June 9, 1925. 1,541,001

R. R. SEARLES

LAPPING MACHINE

Filed Dec. 4, 1920 2 Sheets-Sheet 1

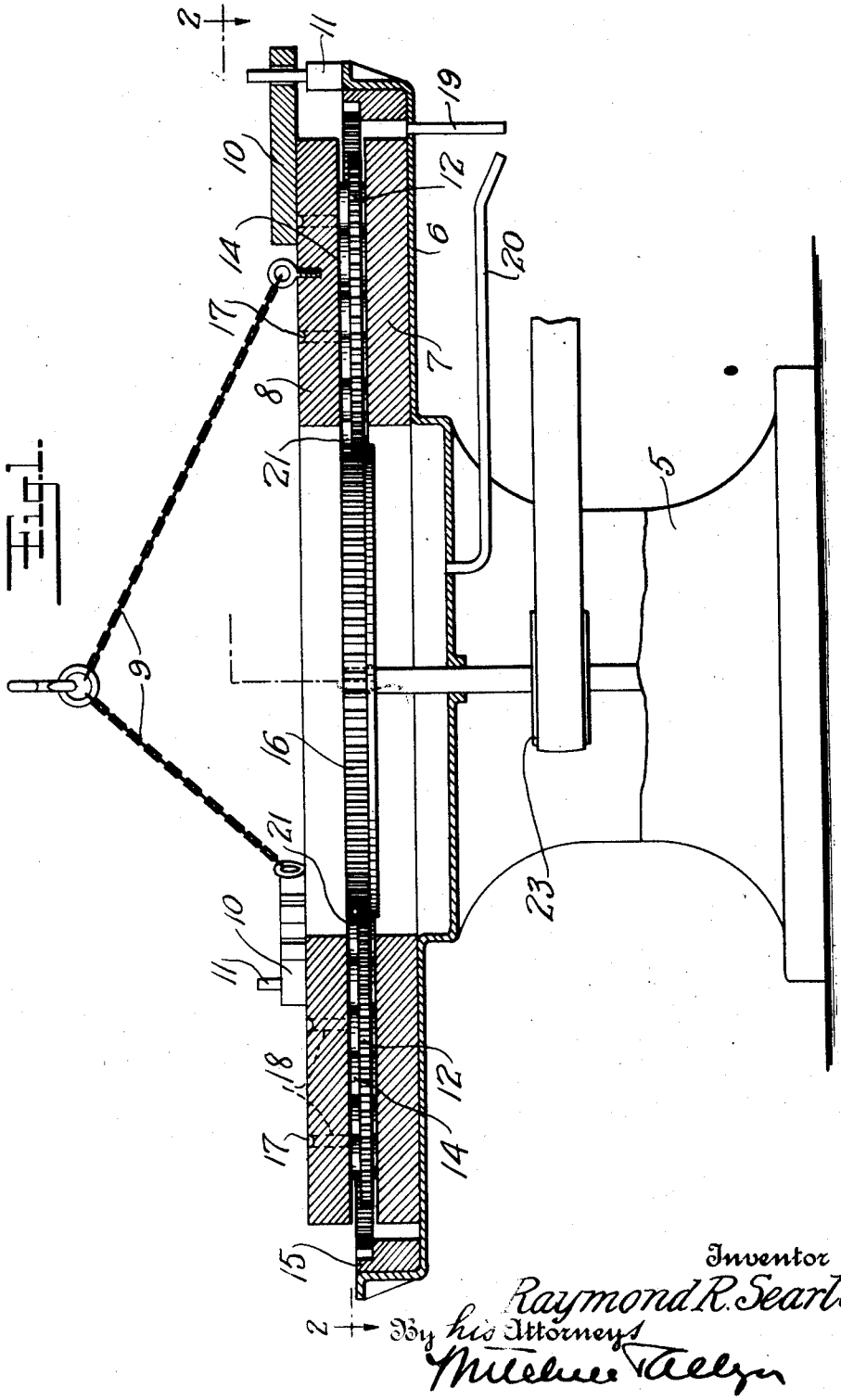


Fig. 1.

Inventor
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By his Attorneys
Mitchell & Allyn

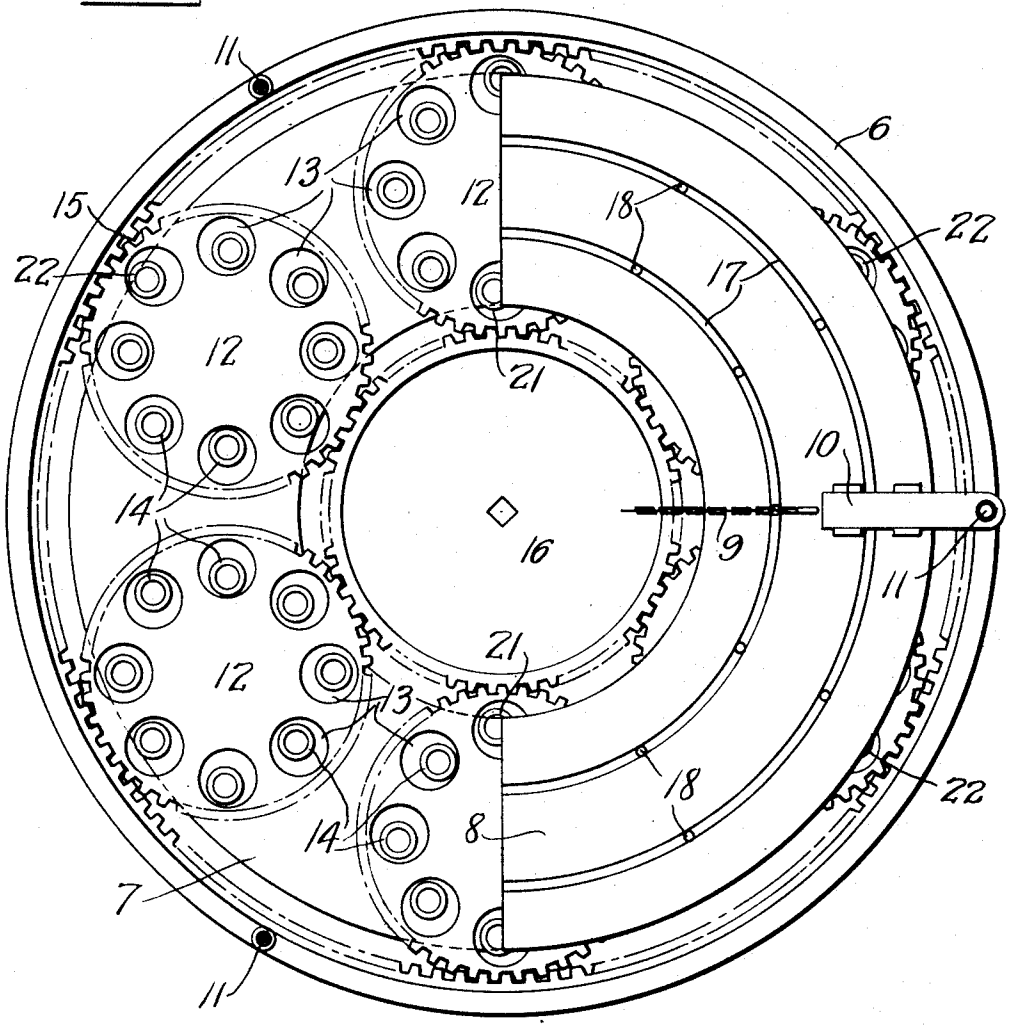
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Fig 2.



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Patented June 9, 1925. 1,541,001

UNITED STATES PATENT OFFICE.

RAYMOND R. SEARLES, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR TO THE FAFNIR BEARING COMPANY, OF NEW BRITAIN, CONNECTICUT, A CORPORATION OF CONNECTICUT.

LAPPING MACHINE.

Application filed December 4, 1920. Serial No. 428,238.

To all whom it may concern:

Be it known that I, RAYMOND R. SEARLES, a citizen of the United States of America, residing at New Britain, Hartford County, Connecticut, have invented a new and useful Lapping Machine, of which the following is a specification.

My invention relates to a lapping or grinding machine, and is particularly adapted for grinding or lapping parallel surfaces on articles, but is adapted to lap or grind the surfaces of other articles such as balls and cylinders not having parallel surfaces.

It is an object of my invention to provide a machine wherein surfaces may be lapped on articles and a very high degree of accuracy and uniformity in the finished product obtained.

It is a further object to provide a machine in which the lapping or grinding surfaces will be worn down evenly.

In general, the object is to provide a very simple and highly efficient machine of the character indicated.

In the preferred form of my invention, a pair of discs are provided, and one or more work carriers are interposed between the discs. These carriers are adapted to carry the articles to be lapped and hold the same between the discs. The carriers are given a planetary movement between the discs, while the articles carried by the carriers are given a movement between the discs which may be generally characterized as a cycloidal movement as more particularly described hereinafter.

In the drawings which show merely a preferred form of my invention,

Fig. 1 is a central vertical sectional view of a lapping machine embodying the features of my invention.

Fig. 2 is a sectional view taken substantially in the plane of the line 2—2 of Fig. 1.

In said drawings, 5 indicates a main frame or pedestal of any suitable design. Within the upper portion 6 of the frame is mounted a grinding or lapping disc 7, and mounted oppositely thereto is a second grinding or lapping disc 8. These discs are, in the preferred form, non-rotatable. One of the discs, in this case, the disc 8, is provided with any suitable means such as chains 9 for separating the discs 7 and 8. In order to prevent the disc 8 from rotating I have shown means in the form of apertured bars 10 fitting over pins 11 supported from the frame.

Means are provided for holding articles to be lapped between the discs. In the preferred form shown I have indicated a plurality of carriers 12 in the form of discs. These carriers are provided with eccentrically located apertures 13 which are preferably sufficiently large to loosely hold one or more articles 14 to be lapped. The carriers and pair of lapping discs are moved or rotated relatively to each other. In the form shown, the lapping discs are non-rotatably mounted and carriers are rotated between them.

Mounted or formed in the frame is an internal gear 15, and mounted preferably concentrically in the frame is a spur gear 16. The peripheries of the carriers are provided with gear teeth which mesh with both the internal and spur gears. It is therefore obvious that upon rotation of one of the gears, for example the spur gear 16, each carrier 12 will rotate about the axis of the machine and also about its own individual axis, that is to say, it will partake of a planetary movement. The articles in the carriers will therefore be moved in a substantially cycloidal curve which would be hypocycloidal if the driving were done by the spur gear 16, and epicycloidal if the gear 15 were the driving gear.

Means may be provided for introducing an abrasive substance between the articles and the lapping discs. In the form shown the disc 8 is provided on its upper surface with one or more grooves 17, and the bottoms of the grooves are provided at intervals with apertures 18 extending through the disc 8. It will be obvious that an abrasive, such as emery dust and oil, introduced into the grooves 17 will work its way between the articles and the lower surface of the upper disc, and then down between the articles and the upper surface of the lower disc. The

excess abrasive material will run down into the space between the frame and the lower disc and may be removed through the pipes 19 and 20.

It should be noted that the discs and article carriers are so proportioned that during the passage of the carriers about the discs some or all of the articles being lapped will pass beyond the edges of the discs, as indicated at 21, 22. This passage of the articles completely across the discs and beyond both edges will insure an even wearing of the latter and prevent shoulders or other irregularities from forming on the surfaces of the discs adjacent the edges.

The operation of the machine is as follows:

The discs 7 and 8 are separated and a plurality of articles, such as rings or bushings 14, are introduced into apertures 13 in the article carriers. The heavy plate 8 is then lowered and the articles in the carriers are held between the discs 7 and 8. The carriers are then rotated as by means of the pulley 23 on the shaft of spur gear 16. The abrasive substance which has been placed in the grooves 17 will work its way between the articles and the surfaces of the lapping discs. The articles in the carriers will then be made to travel around and across the surfaces of the discs in a cycloidal path or curve. The articles themselves may also rotate or oscillate within the openings in the carriers. By this arrangement the articles 14 are bound to traverse substantially the entire surface of each lapping disc and hence wear on the latter will be uniform which insures durability and accuracy of operation for a long period. If the articles, when introduced, are of various sizes, the larger articles will, of course, be first lapped down to the size of the smaller articles, and the lapping operation should continue until all have been lapped to an accurate uniform dimension.

While I have shown the lapping discs as mounted horizontally, in which case the weight of the disc 8 serves to produce the required pressure between the articles and discs for abrading the articles, I do not wish to have it understood that all claims are limited thereto.

While I have described the invention as particularly adapted to lapping parallel surfaces, it is of course obvious that the machine may be used for lapping other than parallel surfaces. It is also obvious that the invention is not confined to strictly lapping operations, but that one or both discs of inherently abrasive material may be substituted for the lapping discs shown.

While I have shown a specific embodiment of my invention, I wish it to be understood that various modifications and changes may be made therein within the scope of the appended claims.

I claim:

1. In a lapping machine, a pair of discs, a plurality of work carriers between said discs adapted to hold articles to be lapped, and means for moving said carriers between said discs and relatively thereto to cause each of said carriers to have a planetary motion.

2. In a lapping machine, a pair of discs, a plurality of work carriers between said discs adapted to hold articles to be lapped, and means for moving said carriers between said discs and relatively thereto to cause each of said carriers to have a planetary motion, said carriers having a plurality of apertures located eccentrically for receiving said articles to be lapped whereby said articles will move in a cycloidal path between said discs.

3. In a lapping machine, a pair of discs, a plurality of work carriers between said discs adapted to hold articles to be lapped, and means for moving said carriers between said discs and relatively thereto, said carriers to have a planetary motion, said carriers having a plurality of apertures located eccentrically for receiving said articles to be lapped whereby said articles will move in a cycloidal path between said discs, said carrier operating to cause parts of said articles to project slightly beyond the edges of the discs during the lapping operation to produce uniform wear throughout the lapping surfaces.

4. In a lapping machine, a pair of discs having lapping surfaces, work carriers mounted between said discs said carriers having eccentric apertures therein for receiving articles to be lapped, means for causing said work carriers to have a planetary movement, whereby the same will traverse around and around the discs, and whereby the individual articles carried thereby will be caused to move in a cycloidal path between and around said discs.

5. In a lapping machine, a pair of discs having lapping surfaces, work carriers mounted between said discs and having eccentric apertures for receiving articles to be lapped, means for causing said work carriers to have a planetary movement, whereby the same will traverse around and around the discs, and whereby the individual articles carried thereby will be caused to move in a cycloidal path between and around said discs, the apertures being sufficiently large to loosely hold said articles, whereby said articles may also have limited independent shifting movement in said apertures during the lapping operation.

6. In a lapping machine or the like, a disc, a work carrier adjacent thereto and adapted to have a planetary motion relatively to the working face of said disc, said carrier being constructed to eccentrically and separately support articles to be worked upon whereby

said articles will partake of a cycloidal movement around the working surface of said disc during the operation of said machine.

7. In a lapping machine, two opposed lapping discs, a work carrier positioned between the discs and constructed to carry articles to be lapped in a ring-like series at one side of the center of said discs, and means for positively moving said work carrier whereby said articles may partake of a planetary movement between said discs at one side of the center of the latter.

RAYMOND R. SEARLES.