Oct. 16, 1934. W. V. ROBINSON 1,976,805

AUTOMATIC GRINDING AND POLISHING MACHINE

Filed Sept. 2, 1930 2 Sheets-Sheet 1

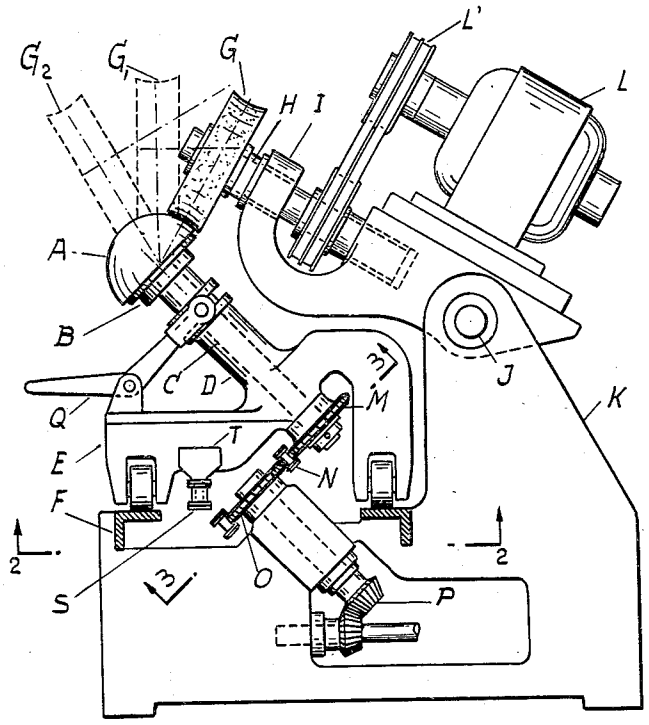


FIG. 1

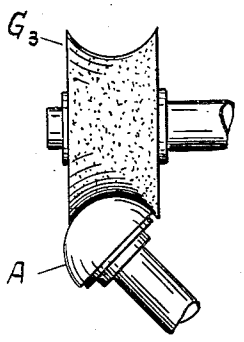


FIG. 4

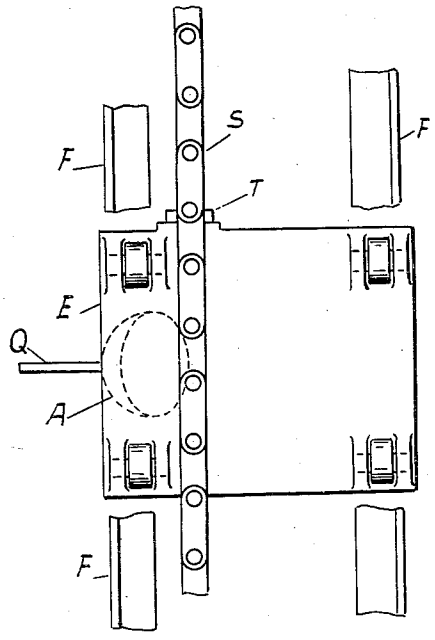


FIG. 2

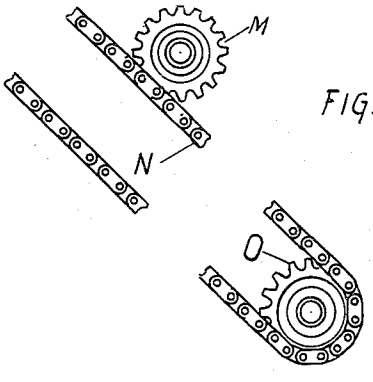


FIG. 3

INVENTOR.
WILLIAM V. ROBINSON
BY Whittemore Hulbert & Whittemore & Belknap
ATTORNEY.

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AUTOMATIC GRINDING AND POLISHING MACHINE

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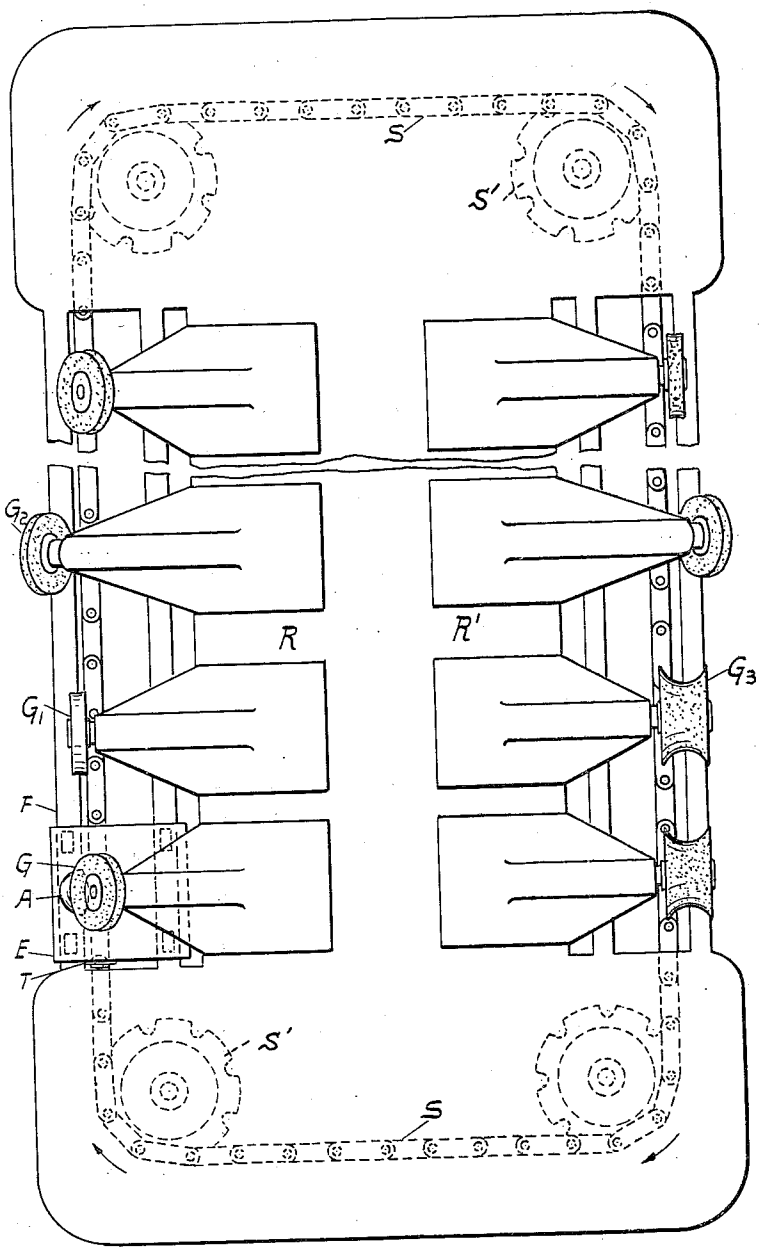


FIG. 5

INVENTOR.
WILLIAM V. ROBINSON
BY Whittemore Hulbert
Whittemore & Belknap
ATTORNEY.

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AUTOMATIC GRINDING AND POLISHING MACHINE

William V. Robinson, Owosso, Mich.

Application September 2, 1930, Serial No. 479,345

8 Claims. (Cl. 51—74)

The invention relates to grinding and polishing machines and more particularly to a construction adapted for the grinding and polishing of spherical surfaces. It is the object of the invention to obtain a construction which progressively performs the grinding and polishing upon successive articles constituting the work and during the travelling movement of the same. To this end the invention consists in the construction as hereinafter set forth.

In the drawings:

Figure 1 is a sectional end elevation of the machine;

Figure 2 is a bottom plan view showing the means for advancing the carriage;

Figure 3 is a section on line 3—3 of Figure 1;

Figure 4 is an elevation showing the final polishing operation;

Figure 5 is a diagrammatic plan view illustrating the orbit through which the work passes during the progressive grinding and polishing operations.

As specifically shown, the machine is adapted for the finishing of semi-spherical shells for motor vehicle lamps. These shells A are mounted on chucks or holders B which in turn are carried by a shaft C rotatively mounted in a bearing D so that its axis extends obliquely. The bearing D is mounted upon a carriage E adapted to travel along a track F. Thus by mounting the work upon a series of trucks E in passing them successively along a track F the grinding and polishing may be performed continuously.

To grind and polish all portions of the semi-spherical surface I arrange a plurality of grinder or polishing wheels G, each having a concave periphery and overlapping each other so as to extend through an included angle of ninety degrees or more. Each of these wheels is mounted upon an arbor H which is carried by a frame I, pivotally mounted at J to a stationary frame K. Mounted beneath or above the frame I is a motor L which through a belt transmission L' drives the arbor H. The motor is so arranged with reference to the pivot J as to partially counter-balance the frame I and wheel G leaving only sufficient downward pressure by said wheel to perform the work. The pivots J for the several wheels G, G', G^2 are so arranged on the frame K that the planes of rotation of the respective wheels are substantially radial with respect to the center of the spherical surface. The wheels G are preferably of fabric construction and have the peripheral portions concaved to correspond to the segment of the sphere which they engage and thus as the work successively passes these wheels it will have zones thereof ground, which together cover the entire surface. Preferably the wheels which are used for the final polishing are wider than the wheels which do the preliminary grinding and if desired the final polishing or buffing may be effected by a single wheel G^3 of sufficient width to polish the entire surface at one time. In this way any marking or streaking of the work is avoided.

During performance of the work each of the shafts C must be rotated, which is accomplished by a sprocket M on the shaft engaging a sprocket chain N which is driven by sprockets O and bevel gear wheels P mounted on the stationary frame K. The arrangement is such that the successive carriages E in travelling along the track F will cause the sprocket wheels M to travel along the chain N which at the same time is being driven to impart a rotary motion to each of the shafts C. This will revolve each of the semi-spherical shells held in the chucks B passing them first between coarse grinder wheels and successively to finer grinders finishing with the buffers. The chuck B may be released through the operation of a handle Q which when the work is completed may be operated to release the shell and to engage another shell therewith for grinding.

As illustrated in Figure 5, the orbit through which the carriages E travel is preferably an endless one so that at one point in this orbit the finished work may be removed from each carriage and new work to be ground placed in engagement therewith. Thus as illustrated the carriage may travel along one side of a rectangle frame K to present the work successively to a series R of grinders diagrammatically represented in Figure 5, of varying grades, beginning with coarse abrasive and gradually becoming finer. Upon reaching the end of one long side of the rectangle the carriage is fed transversely to the other side and returns along the series R'. These may be either finer grinder wheels or buffing wheels so that upon reaching the starting end the grinding and polishing is completed and the work may be removed. The carriages are driven through this orbit by an endless chain S which passes around the sprockets S' at the four corners of the rectangle and which is provided with projecting lugs T for engaging a dog on the carriage to drive the same.

What I claim as my invention is:

1. A grinding machine comprising a rotary chuck for engaging a semi-spherical shell, a carriage for advancing said chuck upon which it is

mounted with its axis obliquely inclined, a plurality of grinder wheels for successively engaging said shell during advancement thereof, each having a concave surface for tracing a zone of said shell during the rotation thereof, said zones overlapping each other, a rotary arbor for each grinder wheel and a tilting frame in which said arbor is journalled, counter-balanced to limit the pressure of said wheel on the work to a predetermined amount.

2. A grinding machine comprising a rotary chuck for engaging a semi-spherical shell, means for advancing said chuck and simultaneously rotating the same, a plurality of grinder wheels for successively engaging with said shell during the advancement thereof, each having a concave grinding face adapted to trace a zone of said shell, the axes of said wheels being in angular relation to each other, rotary arbors for each wheel, a tilting frame in which each arbor is journalled, counter-balanced to limit the pressure of the wheel upon the work to a predetermined amount, and separate motors carried by each frame for driving the wheel.

3. A grinding machine comprising a series of carriages, a frame providing an endless track or orbit around which said carriages are adapted to travel, means for driving said carriages along said orbit, a rotary work holder mounted on each carriage, means located on a stationary frame for driving said rotary work holders during the travel of the carriage, a series of grinder and polishing wheels of varying grades rockably mounted on the stationary frame in positions to engage with the work on said rotary work holders during the travel of said carriages, the axes of said grinder wheels extending at different angles to engage said wheels with different zones in the continuous surface of the work and each frame being counterbalanced to limit the pressure of the grinder wheel upon the work.

4. A grinding machine comprising a series of grinding and polishing wheels, rockable frames on which said wheels are mounted, said frames being arranged in groups with the axes of the grinder wheels thereof extending at different angles when in operative relation to the work and each frame being counterbalanced to limit the pressure of the grinder wheel upon the work, a series of rotary work holders and means for advancing said series of work holders to present the work carried thereby successively to the grinding and polishing wheels of the series.

5. A grinding machine comprising a series of grinding and polishing wheels of different grades, rockable frames on which the respective wheels are mounted, said frames being arranged in groups having fulcrum points thereof differently located to arrange the axes of the grinders in angular relation to each other and each frame being counterbalanced to limit the pressure of the grinder wheel upon the work, a series of rotary work holders each provided with a chuck for holding a spherical article to be ground, means for advancing said series of work holders and simultaneously rotating the same to present different zones of the surface of the work to the grinding and polishing wheels, whereby all portions of the spherical surface of each article are ground and polished.

6. A grinding machine comprising a series of rotary work holders for articles having spherical surfaces to be polished, means for advancing the series, a series of grinding and polishing wheels in operative relation to the path of the rotary work holders, a rockable frame on which each grinder wheel is mounted, said frames being arranged in groups with their fulcrum points differently located to engage the respective grinder wheels with different zones in the spherical surface of the work and each frame being counterbalanced to limit the pressure of the grinder wheel upon the work.

7. A grinding machine comprising a track, a series of carriages for travelling said track, means for advancing said carriages, a rotary work holder on each carriage having its axis obliquely inclined, means in fixed relation to the track for rotating said work holder during advancement of the supporting carriage therefor, a series of rockable frames arranged in fixed relation to said track, a grinder wheel mounted on each rockable frame in operative relation to the path of said work holders, and a motor carried by each rockable frame for driving said grinder wheel and each frame being counterbalanced to limit the pressure of the grinder wheel upon the work.

8. A grinding machine comprising a series of rotary work holders, means for advancing the series and simultaneously rotating said work holders, grinding and polishing wheels arranged along the path of the advancing series, a rockable frame forming a mounting for each of said wheels, said frames being arranged in groups with the fulcrums thereof differently located to extend the axes of said wheels in different angular relation to the work carried by said work holders and each frame being counterbalanced to limit the pressure of the grinder wheel upon the work.

WILLIAM V. ROBINSON.