower the punch within the blank, and since the latter necessarily follows the path of least resistance, its lower end will engage the shoulder 4 and be rounded or curved thereby as shown in Figure 2. When the press has descended sufficiently to perform this operation, the upper end of the tube or blank meets resistance by abutting against the upper shoulder 12 of the punch, which upon continued operation of the press, flares or curves the upper end of the tube outwardly as depicted in Figure 2, wherein it will be noted that the peripheral edge of the curved or flared end 20 is engaged with the inner circumference of the retaining ring 14 and is prevented from having further movement thereby. Upon the application of further pressure the end 20 of the tube is then moved into approximate right angular posi-

tion and is forced against the side plate 11 as depicted in Figure 3. In the above described operations, it will be seen that the reduced end 9 passes below the shoulder 4 of the die and below the lower end of the blank and acts to limit the inward movement of the lower end of the blank when the latter is being rounded. Upon additional pressure of the press, the only part of the blank which is unconfined or can give is that part between the upper face of the die and the lower or under face of the side plate 11, the recited additional pressure effecting doubling of the blank upon itself in an outward direction at 22, due to the punch 8 occupying or filling the adjacent part of the tube interior and accordingly preventing inward movement of the blank. It will thus be seen that the doubled part 22 forms a thick and practically solid flange that frictionally engages the side plate 11 with the result that the flanges 20 and 22 act to clampingly engage the side plate 11 therebetween and thus secure the tubes firmly and rigidly to the plate. It is particularly to be noted that the tube is also materially strengthened and reinforced since the flanges 20 and 22 are not only closely related so as to mutually contribute each to the support of the other, but in addition, the flange 22 being of double thickness of the material of which the blank is formed and being disposed on the inner face of the plate 11 where in use the greatest strain and stresses to which the posts are subjected occurs, the tube is given a firm and secure anchorage, reducing breakage to a minimum. The flange 20 is of the same thickness as that of the blank material and is not reduced as in the instance of the above mentioned old milling operation, while the flange 22 is composed of two thicknesses of the blank material.

In the form of the invention depicted in Figure 5, the die chamber 30 has a square shoulder 31 at its lower end and a reduced lower part 32 to fit the punch 33 which latter is of the same diameter throughout and has a shoulder 34. This form of the invention is for use with tubes that are to possess square lower ends, as distinguished from the rounded lower ends depicted in Figures 1 to 4. In Figure 5, it will be noted the blank fills the space between the punch 33 and the chamber 30 while its lower end seats on the shoulder 31 and is held by the lower end of the punch which enters the reduced lower end of the chamber.

In both forms of the invention it will be seen that during the final operation of forming the doubled flange 22, the spring pressed plungers 7 permit of movement of the plate 11 toward the die 1, so that the flange 22 is formed between the underface of the plate and the upper face of the die.

What is claimed is:

1. In means for fastening tubes to plates, a die having a chamber formed with a shoulder so as to receive the tube in the chamber and with the inner end of the tube seated on the shoulder, a punch receivable in the tube and formed to extend below the shoulder of the die and below said inner end of the tube, a shoulder on the punch engageable with the outer end of the tube, and a retaining ring on the punch encircling the shoulder of the punch and projecting below the punch shoulder, the inner circumference of the ring being spaced from the punch periphery to allow the inner end of the tube to be expanded at right angles against the inner circumference of the ring.

2. In means for fastening tubes to plates, a die having a chamber formed with a shoulder so as to receive the tube in the chamber and with the inner end of the tube seated on the shoulder the chamber having a reduced lower end below the shoulder and the latter being rounded, a punch having a shoulder engageable with the outer end of the tube and having a part fitting the tube interior and a part fitting the reduced lower end of the chamber, and a retaining ring on the punch encircling the shoulder of the punch and projecting below the punch shoulder, the inner circumference of the ring being spaced from the punch periphery to allow the inner end of the tube to be expanded at right angles against the inner circumference of the ring.

3. In means for fastening tubes to plates, a die having a chamber formed with a shoulder so as to receive the tube in the chamber and with the inner end of the tube seated on the shoulder, a punch receivable in the tube and formed to extend below the shoulder of the die, a shoulder on the punch engageable with the outer end of the tube to turn the extreme free outer end of the tube outwardly at substantially right angles, and a spring tensioned slidable retaining ring on the punch formed to have its inner circumference engage the extreme free edge of the outturned end of the tube.

4. In means for fastening tubes to plates, a die having a chamber formed with a shoulder so as to receive the tube in the chamber and with the inner end of the tube seated on the shoulder, a punch receivable in the tube and formed to extend below the shoulder of the die, a shoulder on the punch engageable with the outer end of the tube, a retaining ring on the punch encircling the shoulder of the punch and projecting below the punch shoulder and spring pressed supporting means for the plate borne by the die to allow the plate to move toward the die.

In testimony whereof I affix my signature hereto.

JOHN SCHADE.