J. JOHNSON.

Compositions for Journal Bearings.

No. 208,524. Patented Oct. 1, 1878.

Fig. 2

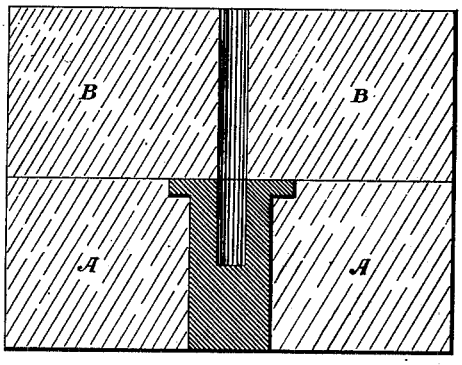


Fig. 1

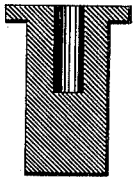


Fig. 4

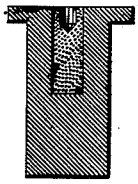
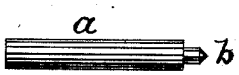


Fig. 3



WITNESSES

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JOHN JOHNSON, OF BROOKLYN, NEW YORK, ASSIGNOR TO HIMSELF AND JAMES H. GILBERT, OF SAME PLACE.

IMPROVEMENT IN COMPOSITIONS FOR JOURNAL-BEARINGS.

Specification forming part of Letters Patent No. **208,524**, dated October 1, 1878; application filed February 27, 1878.

To all whom it may concern:

Be it known that I, JOHN JOHNSON, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in the Manufacture of Compounds for Self-Lubricating Journal-Bearings, which improvement is fully set forth in the following specification.

Numerous compounds were heretofore made and suggested, many of which were patented, as a material for journal-bearings calculated to supply their own lubricant. These may be classified under two heads,—viz., those the lubricant property of which, like tallow, is incorporated, to be developed in the use of the compound by friction or heat, and those having a lubricant property which, like plumbago, is incorporated to afford a permanent dry antifriction bearing.

Among the many advantages which the latter possesses over the former are, that they are not so liable to wear, or by oxidization to determine those acid reactions which attend fatty substances.

The difficulty, however, heretofore experienced in making such compounds is such that, notwithstanding their great advantages, no means were devised to successfully and practically incorporate plumbago or graphite in a compound sufficiently hard to afford bearing-surface to journals, yet so holding the particles of plumbago or graphite as to readily yield the same for purposes of lubrication.

The object of the present invention, therefore, is to produce a dry and sufficiently hard compound capable of being shaped into suitable journal-bearings, and containing a lubricant which shall not be melted out of and disintegrate the composition in supplying a fatty matter, but one incapable of being decomposed, unchangeable in its own properties, and therefore not affecting the ingredients with which it is combined or alter the character of the composition of which it is an element, which lubricant shall be so embodied in the compound as to be readily supplied to the parts in frictional contact.

To this end my invention consists, first, as a new composition of matter, in the combination of plumbago, asbestus, and sulphur, substantially as hereinafter described; second, as a new composition of matter, in the combination of asbestus, sulphur, and plumbago in three parts of varying proportions as to volume, or quantity, or weight; third, in the method of combining asbestus, sulphur, and plumbago by reducing them to powder and thoroughly mixing them together, and by then subjecting the pulverulent compound in a mold to pressure and heat; fourth, as a new article of manufacture, in journal-bearings consisting of plumbago, asbestus, and sulphur molded under pressure and heat; fifth, as a new article of manufacture, in self-lubricating journal-bearings consisting of a plumbago and asbestus compound united with an iron or other metallic casing, into which it is compressed and molded.

To enable others to make and use my said invention, I shall now proceed to describe the manner in which the same is or may be carried into effect.

In the drawings hereunto annexed I have shown my invention applied to the construction of self-lubricating journal-bearings for spindle steps and bolsters for silk and cotton mills as one among its many uses. A description of its manufacture for this purpose will indicate the necessary processes, so that any skilled person can make and apply it to any kind of machinery.

The spindles are placed in a frame, when in use, in a vertical position. The lower end rests in a bearing called the "step." The spindle is also passed through and revolves in another bearing called the "bolster," which is placed at a point about two-thirds of its length from the lower end of the spindle.

In making my bearings my first step is to prepare the lubricating compound. I take asbestus, sulphur, and plumbago, in about equal proportions in volume or quantity, and reduce them to a powder and thoroughly mix them together, so that the result is a powder which is a mechanical mixture of the three ingredients named.

By weight, the composition would be as follows: plumbago, ten ounces; asbestus, two ounces; sulphur, four ounces. I would, however, observe here that I do not confine my-

self to the proportions given above; but those given are the proportions which I have found the best for spindle-bearings.

My object, then, is to convert this powder into a substance of such consistency that it can be made into a journal-bearing. I have found it most expedient to mold the powder into a case, which re-enforces my compound and prevents it from cracking or splitting off. I have found an iron case as good as any for this purpose.

My proceedings in making the spindle-steps are these: I take an iron cast of the form and size indicated in sectional elevation in Figure 1. This case is solid for about one-third of its length, as indicated, and has a cylindrical hole bored in it about one-half inch in diameter and about one inch deep. These dimensions, however, are purely arbitrary, and may be varied to any extent to suit the dimensions of the spindle end. The cases I use are cast and tooled.

I now place my case in a frame or mold, (shown in section in Fig. 2,) as follows: This frame consists of two parts, one, A, being a solid block, with a hole in the middle just large enough to contain the iron case, and of the same height, and another block, B, of the same horizontal diameter as the block A, but having a hole in its middle of exactly the diameter of the hole in the iron case, but nearly twice as long. This proportion of length is observed for convenience, for I have found that when they are in position the continuous tube of the block B and of the iron case contains just enough of the powder to fill the case properly when compressed, and at the same time retain its lubricating quality at the best. I now place the case in the block A and place the block B on block A, so that the hole in block B and that in the case form one continuous hole of uniform diameter. This continuous hole I now fill with the powder even with the top. The powder must now be compressed in such a way that it shall all be crowded into the case, and preserve a seat for the spindle end to revolve in. For this purpose I use a pin (shown in elevation in Fig. 3) the main portion *a* of which is of the same length exactly as the hole in the block B of the mold, and of a size to fit into it snugly. The projection *b* is of the same dimensions as the spindle end which is to revolve in the bearing, and is intended to mold the socket in the bearing to receive the spindle. This pin is now placed on the powder in the mold and forced down by strong pressure until it is entirely within block B of the mold, its upper end being flush with the top of block B. In this way the powder is forced into the hole in the iron case, and remains in the desired form of a journal-bearing, as indicated in Fig. 4. The best means of compression for this purpose I have found to be hydraulic pressure of ten tons. The powder having been thus compressed into the desired form, the next and last step is to vulcanize it, which I do at a temperature of about 260° Fahrenheit. This heat, acting upon the sulphur, fuses it, and causes it to penetrate the whole mass, the result of which is, that the compound becomes a solid, firm material. The step is now ready for use.

In vulcanizing, the heat may be applied with the pin in or out at pleasure. I find it most convenient to remove the pin and sleeve.

The bolster is made in a similar manner. It consists of an iron tube or case about one and one-half inch long, fifteen-sixteenths of an inch in diameter, with a hole about five-eighths of an inch in diameter.

In packing the powder into the bolster, I place it on end, and on its upper end I place another tube of the same size, but nearly twice as long, so that the holes of the two tubes shall form one continuous hole of uniform diameter. Into this hole I place a pin of the size of the spindle at the point where it is to turn in the bolster, and of the length of the two tubes combined. This pin runs through the length of the hole, and stands in a position concentric with the tubes. I then pour in powder around the pin until the two tubes are full to the top. I then, by the same means as before described, press a sleeve upon the powder until it is all packed into the lower tube around the pin. This sleeve is a tube of a size to fit snugly into and fill all the space between the pin and the inner sides of the tubes. The sleeve and upper tube and pin are then removed, and the powder remains in the lower tube compressed into the desired form. It is then vulcanized, and is then ready for use as a bolster.

I have found it best to leave in the lower end of the bolster a shoulder of from one-eighth to one-sixteenth of an inch in thickness, and such as to make the diameter of the tube at that point a little larger than the diameter of the bolster-hole when filled with the compressed powder, so that the spindle shall not touch it. The reason of this is, that the mill-hands, when they remove the bobbin from the spindles, pull them up with such force that the shoulder of the spindle strikes against the lower end of the bolster, and might break the compound if it were not protected. The shoulder in the bolster prevents this, and does not interfere with the lubrication.

My journal-bearing, then, consists of a compound prepared as described, which is re-enforced by a case which may be of iron, brass, or any other desired material. The proportions I have given are those which I have successfully used for spindle-bearings actually made.

It is important to ascertain precisely what degree of solidity shall be given to the compound. The greater the quantity of powder that is compressed into a given space the more solid does the resulting mass become and the less readily does it lubricate. It therefore follows that the compression must be increased in proportion to the weight and pressure which the bearing will have to sustain, and the amount

of such compression must be ascertained by experiment in relation to each class of bearings.

Asbestus and plumbago are non-conductors of heat, and the plumbago has an inherent property of lubrication. These ingredients, when united with the sulphur by vulcanization, form a compound which lubricates itself.

Having thus described my said invention, what I claim, and desire to secure by Letters Patent, is as follows:

1. As a new composition of matter, the combination of plumbago, asbestus, and sulphur, substantially as herein described.

2. As a new composition of matter, the combination of asbestus, sulphur, and plumbago, in three or nearly equal parts by volume, as herein described.

3. The method of combining asbestus, sulphur, and plumbago by reducing them to powder and thoroughly mixing them together, and by then subjecting the pulverulent compound, in a mold, first to pressure and then to heat, as herein set forth.

4. As a new article of manufacture, self-lubricating journal-bearings consisting of a plumbago, asbestus, and sulphur compound united with an iron or other metallic casing, into which it is compressed and molded, substantially as herein set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN JOHNSON.

Witnesses:
L. BRISBANE,
ALEX. CAMERON.