

July 16, 1940.

M. G. FIEDLER

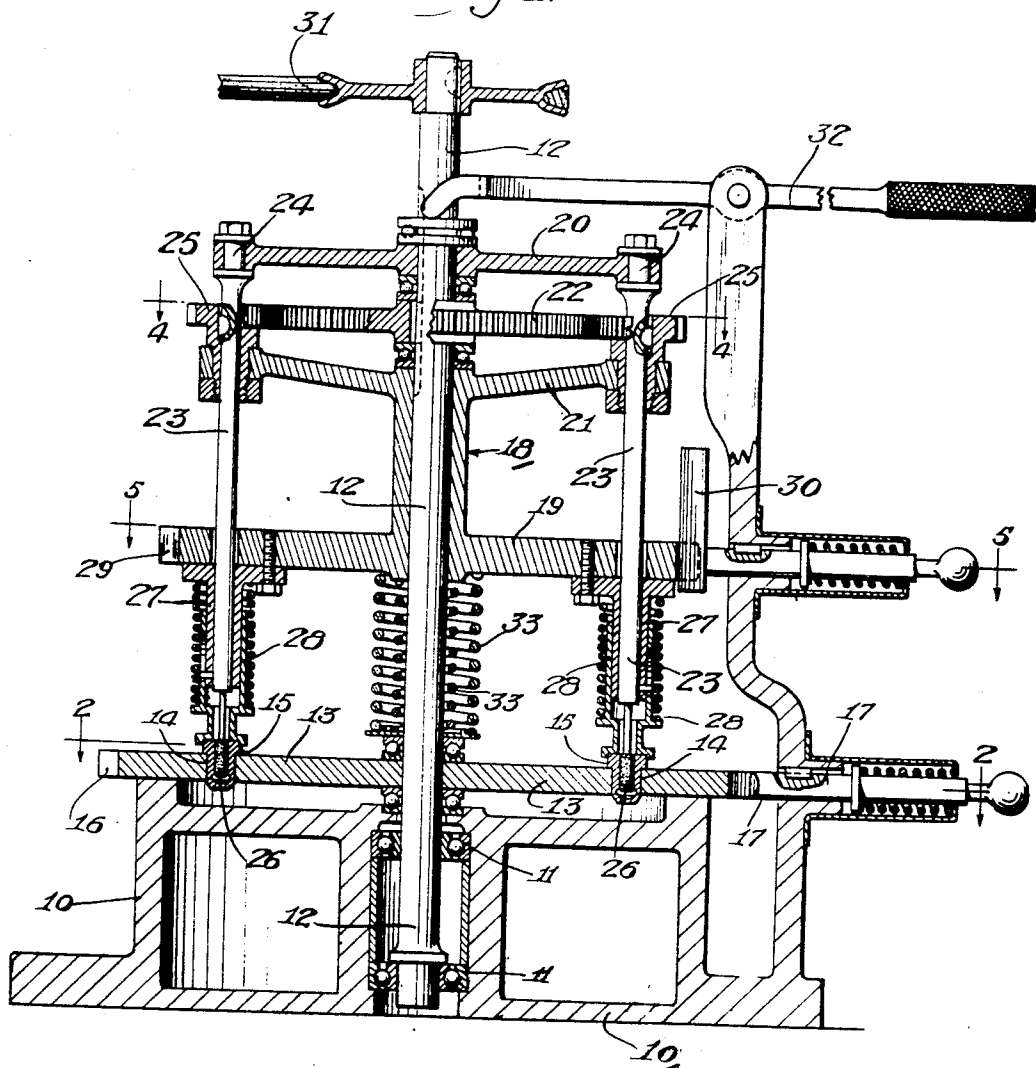
2,208,499

LAPPING MACHINE

Filed Oct. 10, 1939

3 Sheets-Sheet 1

Fig. 1.



Inventor:—
 Max. George Fiedler
 by his Attorneys
 Howson, Howson

July 16, 1940.

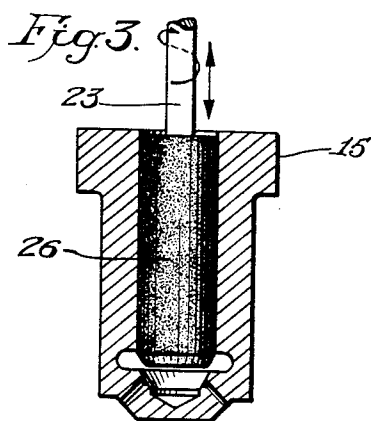
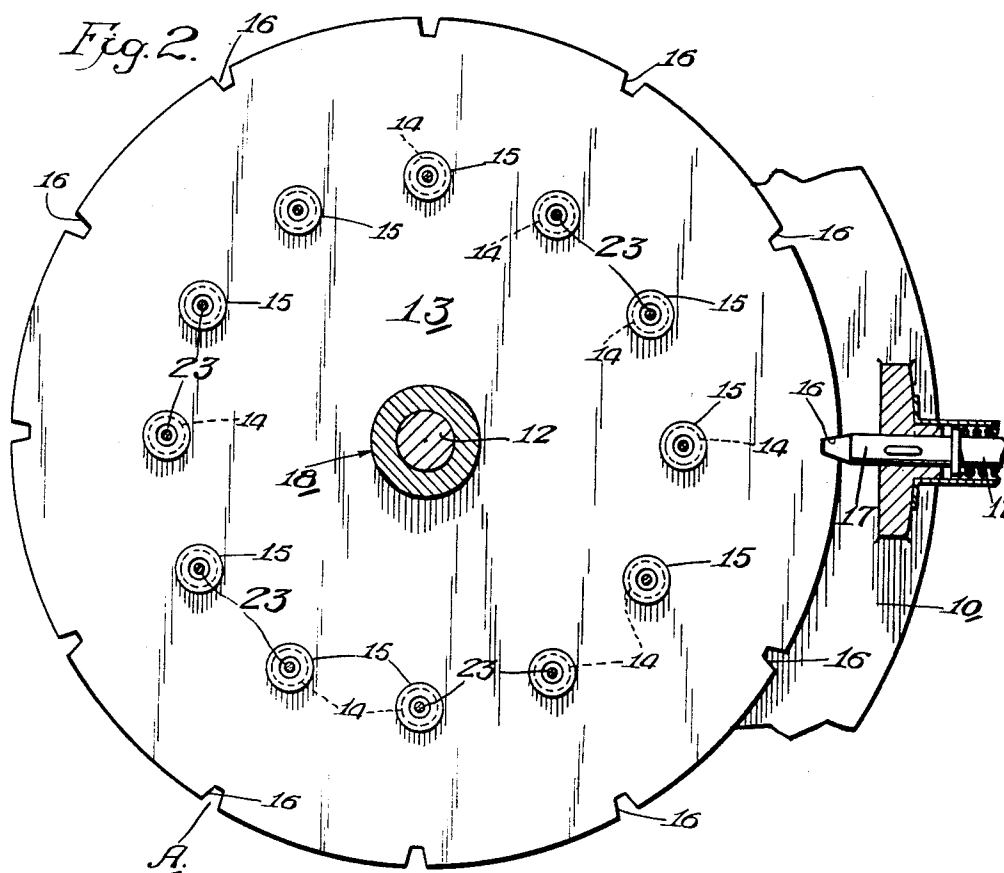
M. G. FIEDLER

2,208,499

LAPPING MACHINE

Filed Oct. 10, 1939

3 Sheets-Sheet 2



Inventor:—
 Max George Fiedler
 by his Attorneys
 Howson & Howson

July 16, 1940.

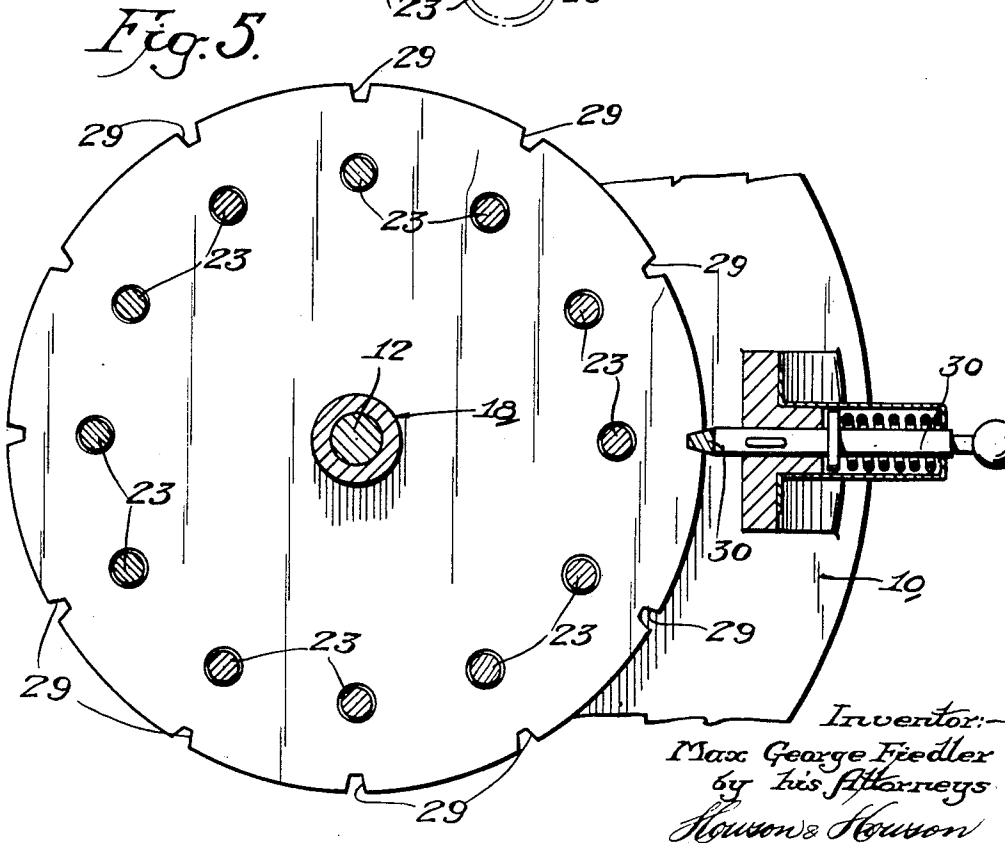
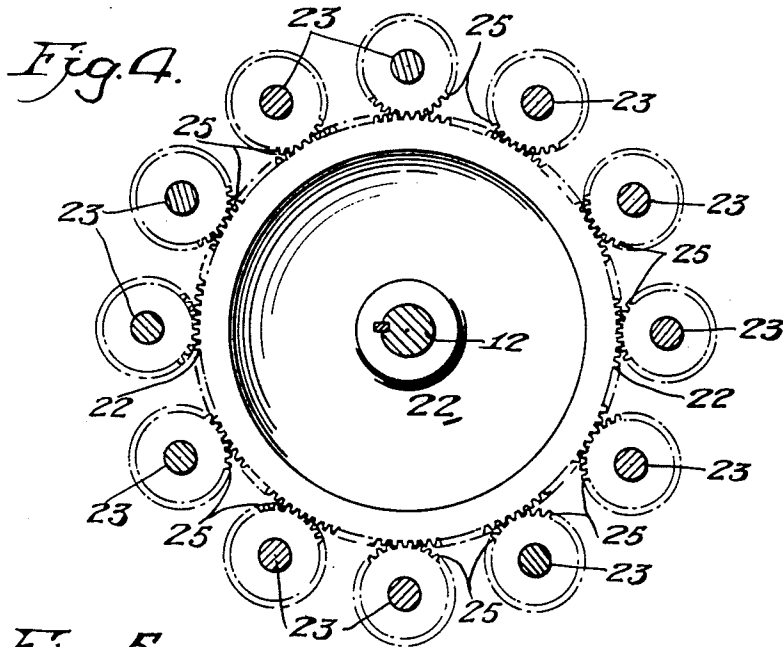
M. G. FIEDLER

2,208,499

LAPPING MACHINE

Filed Oct. 10, 1939

3 Sheets-Sheet 3



Inventor:-
Max George Friedler
by his Attorneys
Houder & Houder

Patented July 16, 1940

2,208,499

UNITED STATES PATENT OFFICE

2,208,499

LAPPING MACHINE

Max George Fiedler, Media, Pa., assignor to
Fiedler-Sellers Corporation, Philadelphia, Pa.,
a corporation of Pennsylvania

Application October 10, 1939, Serial No. 298,858

12 Claims. (Cl. 51—53)

This invention relates to lapping machines and, more particularly, to that type of lapping machine wherein the article being lapped is subjected to the action of a series of lapping elements.

Heretofore, the usual practice in lapping devices of this character has been to produce a plurality of lapping elements graded in size from the smallest to the ultimate size, replacing each size as the lap becomes sufficiently worn. This procedure, obviously, incurs considerable cost in production of the lapping elements and involves considerable time in refitting the lapping machines, particularly where, as in the case of the injection valve holders of Diesel engine injection apparatus, the tolerances are extremely low.

An important object of this invention is the provision of a lapping apparatus so constructed that it is merely necessary to produce a single size of lapping element and in which it is unnecessary to change more than a single lapping element at each renewal of the machine.

Further objects of the invention are the production of a device of this character which may be readily and cheaply manufactured, which will be durable and efficient in service and a general improvement in the art.

These and other objects I attain by the construction shown in the accompanying drawings wherein, for the purpose of illustration, I have shown a preferred embodiment of my invention and wherein:

Fig. 1 is a vertical sectional view through lapping apparatus constructed in accordance with my invention;

Fig. 2 is a section on line 2—2 of Fig. 1;

Fig. 3 is a detail sectional view showing a single lapping element;

Fig. 4 is a section on line 4—4 of Fig. 1; and

Fig. 5 is a section on line 5—5 of Fig. 1.

Referring now more particularly to the drawings, the numeral 10 indicates a suitable base rotatably supporting through bearings 11 a vertical shaft 12. Surrounding this shaft and rotatable thereabout is a table 13 having sockets 14 for the reception of the elements to be lapped, at present shown as valve bodies 15 of Diesel injection nozzles. The support of table 13 is such that the table may be rotated relatively to the shaft, and that the shaft in turn may rotate within the table while the table is stationary. To this end, the periphery of the table is provided with a series of notches 16 which may be selectively engaged by a releasable latch element 17. The notches 16 correspond in number and arrangement to the sockets 14 and each socket may, accordingly be

aligned with a selected loading station which, for the purposes of this description, may be taken as the position indicated at A in Fig. 2.

About the shaft above the table 13 a reciprocable unit 18 is mounted, this unit including a lower disc element 19 and spaced upper disc elements 20 and 21 between which upper disc elements a gear 22 keyed to shaft 12 is mounted for a purpose presently to appear. The discs 19, 20 and 21 mount spindles 23, these spindles being rotatably secured in the uppermost disc element 20 as at 24, and rotatably directed through the disc elements 21 and 19. Each spindle has secured thereto a pinion 25 meshing with gear 22 so that upon rotation of shaft 12 the spindles are rotated at high speeds. The lower end of each spindle carries a lapping element 26 for engagement with the elements to be lapped and the lower disc 19 has at its lower surface a guide 27 for each spindle 23, each guide having associated therewith a spring-pressed holder 28 to engage the member to be lapped and hold the same in position in its socket during the lapping operation. The reciprocable unit 18 is, as in the case of table 13, mounted for rotatable adjustment about shaft 12 and to permit the shaft to rotate with relation thereto. It is, likewise, provided with a series of notches 29 corresponding in number and arrangement to the spindles 23, such notches being adapted to be selectively engaged by a spring-pressed latch 30. Means are provided, as at 31, for rotating shaft 12 and as at 32 for shifting the reciprocating unit downwardly, return movement thereof being obtained through springs 33.

It will be obvious that with a structure of this character it is possible, from a single loading station, to successively remove lapped elements and replace the same with units to be lapped simply by rotating table 13 in a step-by-step movement, or the same effect could be obtained by rotating the reciprocating unit 18 in a similar step-by-step movement. It is to be understood that the laps, which are at present indicated as being 12 in number, will be graded as to size, starting with the smallest and ending with the largest lap. Obviously, since laps depend upon friction for their effect, the laps in service will all wear slightly. By reason of the fact that both table 13 and unit 18 may be rotated in step-by-step relation, it becomes possible to produce a single size of lap and maintain the machine in operation after operation has once been started. When the laps become sufficiently worn, the smallest size lap of the previous series is removed and replaced by one of the larger size, the adjust-

ment to the loading and replacing station A being accomplished by relative rotation through one step of the table 13 and unit 18. By employing this method of operation the production may be materially speeded up and its cost, furthermore, reduced by reason of the fact that it no longer becomes necessary to produce a plurality of different sizes of laps.

Since the construction illustrated herein is one of many forms which my invention may take, I do not wish to be understood as limiting myself thereto except as hereinafter claimed.

I claim:

1. In a lapping machine, a series of reciprocable members each bearing a lapping element, a corresponding series of holders adapted to receive articles to be lapped, means to circumferentially adjust said series of members to successively align the same with a given one of said holders, means to circumferentially adjust said series of holders, and means to reciprocate said members.

2. In a lapping machine, a series of reciprocable members each bearing a lapping element, a corresponding series of holders adapted to receive articles to be lapped, means to circumferentially adjust said series of members to successively align the same with a given one of said holders, means to rotate said members, means to circumferentially adjust said series of holders, and means to reciprocate said members.

3. In a lapping machine, a series of reciprocable members each bearing a lapping element, a corresponding series of holders adapted to receive articles to be lapped, step-by-step means to circumferentially adjust said series of members to successively align the same with a given one of said holders, step-by-step means to circumferentially adjust said series of holders, and means to reciprocate said members.

4. In a lapping machine, a series of reciprocable members each bearing a lapping element, a corresponding series of holders adapted to receive articles to be lapped, step-by-step means to circumferentially adjust said series of members to successively align the same with a given one of said holders, means to rotate said members, step-by-step means to circumferentially adjust said series of holders, and means to reciprocate said members.

5. In a lapping machine, a reciprocable unit mounting a plurality of spindles each adapted to receive a lapping element, a series of holders corresponding in number and arrangement to said spindles and adapted to receive articles to be lapped, means to circumferentially adjust said unit to successively align the spindles of the same with a given one of said holders, means to circumferentially adjust said series of holders, and means to reciprocate said unit.

6. In a lapping machine, a reciprocable unit mounting a plurality of spindles each adapted to receive a lapping element, a series of holders corresponding in number and arrangement to said spindles and adapted to receive articles to be lapped, means to circumferentially adjust said unit to successively align the spindles of the same with a given one of said holders, means to circumferentially adjust said series of holders, means to rotate said spindles, and means to reciprocate said unit.

7. In a lapping machine, a reciprocable unit mounting a plurality of spindles each adapted to receive a lapping element, a series of holders corresponding in number and arrangement to said

spindles and adapted to receive articles to be lapped, step-by-step means to circumferentially adjust said unit to successively align the spindles of the same with a given one of said holders, step-by-step means to circumferentially adjust said series of holders, and means to reciprocate said unit.

8. In a lapping machine, a reciprocable unit mounting a plurality of spindles each adapted to receive a lapping element, a series of holders corresponding in number and arrangement to said spindles and adapted to receive articles to be lapped, step-by-step means to circumferentially adjust said unit to successively align the spindles of the same with a given one of said holders, step-by-step means to circumferentially adjust said series of holders, means to rotate said spindles, and means to reciprocate said unit.

9. In a lapping machine, a standard, a table rotatable about the standard and having a circumferential series of means for receiving articles to be lapped, a unit reciprocable and rotatable upon the standard and having a circumferential series of spindles corresponding in number and arrangement to said receiving means, means to hold said table in rotatably adjusted positions in each of which a receiving means is in alignment with a spindle, means to hold said unit in rotatably adjusted positions in each of which the spindles are in alignment with the receiving means, means to rotate said spindles and means to reciprocate said unit.

10. In a lapping machine, a standard, a table rotatable about the standard and having a circumferential series of means for receiving articles to be lapped, a unit reciprocable and rotatable upon the standard and having a circumferential series of spindles corresponding in number and arrangement to said receiving means, means to hold said table in rotatably adjusted positions in each of which a receiving means is in alignment with a spindle, means to hold said unit in rotatably adjusted positions in each of which the spindles are in alignment with the receiving means, means to rotate said spindles and means to reciprocate said unit, said standard comprising a shaft rotatably directed through said table and unit, means to rotate said shaft, a gear splined to said shaft and reciprocating with said unit and pinions on said spindles engaging said gear.

11. In a lapping machine, a standard, a table rotatable about the standard and having a circumferential series of means for receiving articles to be lapped, a unit reciprocable and rotatable upon the standard and having a circumferential series of spindles corresponding in number and arrangement to said receiving means, said table having a circumferential series of latch elements corresponding in number and arrangement to the receiving elements and radially aligned therewith, a stationary latch to selectively engage the latch elements of the table, means to hold said unit in rotatably adjusted positions in each of which the spindles are in alignment with the receiving means, means to rotate said spindles and means to reciprocate said unit.

12. In a lapping machine, a standard, a table rotatable about the standard and having a circumferential series of means for receiving articles to be lapped, a unit reciprocable and rotatable upon the standard and having a circumferential series of spindles corresponding in number and arrangement to said receiving means, means to hold said table in rotatably adjusted

2,208,499

3

positions in each of which a receiving means is in alignment with a spindle, said unit comprising a disc the periphery of which is provided with notches corresponding in number to and radially
5 aligned with said spindles, a stationary latch to coact with said notches, said latch being ver-

tically elongated to maintain engagement with said notches during reciprocation of the unit, means to rotate said spindles and means to reciprocate said unit.

MAX GEORGE FIEDLER.

5