Jan. 29, 1935. S. M. GREENIDGE 1,989,356

PACKING FOR PISTONS, ETC

Filed Aug. 5, 1932 3 Sheets-Sheet 1

Fig. 1.

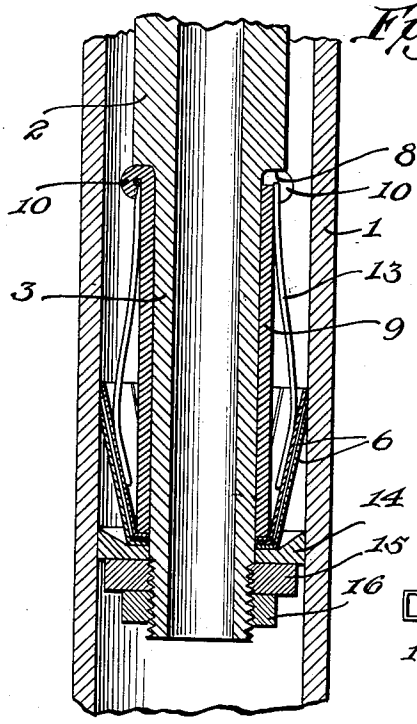


Fig. 2.

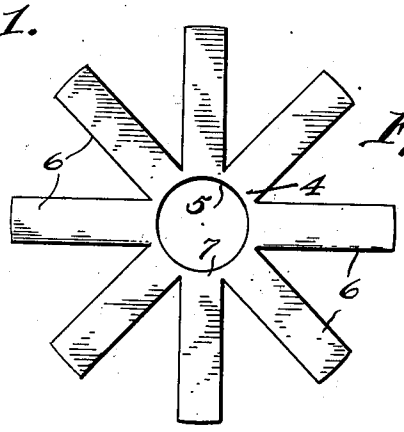


Fig. 3.

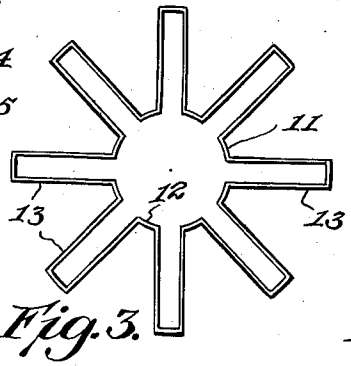
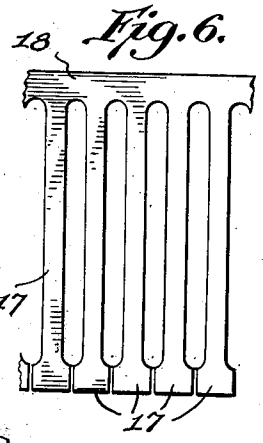


Fig. 6.



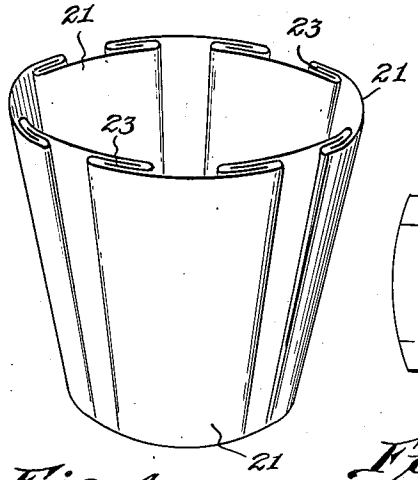


Fig. 4.

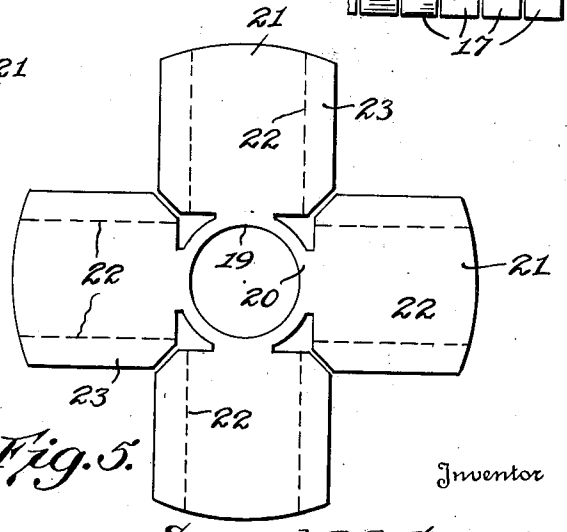


Fig. 5.

Inventor

Samuel M. Greenidge

By Eccleston & Eccleston

Attorneys

Jan. 29, 1935. S. M. GREENIDGE 1,989,356

PACKING FOR PISTONS, ETC

Filed Aug. 5, 1932 3 Sheets-Sheet 2

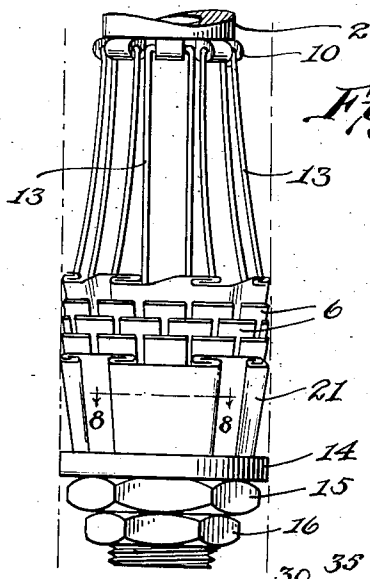


Fig. 7.

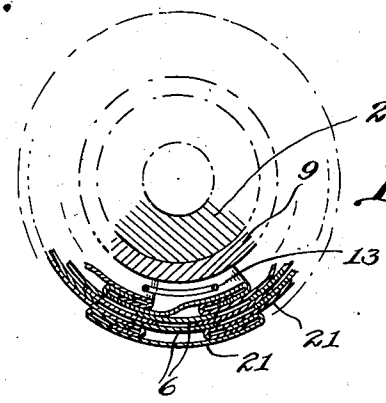


Fig. 8.

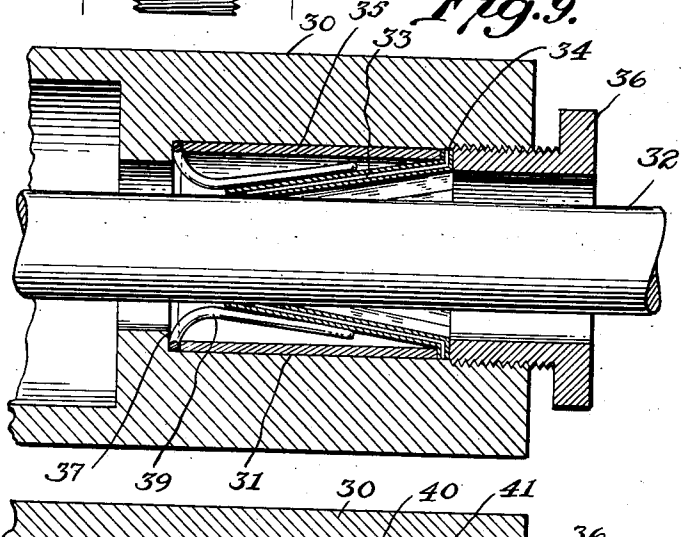


Fig. 9.

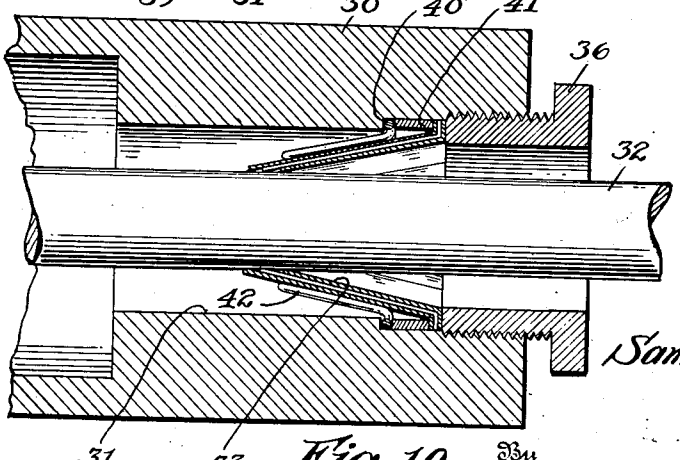


Fig. 10.

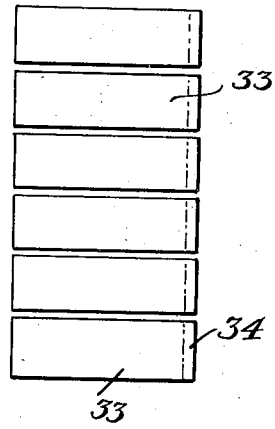


Fig. 11.

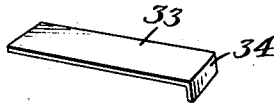


Fig. 12.

Inventor

Samuel M. Greenidge

By Eccleston & Eccleston

Attorneys

Jan. 29, 1935. S. M. GREENIDGE 1,989,356

PACKING FOR PISTONS, ETC

Filed Aug. 5, 1932 3 Sheets-Sheet 3

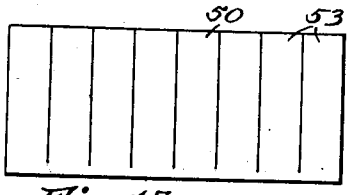


Fig. 13.

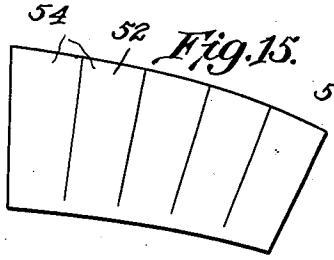


Fig. 15.

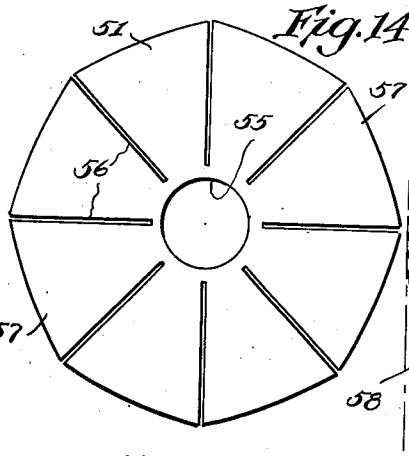


Fig. 14.

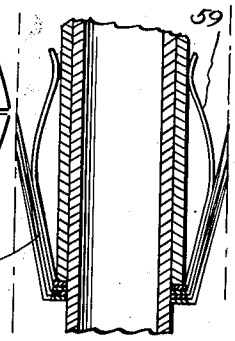


Fig. 16.

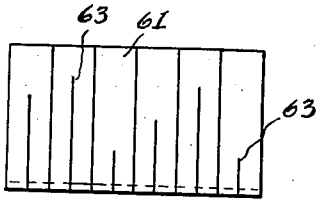


Fig. 18.

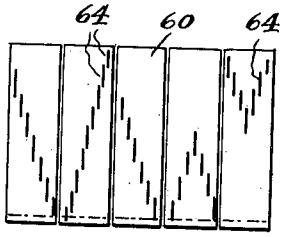


Fig. 17.

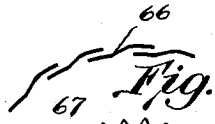


Fig. 20.

Fig. 21.

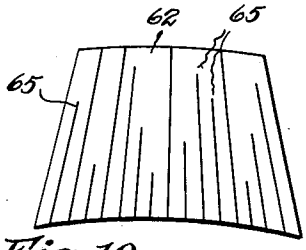


Fig. 19.

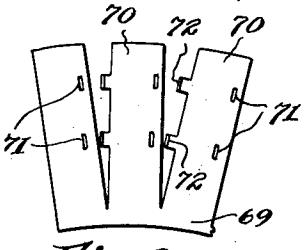


Fig. 23.

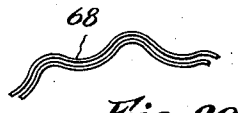


Fig. 22.

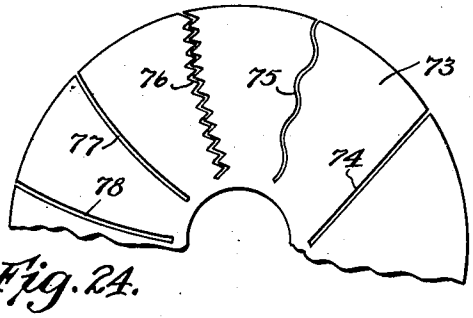


Fig. 24.

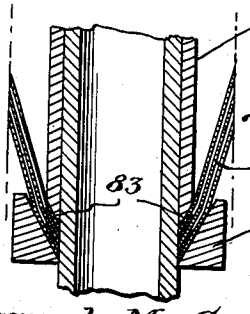


Fig. 25.

Inventor

Samuel M. Greenidge

By Eccleston & Eccleston,

Attorneys

Patented Jan. 29, 1935 1,989,356

UNITED STATES PATENT OFFICE

1,989,356

PACKING FOR PISTONS, ETC.

Samuel M. Greenidge, Fort Worth, Tex.

Application August 5, 1932, Serial No. 627,661

13 Claims. (Cl. 309—33)

This invention relates generally to packings such as for pump pistons, engine pistons, stuffing boxes, etc., and has for its primary object to provide an improved and more durable construction of packing which will be unaffected by changes in temperature or by acids, alkalies or other fluids, and will offer a greater amount of abrasion resisting material to wearing of the packing during prolonged use and to the effect of solids which may come in contact with the packing and the surface with which it cooperates.

A further object of the invention resides in the provision of a novel packing construction by means of which a more uniform and more continuous contact between the packing and the surface with which it cooperates is maintained with either reciprocating or rotary motion.

Other objects and advantages of the invention will be apparent from the following description when taken in connection with the accompanying drawings, in which,

Figure 1 is a vertical sectional view through a packing including the novel features of the construction.

Figure 2 is a plan view of one of the packing elements before being bent to shape.

Figure 3 is a similar view of one form of spring which may be employed.

Figure 4 is a perspective view of one form of one of the cup-shaped elements.

Figure 5 is a plan view of the construction shown in Figure 4, but before being bent into final shape.

Figure 6 is a plan view of a modified construction of spring member.

Figure 7 is a side elevational view of an assembled packing embodying the cup-shaped elements of Figures 4 and 5.

Figure 8 is a sectional view taken on line 8—8 of Figure 7.

Figure 9 is a sectional view of a modified construction in which the packing is stationary.

Figure 10 is a view similar to Figure 9, but employing a different spring mounting.

Figure 11 is a plan view of a series of packing elements for use in the construction shown in Figures 9 and 10, and,

Figure 12 is a perspective view of one of the packing elements of Figure 11.

Figures 13, 14 and 15 are plan views of differently shaped metal sheets which are slitted and then bent into forms similar to that shown in Figure 2.

Figure 16 is a vertical section through a portion of an assembled packing made from segments illustrated in Figure 11.

Figures 17, 18 and 19 are fragmentary plan views of packing material before being bent into shape, and provided with variously positioned slits to provide progressively continuous expansion.

Figure 20 is a fragmentary end view of a packing section in which portions of adjacent segments of a section are arranged in overlapping relation.

Figures 21 and 22 are fragmentary end views of packing sections in which corrugated and fluted material are employed.

Figure 23 is a fragmentary plan view of a packing section in which means are employed for limiting the extent of expansion of the formed cup to a predetermined diameter.

Figure 24 is a fragmentary plan view of a packing element showing variously shaped slits other than on straight radial lines, and

Figure 25 is a sectional view through an assembled packing in which beveled shoulders are employed as the clamping means.

More specifically, the numeral 1 indicates a cylinder or other mechanical element in which a packing is essential. In the form shown, a piston rod 2 is mounted within the cylinder 1 and is provided with a reduced portion or recess 3, in which the novel packing to be described is mounted.

The packing comprises essentially three separate elements, namely the packing proper, spring means for maintaining the packing against a coacting surface, and means for holding these parts in their correct assembled relation. In the embodiment shown in Figures 1, 2 and 3 the packing material is composed of a plurality of metal sections 4. These sections are made from sheet metal and are provided with a central opening 5, a plurality of fingers 6, and an annular portion 7 uniting the fingers. The fingers 6 are bent upwardly as indicated in Figure 1 and a plurality of the sections nested together with their fingers in staggered relation and the flange portions 7 superposed and slipped onto the reduced portion 3 of the piston rod 2.

While the packing section 4 is shown as one continuous circular piece of metal it will be apparent to those skilled in the metal art that substantially the same result may be obtained by elements made in a variety of different ways, a few of which will be described hereinafter, and it is intended that the disclosure of Figure 2 be merely illustrative of one method of producing

such sections. Moreover, the thickness of the material employed may be varied to suit the particular circumstances.

The reduced portion 3 of the piston rod provides a shoulder 8 spaced from the inner end of the rod and this shoulder forms a stop for a combined spacing element and spring mounting 9. This element 9 is in the form of a cylinder or a sleeve provided with a plurality of vertical slits at its upper end to provide tongues which may be bent outwardly to form knuckles 10 for supporting a spring 11. The spring is indicated in Figure 3 as formed of a continuous piece of wire bent to provide a circular portion 12 and a plurality of spring fingers 13. The knuckles 10 are engaged about the circular portion 12 of the spring member and the fingers 13 are extended downwardly to engage the inner face of the packing and force the same against the surface of the cylinder 1.

The several elements of the assemblage are secured in fixed relation by a washer 14 and lock nuts 15 and 16 which force the spacing element 9 against the shoulder 8 of the piston rod, and also clamp the flanges 7 of the packing elements against the lower end of the spacer 9.

It will be understood of course that while only three of the packing elements 4 are shown as composing the packing of Figure 1, this number may be increased as desired to suit circumstances, and may be formed of various thicknesses of metal. Moreover, the contiguous fingers of the packing sections may be caused to overlap or remain entirely separate as may be found desirable for the particular installation.

In Figure 6 is shown a modified construction of the spring member 11. In this latter form of construction the spring fingers 17 are made from a sheet of spring metal, the upper ends of the fingers being integrally connected to a band portion 18 which is bent into circular form when the fingers are mounted in cooperative relation with the packing material. The upper edge 18, (Figure 6) may be turned inwardly to form a shoulder or flange which will fit over the spacing element 9 and be secured against the shoulder 8 of the piston when the lock nuts are set.

A modified form of packing and assemblage is disclosed in Figures 4, 5, 7 and 8. In this modified construction the spacing member 9, the packing elements 4, the spring 13, and the securing elements 14, 15 and 16 are identical with the elements shown in Figures 1, 2 and 3. In addition to these elements, however, inner and outer cup-shaped elements are employed for limiting the expansion of the packing proper. This limitation of the diameter of the packing is especially useful in that it facilitates removal of the packing from deep well pumps by preventing the packing from expanding into contact with the walls of the pipe or other mechanisms. One of the cup-shaped elements is shown in set-up condition in Figure 4 and in flat condition in Figure 5. These blanks may be made from sheet metal to provide a central opening 19, an annular band 20 and radial extensions 21. The extensions 21 are provided with longitudinal flanges 23 formed by bending the marginal edges along the lines 22. Two of these sections are preferably nested together with the extensions of one section bridging the spaces between the extensions of the other section. The flanges 23 of one section may be turned inwardly and those of the other section turned outwardly so that they will interlock as indicated in Figure 4.

In lieu of bending the flanges 23 in the manner just described, they may be bent as shown in the inner cup of Figures 7 and 8. In this modified construction of cup one longitudinal edge of each extension may be turned inwardly and the other longitudinal edge turned outwardly so as to provide an interlocking connection between adjacent extensions.

These joints between the cup sections allow a limited expansion of the cup sections and thus control the extent of expansion of the interposed packing. A wide variety of alternate forms of cup construction will of course be apparent and are intended to be included within the scope of the present invention.

The constructions shown in Figures 9, 10, 11 and 12 are substantially a reversal of the disclosure of Figures 1, 2 and 3 in that the packing is stationary and is spring-pressed inwardly against a movable member. In Figure 9 the outer casing, which is indicated by the numeral 30, is provided with a compartment 31 in which the packing assemblage is mounted. The numeral 32 indicates either a reciprocating or rotating rod with which the packing cooperates.

The packing elements 33 (Figures 11 and 12) are composed of a plurality of individual fingers provided with out-turned flanges 34 by means of which the fingers are clamped, or otherwise secured, in position. A plurality of series of the fingers 33 are nested together as indicated in Figure 9 and their flanges 34 are clamped against the adjacent end of a spacing sleeve 35 by means of a clamping nut 36. The opposite end of the sleeve 35 cooperates with a shoulder 37 for clamping in position the spring fingers 39. These fingers, it will be noted, extend in a direction opposite to that of the packing fingers and engage against the outer face of the packing so as to compress the same against the movable element 32. In this connection it is to be noted that the construction in addition to its function as a packing, also serves as a bearing member for the element 32. While individual fingers are disclosed as forming the packing in this form of the invention it will be understood that other forms of packing similar to those shown in Figures 1 and 7 may be employed.

In the form of the invention shown in Figure 10 the same casing 30 and compartment 31 are indicated, but the shoulder 40 is spaced only a slight distance from the operative end of the clamping nut 36. By thus locating the shoulder 40, only a short spacing sleeve 41 is required and the springs 42 are mounted so as to extend in the same direction as the packing fingers 33. This construction, as well as that shown in Figure 9, is useful for both a rotary shaft and a reciprocating shaft and also serves as a bearing for the shaft.

On sheet three of the drawings are depicted a variety of different forms of packing which may be employed in lieu of the structures disclosed in Figures 1 to 12, inclusive. For instance, in Figures 13, 14 and 15 are disclosed packing elements 50, 51 and 52, respectively. The packings 50 and 52 are slitted to provide a plurality of fingers 53 and 54, respectively, connected at their bases and adapted to be bent up into final form to provide a packing similar to that shown in Figure 2. In Figure 14 a substantially disc-shaped plate is provided with a central opening 55 to be received over a piston rod or the like and is radially slitted as indicated by numeral 56 to provide a plurality of outwardly flared fingers 57. The fingers in this modified construction will of course overlap

when the sections are shaped up into final form.

In Figure 16, the numeral 58 indicates a packing assembly comprised of a plurality of finger-like sections such as shown at 33 in Figure 11. In this assembly, however, the flanges 34 are turned inwardly instead of outwardly (as shown in Figures 9 and 10), but may be clamped together in the usual way. Springs 59 are employed for pressing the packing against the surface with which the packing cooperates.

Figures 17, 18 and 19 disclose various modified constructions of packings 60, 61 and 62, respectively, in which the several parts composing a single packing section are slitted as indicated at 63, 64 and 65. By means of these slits the wearing away of the packing elements causes the slits to open up and permit an easier expansion of the packing segments; and furthermore the conformability of the packing to the coacting surface is greatly improved. It will of course be apparent that an almost infinite variety of slits may be employed for accomplishing the desired end.

In Figure 20 the fingers of the packing section 66 are shown as overlapping each other, as for instance, the fingers 57 of the packing element of Figure 14.

Figures 21 and 22 show packing elements 67 and 68, respectively, formed of corrugated and fluted material. These constructions are more especially useful where high pressures are to be encountered, as for instance, in deep wells. These packings may be made up from forms such as shown in Figure 2 or the like, and the corrugations or flutes provide suitable reinforcement to withstand the relatively high pressures to which the packings may be subjected.

In Figure 23 is disclosed a portion of a packing section 69 in which each of the fingers 70 has one longitudinal edge provided with slots 71 and the other edge with corresponding tongues 72. When this form of the invention is bent up into shape the lugs or tongues of one finger are engaged in the corresponding slots of an adjoining finger, and thus serve to limit the extent of expansion of the packing in a manner similar to that shown in Figures 4, 5, 6 and 7. Obviously other forms of interlocking means could readily be provided.

Figure 24 shows a packing element 73 of disc-like form, partly broken away, in which substantially radial slits of varying configuration, such as indicated at 74, 75, 76, 77 and 78, may be employed in lieu of the straight line slits of Figure 14, etc. In Figure 25 the sleeve or cylinder 80 which cooperates with the washer 81 in clamping the packing 82 has its lower end beveled as indicated at 83. Such beveled or rounded construction may be employed, if desired, in lieu of the squared end shown on sleeve or cylinder 9 of Figure 1.

In the operation of the devices described herein it will be apparent that the nested packing elements will be automatically arranged with their outer edges in beveled or wedge-shaped formation to conform to and obtain an intimate contact with the cooperating surface. Moreover the packing will be automatically and progressively expanded to compensate for wear, although undue expansion such as would hamper the withdrawal of the packing from its surrounding mechanism is avoided. The packing is strong and durable, and unaffected by temperature changes, acids, alkalies, etc., and can be produced at a relatively low cost.

While several modified constructions have been disclosed herein it will be evident that many variations may be embodied in the packing material as well as in the inner and outer cup-shaped members and it is intended that all such variations be included within the scope of the appended claims.

What I claim is:

1. A packing including a pair of expansible cup-shaped elements, means on said elements for limiting the extent of expansion thereof, and packing elements disposed between the walls of said cups.

2. A packing including a pair of nested cup-shaped elements, composed of a plurality of laterally movable sections, interlocking flanges connecting the edges of adjoining sections to limit the outward movement thereof, and metallic packing disposed between the walls of said cups.

3. A packing including a plurality of nested metallic packing elements formed from sheet metal to provide a plurality of fingers, inner and outer expansible cup-shaped elements between the walls of which the packing elements are disposed, and means forming a part of said elements for limiting the extent of expansion.

4. A packing including a plurality of nested metallic packing elements formed from sheet metal to provide a plurality of fingers, inner and outer expansible cup-shaped elements between the walls of which the packing elements are disposed, said walls composed of laterally movable sections, and means on the sections for limiting the extent of expansive movement of said elements.

5. A packing including a pair of expansible cup-shaped elements, packing material disposed between the walls of said cup-shaped elements, spring means for expanding said elements and packing material, and means for limiting the extent of expansion.

6. A packing including a pair of expansible cup-shaped elements, packing material disposed between the walls of said cup-shaped elements, spring means for expanding said elements and packing, and means forming an integral part of the cup-shaped elements to limit the extent of expansion.

7. In a device of the class described a member to be packed, said member provided with an annular recess, a spacing sleeve in said recess, springs secured by one end of the spacing sleeve, packing material secured at the other end of the sleeve, said springs forcing the packing into engagement with a cooperating surface.

8. In a device of the class described a member to be packed, said member provided with an annular recess, an expansible packing having its base mounted in the recess, a spring cooperating with said packing and having its base mounted in the recess, a spacing member between the packing and spring, and means for clamping the parts in position.

9. In a device of the class described a member, to be packed, said member provided with an annular recess to form a shoulder, an expansible packing having its base mounted in the recess, a spring cooperating with said packing and having its base mounted in the recess, a spacing member between the packing and spring, and means for securing said parts in position.

10. In a device of the class described a member to be packed, said member provided with an annular recess to form a shoulder, an expansible packing having its base mounted at one end of the recess, a spring cooperating with said pack-

ing and having its base mounted at the other end of the recess, a spacing sleeve mounted in the recess in contact with said spring and packing, and means for clamping said elements in the recess.

11. An expansible packing including a plurality of nested metallic sections, each comprising a central portion and a plurality of finger portions, and means forming a part of said sections for limiting the extent of expansion of said packing.

12. An expansible packing including a plurality of nested metallic sections, each comprising a plurality of finger portions provided with slits of less length than the fingers.

13. A packing including a cup-shaped element formed of a plurality of outwardly movable sections and means on the edges of the sections to limit the extent of outward movement.

SAMUEL M. GREENIDGE.