

C. G. CUNNINGHAM.
PACKING RING FOR SHAFTINGS.
APPLICATION FILED AUG. 17, 1909.

951,435.

Patented Mar. 8, 1910.

Fig. 1.

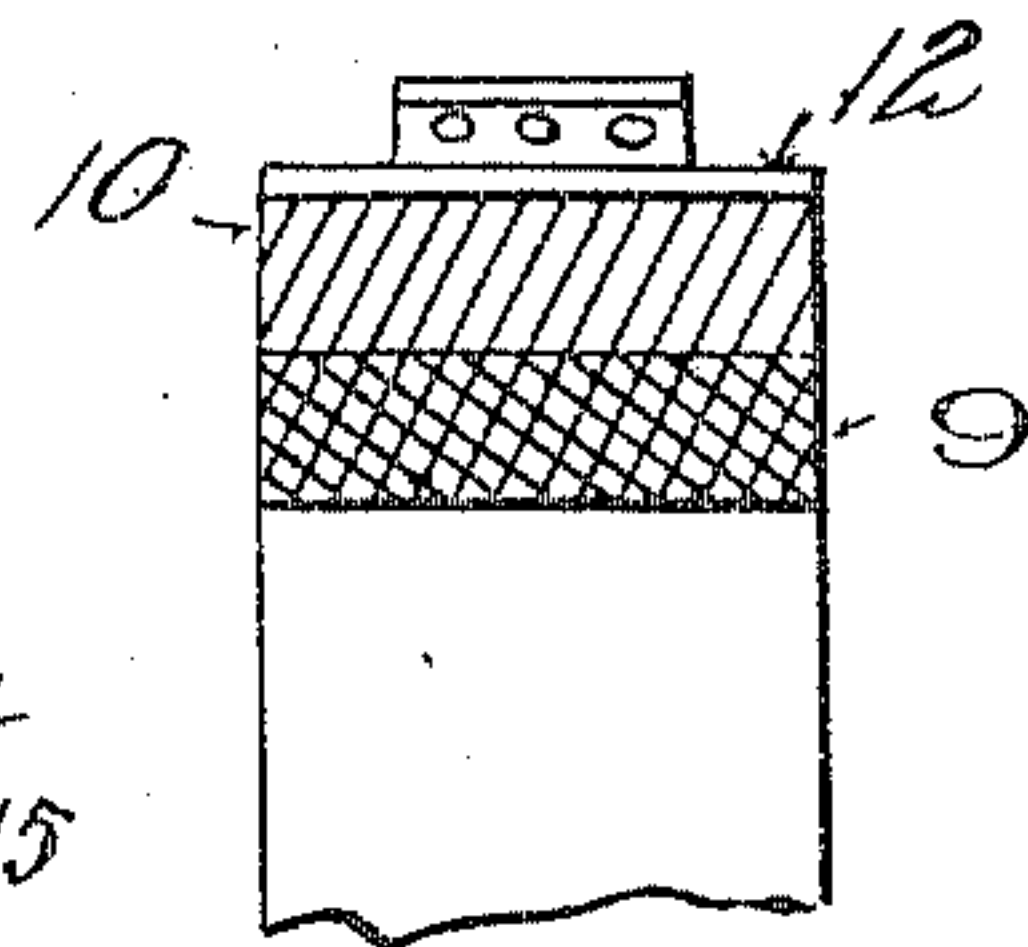
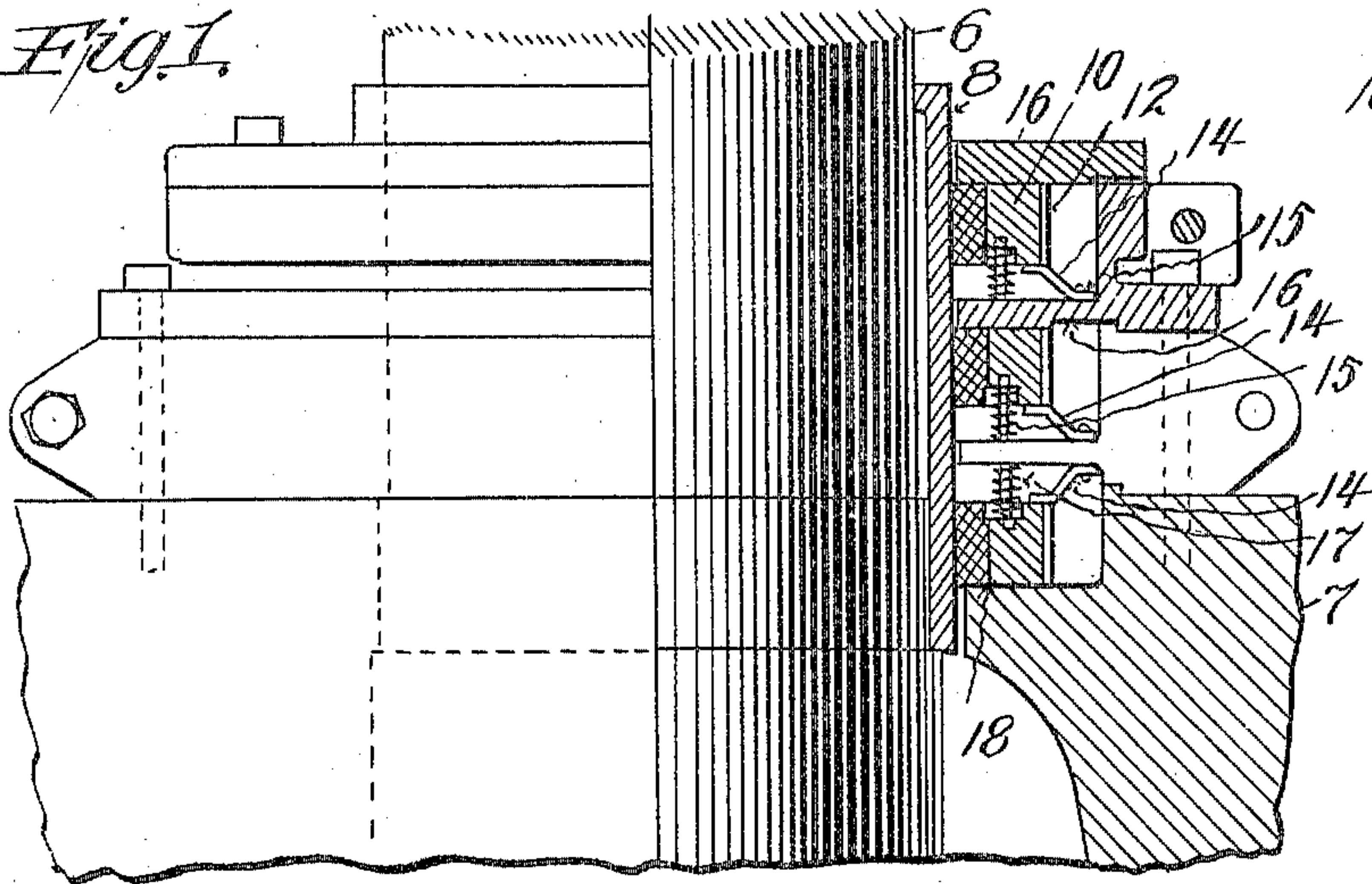


Fig. 4.

Fig. 2.

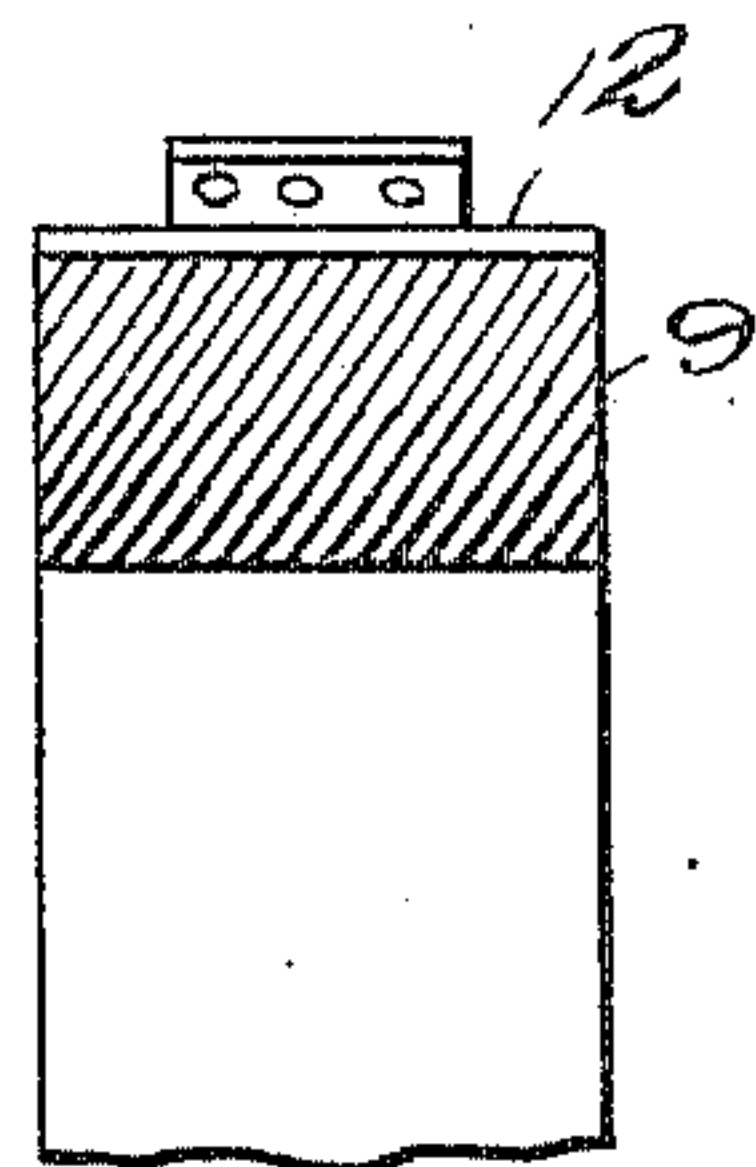
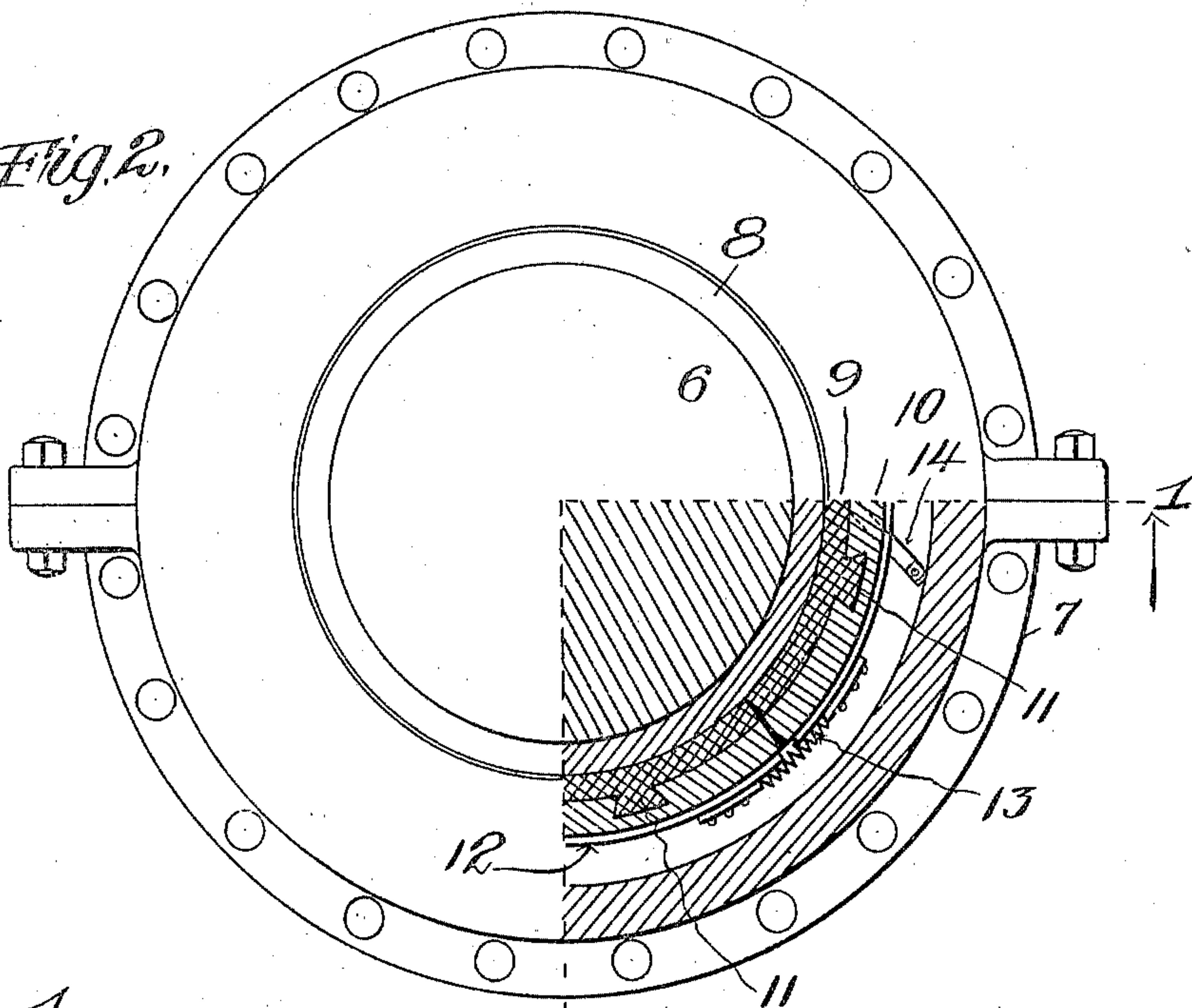


Fig. 5.

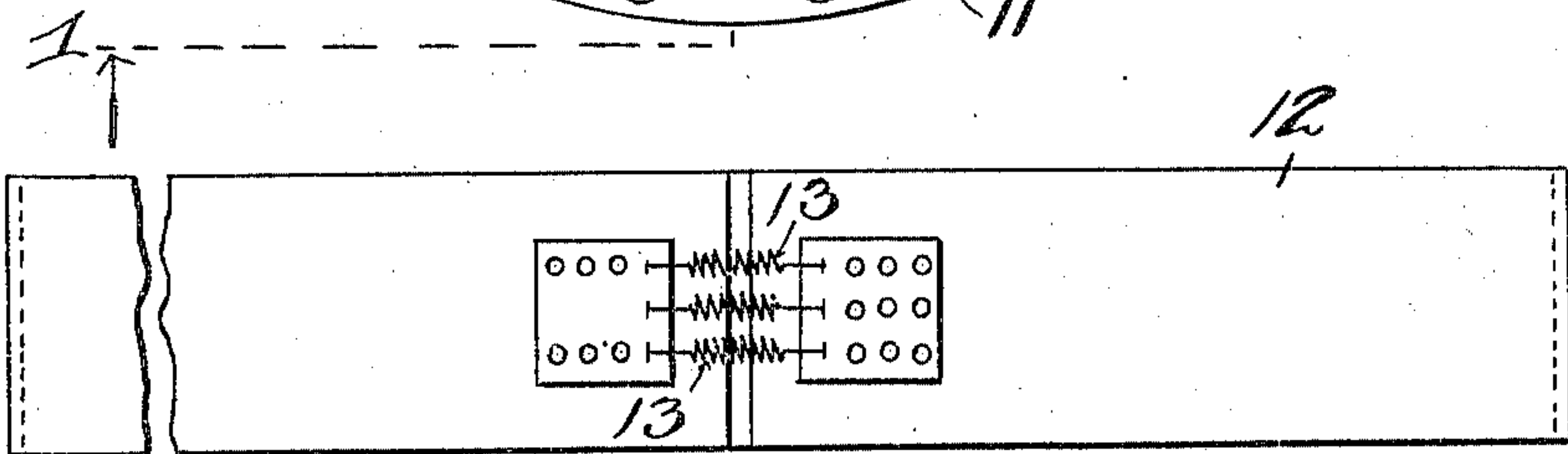


Fig. 3.

Witnesses:

W. H. Cunningham
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Samuel E. Barby By his Attorney

UNITED STATES PATENT OFFICE.

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PACKING-RING FOR SHAFTINGS.

951,435.

Specification of Letters Patent.

Patented Mar. 8, 1910.

Application filed August 17, 1909. Serial No. 513,361.

To all whom it may concern:

Be it known that I, CHARLES GODVIN CUNNINGHAM, a citizen of the United States, residing at Kings Bridge, in the county of New York, State of New York, have made a certain new and useful Invention in Packing-Rings for Shafting, of which the following is a specification.

This invention relates to packing rings for shafting.

The object of the invention is to provide means which are simple, practical, economical and efficient for securing a steam tight joint at the point where a rotating shaft passes through a casing in which steam or other elastic fluid is confined under pressure.

A further object of the invention is to provide a packing which is adapted to work against pressure as well as against vacuum.

A further object is to provide a packing capable of withstanding the high pressure and temperature of the steam employed in steam turbine engines, and also which affords an efficient antifriction bearing or wearing surface, and which does not require lubrication and will not stick to or hug the shaft, or cut, wear or score the same.

Other objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawing, and finally pointed out in the appended claims.

Referring to the accompanying drawing and to the various views and reference signs appearing thereon, Figure 1 is a broken view, partly in elevation, and partly in section, on the line 1, 1, Fig. 2, looking in the direction of the arrows, and showing a construction of packing embodying the principles of my invention as applied to a steam turbine shaft. Fig. 2 is a view partly in plan and partly in transverse section. Fig. 3 is an elevation of a packing ring clamping band employed in connection with my invention. Fig. 4 is a transverse section of a packing ring embodying my invention. Fig. 5 is a view similar to Fig. 4 showing a modified form of packing.

The same part is designated by the same reference sign wherever it occurs throughout the several views.

In the operation of rotary steam engines, and, particularly engines of the steam tur-

bine type, great difficulty has been experienced in providing an efficient construction of packing which is capable of withstanding the high degree of heat and pressure to which the packing is subjected. The ordinary Babbitt metal has been found inefficient for the purpose on account of its characteristic of becoming soft under the heat of friction, and of the superheated steam employed, and when soft, it tends to cling to or hug the shaft and to cause the same to wear and score. It has also been proposed to employ carbon segments, but this has not proven successful on account of the grinding of the carbon.

It is among the special objects and purposes of my present invention to provide a packing in which the above noted, as well as other difficulties, are overcome.

In the drawing, reference sign 6, designates a shaft arranged to extend through a casing 7, in which steam is confined under pressure. If desired the shaft may be provided with a sleeve 8, presenting a smooth outer cylindrical surface, to which the packing embodying my invention is to be applied. These parts may be of the usual form and arrangement such, for instance, as employed in steam turbines.

In accordance with the principles of my invention I employ a metallic packing ring, and I have found red-metal efficient for my purpose as it is capable of withstanding the heat and pressure without impairing its efficiency as an antifriction packing.

The packing ring may be made up of segments 9, of the red-metal which, if desired, and as shown in Fig. 5, may be of sufficient thickness to withstand, by its own natural hardness, the high temperature of the steam and friction to which it is subjected in use. In practice, however, I prefer to apply the red-metal packing to a rigid metal reinforcing backing 10, as shown in Figs. 2 and 4. The red-metal packing material may be applied and secured to the metal support 10, in any suitable or convenient manner, as, for instance, by providing the packing and backing with interlocking grooves and projections, as indicated at 11.

The packing ring, whether composed of the all metal packing, or of the packing material applied to a metallic supporting back, is made up of segments which are assembled into ring form and held in assem-

bled relation by means of a holding band or strap 12, applied around the segments, as shown, the ends of the strap being held together by means of spiral springs 13, having
 5 their ends connected respectively to the respective end of the strap or band 12, thereby holding the segments assembled and at the same time permitting expansion and contraction of the packing ring segments under
 10 the influence of the heat to which they are subjected.

The packing rings may be suitably anchored inside the casing as indicated at 14.

In practice it is desirable to arrange the
 15 packing rings so that they will afford a packing not only against steam pressure but also against vacuum. Therefore, in accordance with my invention, and as shown in Fig. 1, some of the packing rings are supported on springs 15, the tension of which
 20 is applied to urge the rings outwardly or longitudinally of the shaft 6, and against stationary abutments 16, while one or more of said packing rings are arranged to be
 25 acted upon by springs 17, which urge them longitudinally of the shaft and inwardly against a stationary abutment 18. In this manner I efficiently pack the joint not only against outwardly operating steam pressure,
 30 but also against atmospheric pressure or vacuum within the casing.

In the form of application of my invention as shown, the packing rings are held stationary while the shaft and its sleeve rotate inside them.
 35

I have used the term packing ring to designate the structure of the packing as a whole, whether made up of all red metal packing material or of the packing material
 40 as applied to the metal stiffening or backing sections.

While my invention is shown and described as applied to the rotary shaft of a steam turbine engine, and is specially designed for use in connection with such an
 45 engine on account of the special packing difficulties encountered in the use of high pressure superheated steam such as is commonly employed in steam turbine engines, and which precludes the efficient use of Babbitt-metal, still my invention, as defined in the claims, is not to be limited or restricted in respect to the use to which the invention is put.
 50

55 The packing material which I have found

to possess the necessary characteristics for use is an alloy of copper and lead and which is known on the market as red metal.

Having now set forth the objects and nature of my invention and constructions 60 embodying the principles thereof, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent is,—

1. A packing ring for rotary shafts composed of segments of antifriction soft 65 expansible metal, a band encircling the segments, and springs connecting the adjacent ends of the band.

2. A packing ring for rotary shafts composed of segments of antifriction soft 70 expansible metal, holders to the interior surface of which said segments are applied, a band encompassing said holders, and springs connecting the adjacent ends of the band. 75

3. The combination with a casing and a shaft extending through and revolving in the casing, of soft metal, expansible packing rings applied to the shaft, abutments for said rings, and means for pressing said 80 rings, in opposite directions and longitudinally of the shaft, against said abutments.

4. The combination with a casing having outer and inner abutments, and a shaft passing through and revolving in said casing, 85 of soft metal expansible packing rings applied to said shaft, springs bearing against certain of said rings and tending to press the same longitudinally of the shaft against the outer abutments and springs bearing 90 against other of said rings and tending to press the same longitudinally of the shaft and against the inner abutment.

5. A packing ring for rotary shafts composed of hard metal backing segments having 95 grooves in the interior surface thereof, soft red metal packing applied to said segments and having lugs fitting into said grooves, a band applied around said backing segments and springs connecting together 100 the adjacent ends of said band.

In testimony whereof I have hereunto set my hand in the presence of the subscribing witnesses, on this 28th day of July A. D., 1909.

CHARLES GODVIN CUNNINGHAM.

Witnesses:

S. E. DARBY,
 J. E. KLEIN.