Aug. 28, 1962 A. F. LICHTENFELD 3,050,910

AUTOMATIC LAPPING MACHINE

Filed Dec. 21, 1959 3 Sheets-Sheet 1

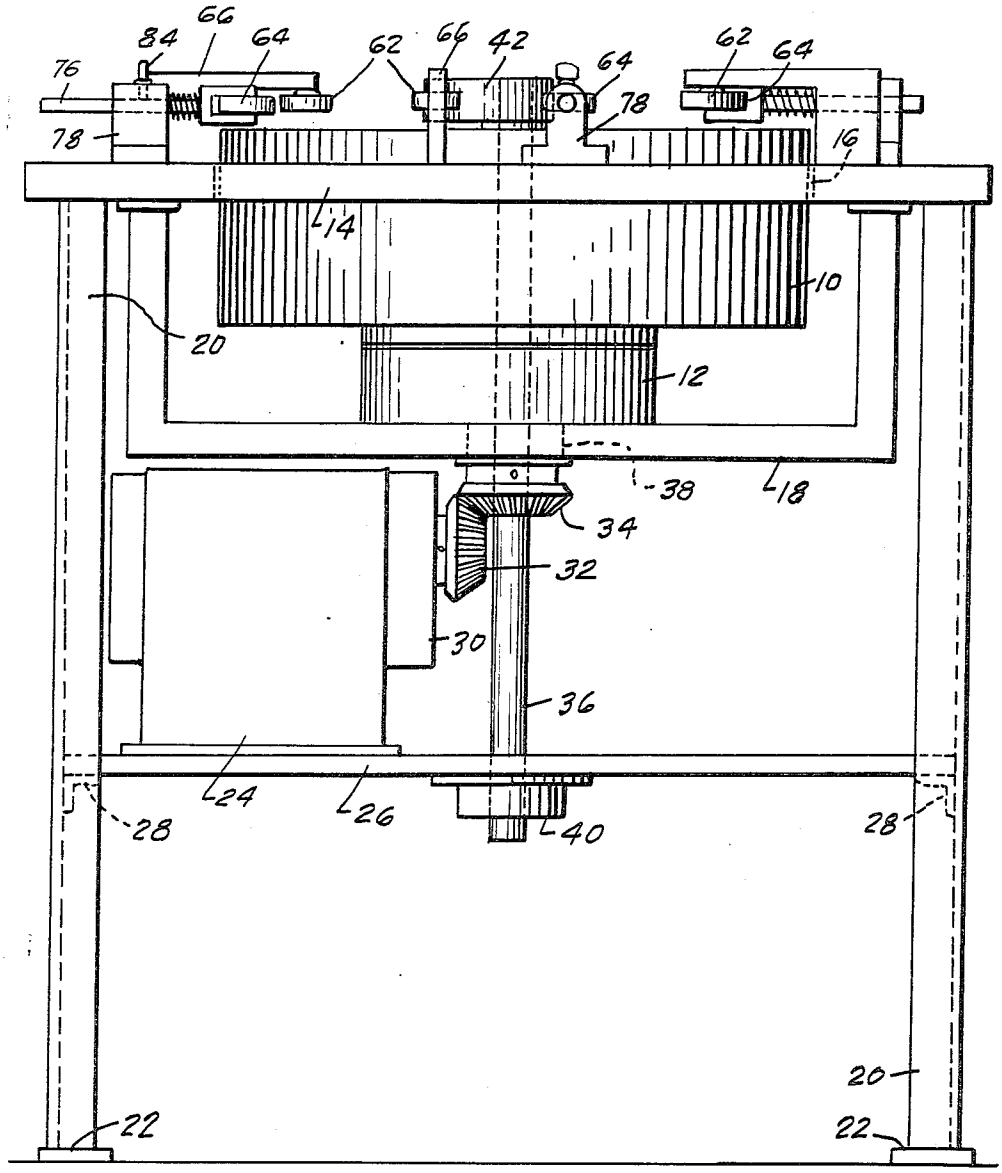


FIG. 1.

INVENTOR.
ALFRED F. LICHTENFELD
BY
Harry N. Hitzeman
ATTORNEY.

Aug. 28, 1962 A. F. LICHTENFELD 3,050,910

AUTOMATIC LAPPING MACHINE

Filed Dec. 21, 1959 3 Sheets-Sheet 2

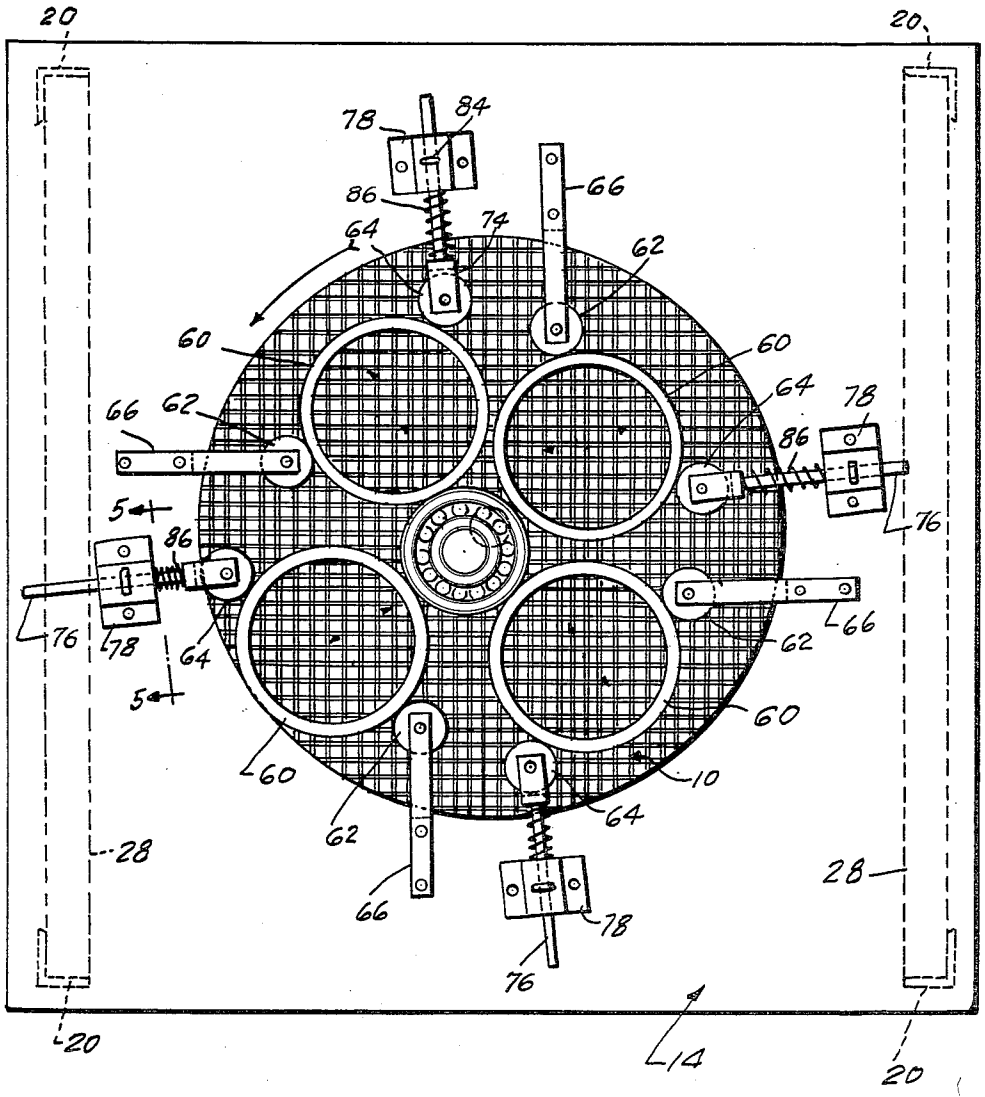


FIG. 2.

INVENTOR.
ALFRED F. LICHTENFELD
BY
Harry N. Huffman
ATTORNEY.

Aug. 28, 1962 A. F. LICHTENFELD 3,050,910

AUTOMATIC LAPPING MACHINE

Filed Dec. 21, 1959 3 Sheets-Sheet 3

FIG. 3.

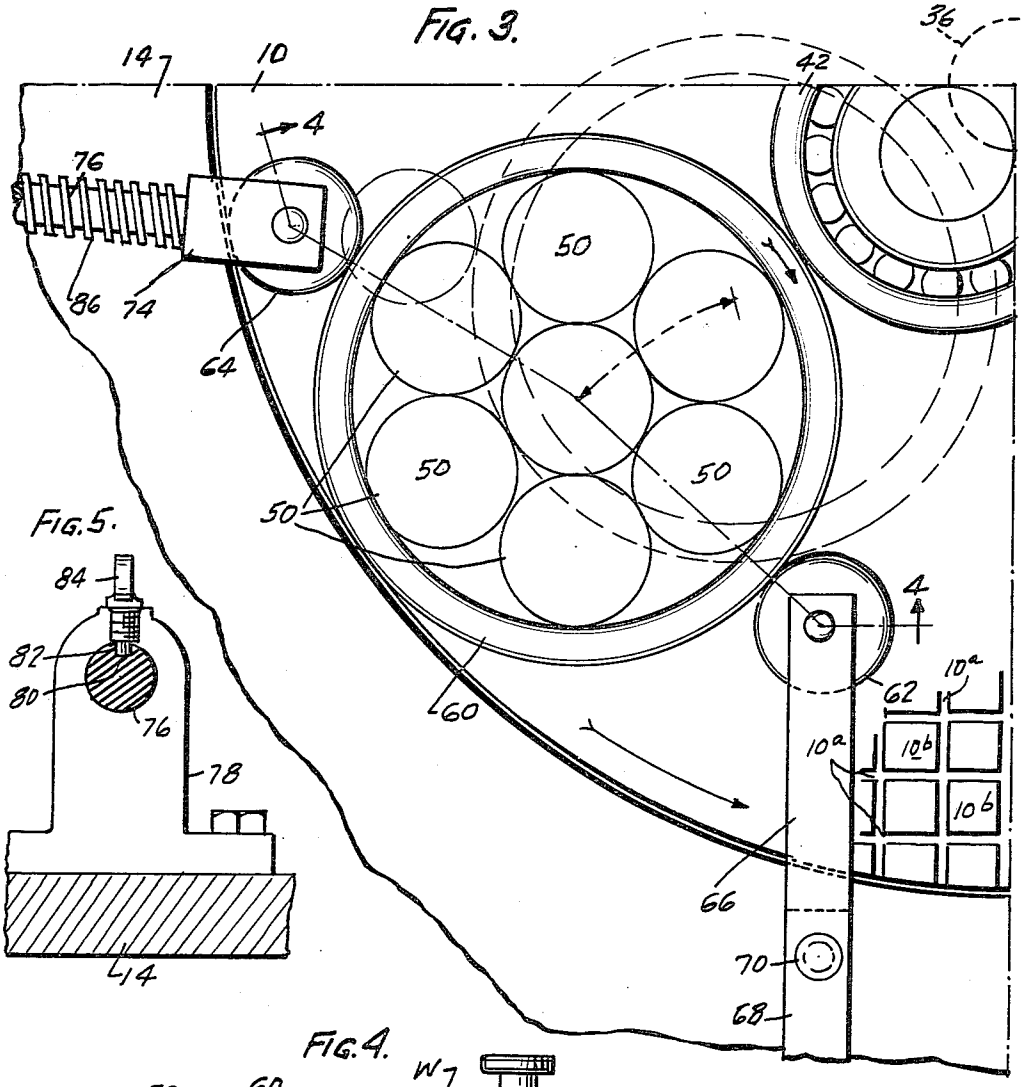
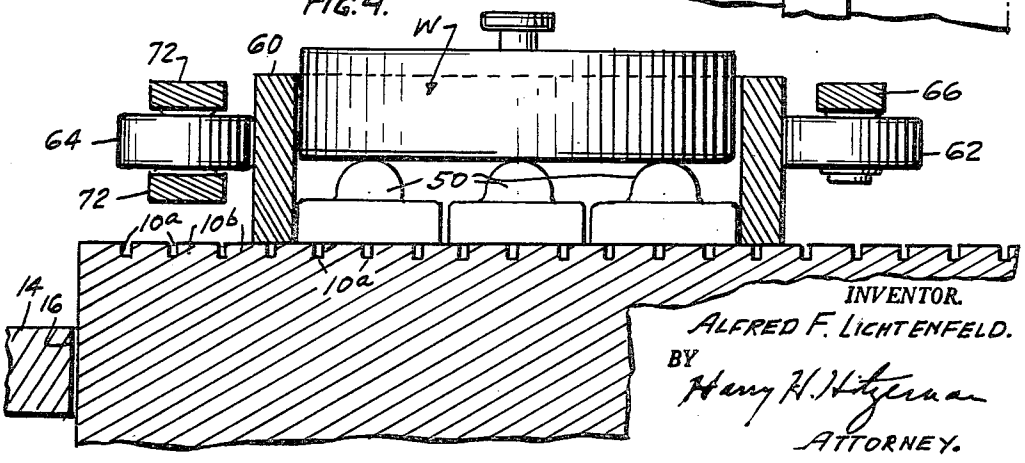


FIG. 5.

FIG. 4.



INVENTOR.
ALFRED F. LICHTENFELD.
BY
Harry H. Hitzeman
ATTORNEY.

United States Patent Office 3,050,910 Patented Aug. 28, 1962

3,050,910

AUTOMATIC LAPPING MACHINE

Alfred F. Lichtenfeld, Glenview, Ill.; Hedwig Lichtenfeld, executrix of said Alfred F. Lichtenfeld, deceased, assignor of one-half to Harry J. Harris, Melrose Park, Ill.

Filed Dec. 21, 1959, Ser. No. 860,957
2 Claims. (Cl. 51—129)

My invention relates to improvements in automatic lapping machines.

My invention relates more particularly to a lapping machine of the type having a horizontally disposed rotary lapping plate or platform and means associated with the drive for said lapping plate for effecting an oscillatory or rotary movement of objects being face lapped upon the face or surface of the lapping plate.

The principal object of my invention is to provide an improved lapping machine having automatic means for moving work pieces back and forth over the lapping surface of the lapping plate while the same is being rotated.

A further object of my invention is to provide in combination with the above, means for pressing the surface of the work piece down against the lapping surface at a desired pressure.

A further object of the invention is to provide a lapping machine capable of operation in the manner described which can employ a plurality of work piece holding pots so that a greatly increased number of work pieces may be treated at the same time.

Other objects and advantages will be more apparent from the following description wherein reference is had to the accompanying drawings, upon which

FIG. 1 is a side elevational view of my improved face lapping machine;

FIG. 2 is a plan view thereof;

FIG. 3 is a fragmentary plan view of approximately one-fourth of the lapping plate and the mechanism associated with each quadrant of the same;

FIG. 4 is generally a cross-sectional view taken on the lines 4—4 of FIG. 3; and

FIG. 5 is a fragmentary section taken on the lines 5—5 of FIG. 2.

In the embodiment of the invention which I have chosen to illustrate and described the same, I have provided the usual lapping plate which in the present instance may be a cylindrical plate **10** that is comparatively thick in cross-section and mounted for rotation upon a comparatively large radial thrust bearing **12**, the lapping plate being adapted to extend above the surface of the work table **14** approximately 1 inch, the plate being positioned in a medially spaced opening **16** in the work table **14**. The combined radial and thrust bearing may be supported on a horizontal shelf **18** that is suspended below the work table **14**, the table being preferably square and having at its four corners support legs **20** mounted upon foot pads **22**. The driving motor **24** may be positioned upon a suitable shelf **26** supported by angle members **28** at its ends, the angle members **28** being connected between table legs **20**.

The motor **24** may have a gear reducer **30** associated therewith to reduce the speed of the driven bevelled gear **32** to approximately 60 r.p.m. The bevelled gear **32** is in mesh with a similar gear **34** keyed to a vertically disposed drive shaft **36**, the shaft **36** being journaled in suitable bearing mounts **38** and **40** supported by the upper shelf **18** and the motor shelf **26**. The upper end of the drive shaft **36** is of course keyed to the lapping plate **10** and may extend therethrough and have a ball bearing unit **42** eccentrically mounted on the top end of the same.

The ball bearing race **42**, in the embodiment of the invention illustrated, has been shown as being offset approximately 1 inch so that as it rotates it will have a two inch outward travel from the inner to the outer edges of its eccentric circle. This thus effects approximately a two-inch movement of any object that engages the side of the same.

The lapping plate **10** that is used by users for face lapping work pieces **50**, is of the type that has the parallel grooves **10***a* throughout its surface, providing square raised block formations **10***b* on the lapping surface of the plate **10**, and it is the action of these blocks as they wipe over the surface of a work piece covered with lapping compound that has the effect of producing the lapped surface desired on the work piece.

The lapping compounds are of course well known in the art, as well as the general features of the lapping surface of the plate **10**, and further description will not be made, as it is only necessary to remember that any suitable or desirable lapping surface and any suitable or desirable lapping compound may be employed.

In using my improved machine, work pieces are placed in a lapping pot **60**, which may be in the nature of a metal ring of a desired height, the metal ring being guided in its action while the table is revolving by a pair of ball bearing rollers **62** and **64** which bear against the sides of the same, as best shown in FIG. 4. Each of the rollers **62** may be held by a support bracket **66** that extends above the same and may have a base portion **68** fastened on the table top **14** by screw members **70**. Each of the rollers **64** may be carried between the jaws **72** of a U-shaped bracket **74** fastened to the forward end of a rod **76**. The rod **76** is mounted in a bearing block **78**, the rod **76** having a key slot **80** which receives a pin extension **82** of a thumb screw **84** that is screw-threadedly mounted in the bearing **78**.

A coiled spring member **86** normally urges the roller support **74** inwardly toward the center of the lapping plate **10** so that, as best illustrated in FIGS. 2 and 3, each lapping pot **60** is held during its back and forth movement as caused by the rotation of the eccentric ball bearing **42**, between the rollers **64** and **62**. Since the roller **64** is spring mounted, it will yield and permit movement of the pot **60** from the full line position shown in FIG. 3, to the dotted line position, at all times being yieldingly held by the spring pressed roller **64** which assumes the dotted line position shown in FIG. 3. The arrow on a radius about the center of the roller **62** shows the amount of travel of the pot **60** and the arcuate path which it takes.

With this construction, when the lapping plate is being rotated at approximately 100 r.p.m., and the pots **60** are positioned as shown with work pieces in the same, rotation of the lapping plate will cause a rotation of the pots **60** by reason of their edge contact with the ball bearing race, the edge contact with the ball bearing rollers **62** and **64** permitting easy rotation of the pots.

Thus, while the work pieces are held against the face of the lapping plate by a weight W of desired amount placed over them in the pot **60**, they may be rotated while they are moved back and forth through a segment of an arc, and at the same time the squares of the surface edge of the lapping plate are moving across them in a circular movement.

As can be seen from the arrangement of the guide rollers on FIG. 2, in the size lapping plate used four lapping pots may be simultaneously used, thus giving a maximum efficiency to the operation of the lapping plate. In the event a larger diameter lapping plate is used, it is possible to provide for the employment of more pots, the size and arrangement depending primarily on the diameter of the lapping plate being used.

From the above and foregoing description, it will be

apparent to those skilled in the art that I have provided a highly efficient and capable automatic lapping machine, one which should give long and efficient use without becoming broken or out of order. I contemplate that changes and modifications may be made in the exact details shown and I do not wish to be limited in any particular; rather what I desire to secure and protect by Letters Patent of the United States is:

1. The combination with a rotatable lapping plate of means for holding a lapping pot on said plate and moving the same back and forth while said plate is rotating, said means comprising an eccentric unit on the lapping plate, a fixed lapping pot holding arm and a movable holding arm, said eccentric unit and said holding arms being adapted to engage a lapping pot at three points of contact.

2. The combination with a rotatable lapping plate of means for holding a lapping pot on said plate and moving the same back and forth while said plate is rotating, said means comprising an eccentric unit on the lapping plate, a fixed holding arm and a movable holding arm, said eccentric unit and said holding arms being adapted to engage a lapping pot at three points of contact, said fixed and said movable arms each having a roller for engagement with said lapping pot.

References Cited in the file of this patent

UNITED STATES PATENTS

1,419,740	Kronable	June 13, 1922
2,274,332	Jarrett	Feb. 24, 1942
2,627,144	Roshong	Feb. 3, 1953
2,722,785	Porter et al.	Nov. 8, 1955
2,740,237	Day et al.	Apr. 3, 1956
2,870,580	Norton	Jan. 27, 1959
2,883,803	Stead	Apr. 28, 1959