W. J. WRIGHT.

METHOD OF MAKING METALLIC PACKING.

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1,018,149.

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Fig. 1.

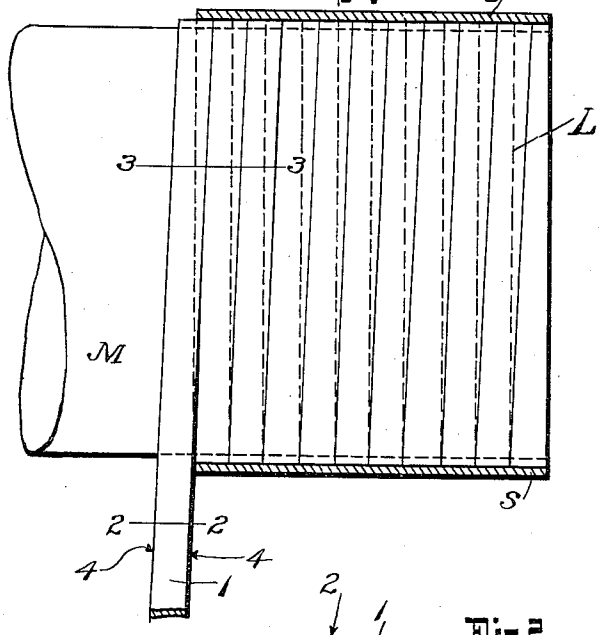

Fig. 2.

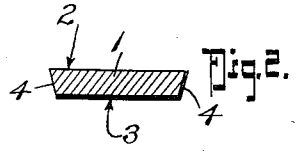

Fig. 4

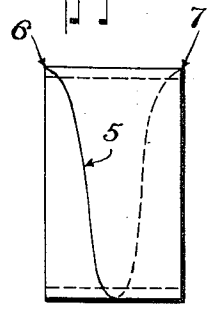

Fig. 5.

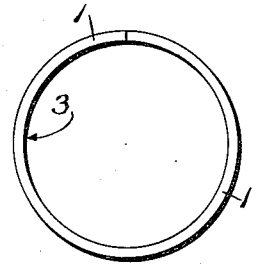

Fig. 3.

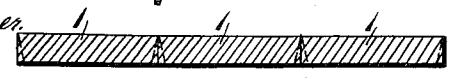

Fig. 6.

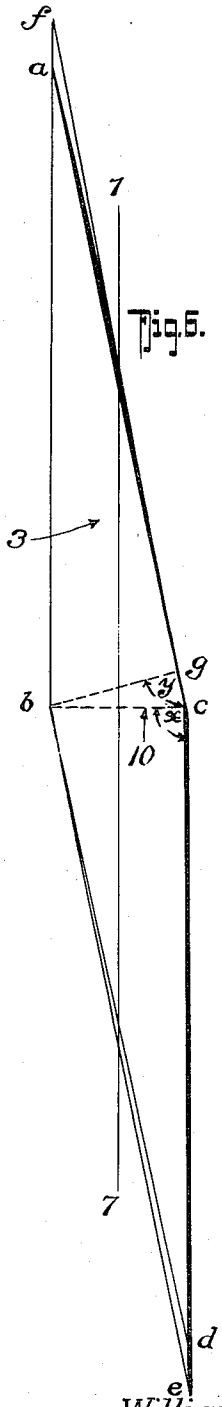

Fig. 7.

Witnesses

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METHOD OF MAKING METALLIC PACKING.

1,018,149. Specification of Letters Patent. Patented Feb. 20, 1912.

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To all whom it may concern:

Be it known that I, WILLIAM J. WRIGHT, residing at Franklin, in the county of Venango and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Making Metallic Packing, of which the following is a specification.

My invention has for its object to provide an improved method of making metallic packing which packing is particularly adapted for use on engine pistons, shafts and the like, and the invention has for its object to provide a packing ring that will expand evenly throughout and one of such construction that it can be cheaply manufactured and will effectively serve its intended purposes.

Another object of my invention is to provide an improved method for making a packing ring in which the ends of the ring or band are overlapped preferably throughout a complete turn around the ring so they will not separate when the ring contracts to form an opening.

In carrying out my invention, I take a long strip or ribbon of a width slightly less than the width of the packing ring desired, and I wind it tightly in a spiral on a suitable mandrel. After which the strip is cut into rings of the required size, cut by a tool held at right angles to the axis of the mandrel, the pitch of the spiral being equal to the width of the packing so that the line of separation of the overlapping portions of the ring blank will extend in one complete turn and thereby avoid a direct cut or opening across the face of the ring and provide, as it were, a closed ring when the same is applied to the piston and in use.

In the drawings Figure 1, is a view illustrating the manner of winding the strip or band onto the mandrel to form the ring. Fig. 2, is an enlarged cross section on the line 2—2 of Fig. 1, the beveled edges of the strip being greatly exaggerated, for purposes of illustration. Fig. 3, is a view similar to Fig. 2, on the line 3—3 of Fig. 1, and hereinafter specially referred to. Fig. 4, is a side elevation of a complete packing ring formed in accordance with my invention, the relative propositions of width to diameters and thickness of material being greatly distorted or exaggerated for purposes of illustration from what would usually be the practical proportions employed. Fig. 5, is an end elevation of the ring shown in Fig. 4. Fig. 6, is a developed view of the ring shown in Figs. 4 and 5. Fig. 7, is a section on the line 7—7 of Fig. 6.

Referring now to the accompanying drawings, in which like letters and numerals of reference indicate like parts in all of the figures, I take a suitable strip or band of steel, copper or other suitable material of a uniform width throughout its length, the band 1, however, having its side edges 4 beveled to reduce the width of the lower face 3 to less than that of the upper face 2 of the strip 1, the amount of this beveling being dependent upon the thickness of the strip and the diameter of the mandrel on which the strip is to be wound. The strip 1 is next wound onto a mandrel M of any approved type in a manner such as indicated in Fig. 1, of the drawings. The mandrel M may be placed in a magnetic chuck or it may itself be magnetized to hold the strip 1 in place, if the strip 1 be of magnetic material, or a sleeve S may be slid over the wound strip to retain it in position on the mandrel until the strip is cut into the form of rings. After the strip has been wound onto the mandrel M a cutting tool is applied to cut the strip along the lines L which are in parallel planes normal to the axis of the mandrel M, thereby cutting packing rings of such width that the line of overlap 5 of the overlapping edges of the ring will commence at the point 6 (see Fig. 4) and make a complete turn around the ring terminating at a point 7 directly opposite to the point 6 in longitudinal alinement with the axis of the mandrel so that the line 5 extends throughout one complete turn. In this way, by making the strip 1 of narrow width to form narrow width rings a fine feather edge of the material may be provided where it overlaps the main body portion of the ring section.

In Fig. 3, I have shown a section through the strip after it has been wound on the mandrel, the dotted lines indicating the original cross sectional outline of the strip (see Fig. 2) while the full lines indicate the

final cross sectional outline of the strip after it has been tightly wound on the mandrel.

In winding the strip on the mandrel the surface 3 being bent into a circle of a diameter less than that of the surface 2 will expand and were the strip originally of a rectangular cross section the lower surfaces 3 would expand laterally to a greater degree than the upper surface 2 and a tight contact between the adjacent edges of the band 1 in its different folds could not be had. Therefore the strip 1 is initially beveled on the sides as at 4, to allow for its unequal expansion.

The preferred form of the packing ring after it has been cut from the spiral winding (see Fig. 4) is of a shape such as indicated in Fig. 6, when folded out into a plane. It will be observed by reference to Fig. 6 that the line *fab* and the lines *cde* are parallel to one another, and the lines *ac* and *bd* are also parallel to each other, the lines *fc* and *be* being also parallel to one another.

The inner surface 3 of the ring when developed is bounded by the lines *ab*, *bd*, *dc*, *ca*, and comprises a parallelogram. The outer surface 2 of the ring when developed is formed by the parallelogram *fbecf*.

It will be noticed that by connecting the points *b* and *c* with a line 10, this line 10 making an angle of 90° with the line *ab* and also with the line *cd*, the line 10 is equal to the width of the packing ring desired.

A line drawn from *b* to intersect the line *ac* at right angles, being the line *bg*, will give the width of the strip which must be employed in order to provide a ring equal to the width of the line *bc*, the angles *y* and *x* respectively being right angles. It is then a comparatively easy matter to determine the width of strip necessary to be employed to produce a ring of a given width, knowing the width of the ring desired gives the value of the line *bc*, and knowing the circumference of the ring desired gives the value of the lines *cd* and *ab* or *ce* and *af*, as the case may be, depending upon whether the circumference is the inner or outer circumference of the ring. Knowing these factors one can determine the value of the side *bd* or *be*, as the case may be, and knowing the value of this side, the value of the line *bg* can be determined, thereby giving the width of strip necessary to use to make the ring of the width desired; the following formula may be used to determine its quantity, viz:—Let *bc* equal the width of the packing ring desired, and let *cd* equal the circumference of the ring, then *bd* is equal to

$$\sqrt{bc^2+cd^2}.$$

Therefore $bg : bc :: cd : bd$.

By constructing a packing ring in the manner described and disclosed a more effective packing of the part on which the ring is used can be had than is possible by the use of split packing rings in which the split or cut extends across the ring instead of extending around the ring through preferably a full turn. As before stated, by making a ring of this type and making the width of the ring small in proportion to the diameter of the same, the overlapping ends of the ring may be drawn out to a fine feather edge, as it were, so as to render such edge exceedingly flexible, and cause it to hold up tightly against the main or body part of the ring as the packing is carried along by the piston, and, should the packing ring be of slightly less width than the groove in which it is held, this condition would not result in leakage, but on the other hand, would be more or less beneficial when my packing is employed, for the reason that by using a packing in which the overlapping parts may be drawn out to a fine feather edge made very thin, a tighter contact at the cut 5 can be had than is possible with packing rings split straight across or on a bevel as when such packing rings expand an opening is left between the ends through which leakage occurs which cannot be had with the use of my packing.

While I prefer to construct the ring as specifically herein described, in which the line of lap of the ring extends a complete turn around the ring, yet I do not wish to confine myself to this specific form, as the line of lap may make more than a complete turn or make less than a complete turn so long as the line of lap is of a sufficient length to prevent separation of the ring ends when they contract.

In this application I make no specific claim to the construction of the packing ring *per se*, as that forms the subject matter of a divisional application.

From the foregoing description, taken in connection with the accompanying drawings, it is thought the complete construction, operation and advantages of my invention will be readily understood by those skilled in the art to which the invention appertains.

What I claim is:

1. The method of forming metallic rings consisting in taking a band or strip of a width slightly less than the width of the ring desired, winding such strip spirally on a mandrel with its edges in contact and then cutting such strip in planes normal to the axis of the mandrel.

2. The method of manufacturing packing rings which consists in taking a strip or ribbon of material of a uniform width throughout its length and whose edges are beveled to reduce uniformly the width of the under surface of the strip, winding such strip spirally on a mandrel with its edges in contact, holding such strip on said mandrel,

and then cutting said strip into ring sections, the cutting plane being normal to the axis of the mandrel.

3. The method of forming metallic packing rings which consists in taking a band or strip of a uniform width winding said strip tightly on a mandrel with its edges in contact, then cutting said strip in planes normal to the axis of the mandrel, said cutting planes being spaced apart a distance equal to the width of the ring desired.

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