J. CARRIE.

GRINDING AND POLISHING MACHINE.

APPLICATION FILED OCT. 27, 1919.

1,375,129.

Patented Apr. 19, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

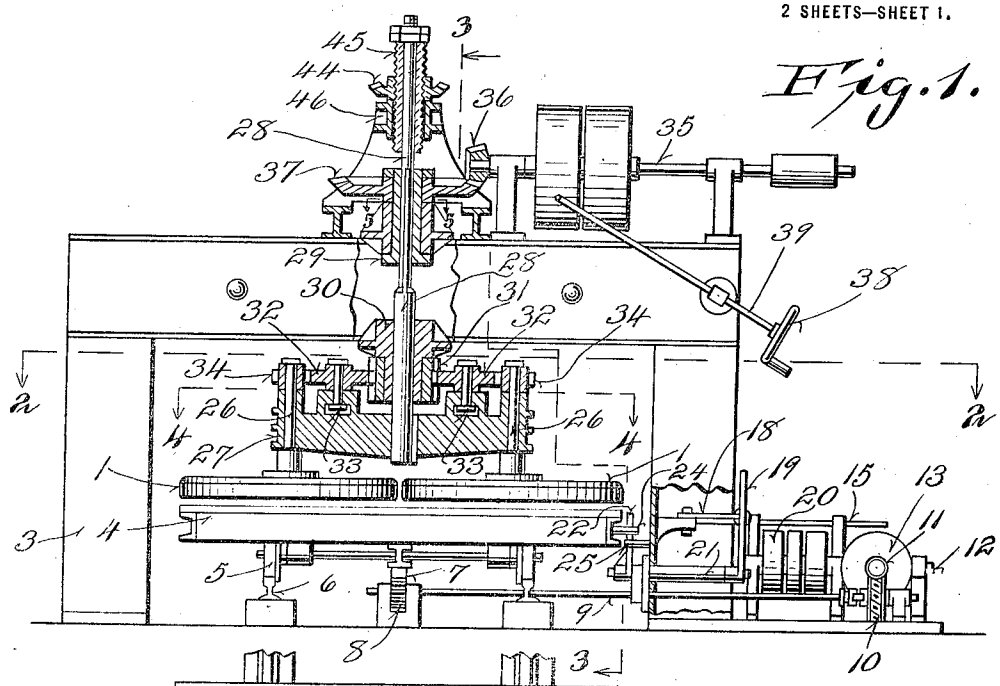
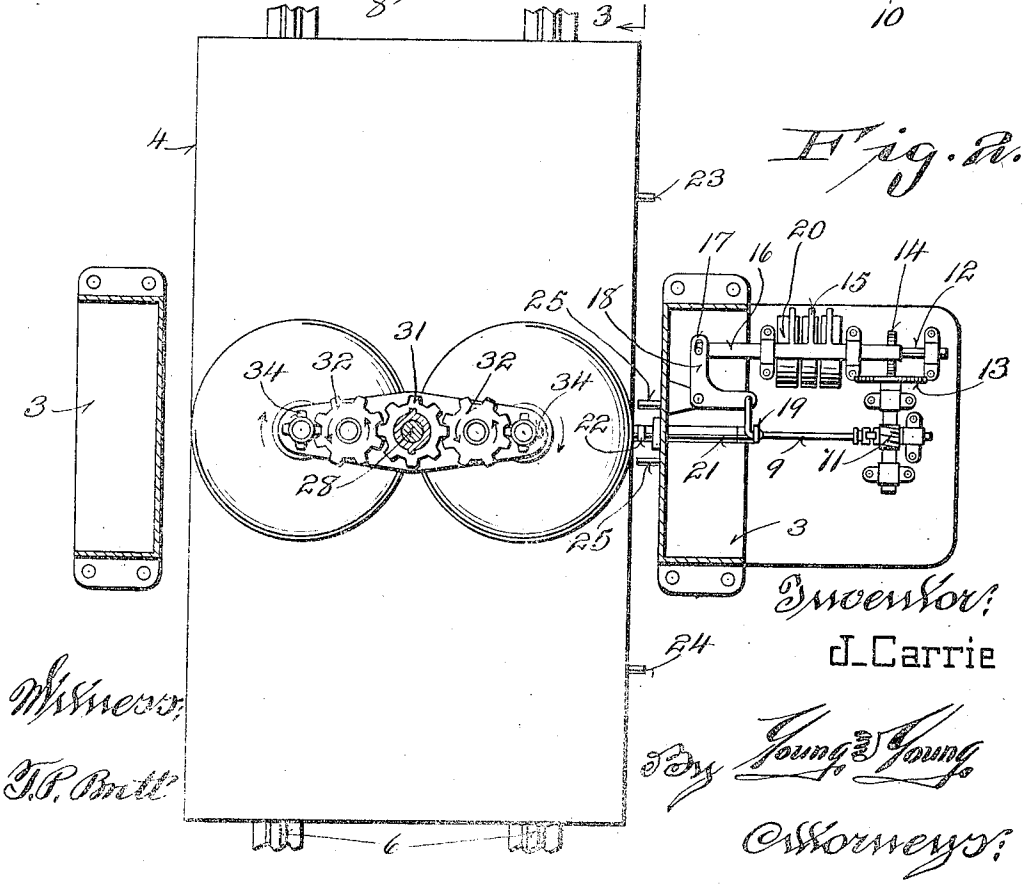


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

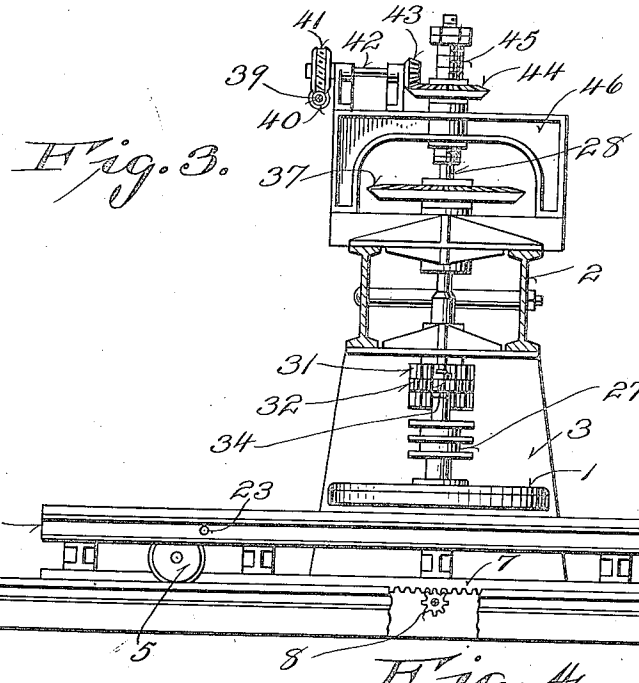
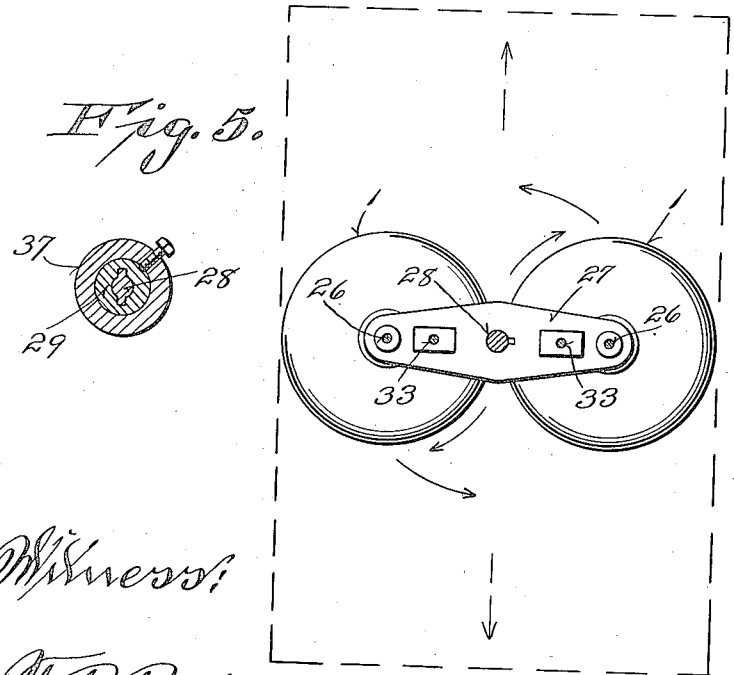


Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

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GRINDING AND POLISHING MACHINE.

1,375,129. Specification of Letters Patent. Patented Apr. 19, 1921.

Application filed October 27, 1919. Serial No. 333,629.

To all whom it may concern:

Be it known that I, JAMES CARRIE, a subject of Great Britain and resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Grinding and Polishing Machines; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to new and useful improvements in machines for grinding and polishing slabs or plates of material such as marble, glass, or the like.

The primary object of my invention is to provide a gravity controlled grinding and polishing unit of the planetary type having means for suspending the unit in such manner that the weight of the same is controlled so as to cause the grinding and polishing elements to exert pressure upon the work in a step-by-step manner from light load to full load.

By providing a machine of the character mentioned with mechanism for controlling the gravity grinding and polishing unit, the initial grinding and polishing can be effected by a predetermined light weight of pressure so as to avoid any tendency to break the slab worked upon. When the slab has been initially ground true, the entire weight of the polishing unit can be released so as to quickly finish the work. Thus much time is saved in grinding and polishing glass surfaces or the like and breakage of the slabs is reduced to a minimum.

In addition to the foregoing, it is also an object to provide an arrangement for automatically changing the direction of movement of the work table when the same reaches its limit of travel in both directions and also to vary the speed of movement of said table.

With these and other objects and advantages in view, the invention consists in the novel features of construction, combination and arrangement of parts which will be hereinafter more particularly described and claimed and shown in the drawings wherein:

Figure 1 represents an end elevational view, partly in section, of the invention.

Fig. 2 is a horizontal section taken substantially on the plane of the line 2—2 of Fig. 1.

Fig. 3 is a side elevational view of the invention.

Figs. 4 and 5 are horizontal sections taken respectively on the planes of the lines 4—4 and 5—5 of Fig. 1.

Referring more particularly to the drawings, it will be seen that the abrading shoes or grinding and polishing members 1 and their operating mechanism are mounted upon a suitable supporting frame consisting of a pair of horizontal I-beams 2 supported on spaced feet or end members 3. These end members 3 are located a sufficient distance apart to permit the movement of a work table 4 therebetween, said table being provided with suitable supporting trucks including wheels 5 which are designed to run upon track rails 6. In other words the supporting frame consisting of the beams 2 and feet 3 straddle the tracks 6 and the work table 4 which is shiftable thereon.

The reciprocation of the table 4 is carried out by means of a rack 7 suspended from the under side thereof and a spur gear 8. As seen most clearly in Fig. 1 the gear 8 is keyed to a drive shaft 9 which extends transversely of the track rails 6 and from a point substantially midway therebetween to the outer side of one of the feet 3 where it is connected with a worm gear 10. This gear is rotated by a worm 11 in turn actuated by a friction drive through a shaft 12.

This drive consists of a friction disk 13 carried by the shaft of the worm 11 and a friction pulley 14, the same being readily shiftable while the machine is inoperative by means of a traveling screw or other means (not shown). The friction disk is rotated in opposite directions to thereby impart reciprocative movement to the table by shifting a cross and an open belt (not shown) on the drive pulley 20. This movement of the belt is carried out in any convenient manner such as by means of a spanner 15 which extends from a spanner rod 16 loosely connected as at 17 with one arm of the bell crank 18, the other arm of the bell crank being linked to an actuating lever 19.

The operating lever 19 extends from one end of a rock shaft 21, on the other end of which is a trip arm 22 designed to be struck by either of the trips 23 or 24, both being

extended from one longitudinal edge of the movable work table 4. Thus the table is shifted longitudinally of the tracks 6 in either direction until the stops 23 or 24 come in contact with the trip arm 22 and rock the same.

Inasmuch as the shaft of the worm 11 will rotate at varying speeds dependent upon the point of engagement of the shiftable friction pulley 14 with the friction disk 13, I provide means for readily changing the location of these parts with respect to each other when necessary. For this purpose stop pins 25 are extended from one of the feet 3 and located one on each side of the trip arm 22. By moving these pins closer to or farther away from the trip arm 22 when in vertical position, it will be seen that the limits of movement of this arm will be changed.

The abrading shoes 1 referred to are preferably two in number and circular, each being supported upon a vertical arbor 26 journaled in the ends of a drive head 27. Attention is invited to the fact that the arbors 26, in practice, are assembled to permit slight vertical play in their journals. This function is desirable in order to obtain a true initial slight pressure upon the slab to be worked upon, which pressure would be the weight of the shoes, and it follows that when the end play of the arbors is taken up in a downward motion of the unit, as a whole, the full weight of said unit will be exerted upon the surface to be worked upon. A vertical drive shaft 28 journaled in suitable bearings 29 and 30 carried by the I-beams 2 has the drive head 27 keyed thereto.

The bearing 30 is elongated and has a gear 31 fixed thereto, and the teeth of this gear mesh with the teeth of idler pinions 32 which are journaled on stub shafts 33 extending from the drive head 27. The upper end of each of the arbors 26 has a pinion 34 thereon which meshes with the idlers 32. From Fig. 2 it will be seen that as the axes of the pinions 32 and 34 are diametrically alined with respect to the axis of the spindle 28 and the drive head 27 keyed to the spindle 28, the rotation thereof will not only rotate the abrading heads 1 but will also move the same planetarily.

The vertical spindle 28 is designed to be rotated by a belt driven shaft 35 mounted upon the I-beams 2 and having a bevel pinion 36, the teeth of which are meshed with a bevel gear 37. The bevel gear wheel 37 is secured to a bushing 37′, which bushing is in spline connection with the main drive shaft 28, the bushing being journaled in the bearing 29 of the frame as best shown in Fig. 1.

The counter shaft 35 is also in belt drive connection with the pulley 20 of shaft 12, whereby said shaft receives its motion.

As will be seen from Figs. 1, 2 and 4, the distance between the outermost opposite points on the circular abrading heads 1 is substantially equal to the width of the table 4 so that the full width of the article or material placed on the latter will be operated upon and ground or polished as necessary. In order to place the plate or slab of material on the table beneath the heads 1, the latter, together with the drive head 27, are raised by the rotation of a hand wheel 38 in the proper direction. This wheel 38 is on a shaft 39 having a worm 40 which is meshed with a worm gear 41.

The worm gear wheel 41 is secured to a spindle 42, which spindle also carries a bevel pinion 43 that engages a bevel gear wheel 44. The hub of the gear wheel 44 is internally threaded, as shown in Fig. 1, for engagement with an externally threaded sleeve 45 surrounding the shaft 28.

The spindle 42 and gear wheel 44 are mounted upon a frame element 46 secured to the I-beams 2, and this frame element also constitutes a journal or guide for the sleeve 45.

Therefore in the operation of the invention the hand wheel 38 is revolved so as to cause the sleeve 45 to be fed upwardly which will raise the shaft 28 and the parts suspended from the lower end thereof away from the surface of the table 4 to permit the insertion of a plate or slab between the same and said abrading heads 1. After the material to be operated upon is in position, the abrading shoes are moved downwardly and into a more or less contact with the same.

As shown in Fig. 1 the upper end of the externally threaded sleeve element 45 engages a collar 45′ of the main drive shaft 28, whereby the drive shaft and its associated parts are held in suspension when the sleeve is raised a predetermined degree, and owing to this suspension means the gravity controlled burnishing unit, as a whole, is capable of rising and falling, which movement is limited by the contact between the collar 45′ and upper end of the sleeve.

It will also be seen that the abrading unit, as a whole, is primarily a gravity pressure device controlled by a screw element or its equivalent in such manner that initially a predetermined light weight is utilized for grinding and polishing, which weight, for example in this instance, is the weight of the individual abrading shoes. After the surface of the work has been initially reduced to a comparatively true plane, the work can be speeded up by throwing an additional maximum weight upon the shoes without liability of breaking the slab worked upon. The maximum weight of the abrading unit is exerted upon the slab by a further manipulation of the screw element to permit said weight to exert its full force upon the under surface of the shoes, which maximum

weight includes the main shaft, head, and associated parts.

It will be noticed that owing to the disposition of the gear 31 and pinions 32 and 34 with respect to each other and to the spindle 28 and drive plate 27, that the abrading heads will be rotated in the same direction as indicated by the arrows in Fig. 4 and given a planetary movement in a reverse direction as is also shown by the arrows in said figure. These movements produce a grinding and polishing action between the abrading heads and the material operated upon of a maximum efficiency, the material being finished in a much shorter time than is possible through the use of similar abrading heads having different degrees and directions of movement.

The uniformity of the grinding and polishing action obtained as a result of these movements of the abrading heads is further enhanced by the longitudinal movement of the work table 4 and the material thereon. This table, as hereinbefore mentioned, is caused to reciprocate between certain limits by the shifting of the drive belts disposed about the pulleys 20.

From the foregoing description taken in connection with the accompanying drawings, it will be noted that I have invented an extremely simple, practical and efficient machine which readily lends itself to grinding, polishing and buffing operations in connection with the treatment of plates of glass and the like, slabs of marble and other stone, etc.

While I have shown and described a particular and preferred embodiment of my invention, it will be appreciated that various changes and modifications of structure may be employed to meet differing conditions of operation or manufacture, without departing from the spirit or sacrificing any of the advantages of the invention.

I claim:

1. A mechanism of the class described, comprising a gravity controlled grinding and polishing unit, the same including a rotary shaft, a head carried thereby, revoluble abrading shoes journaled in the head, gears connecting the abrading shoes for imparting a planetary motion thereto relative to the shaft, a normally fixed suspension means for the shaft, and adjusting means in gear connection with the suspension means for predeterminately regulating the weight of the grinding and polishing unit, whereby said weight is exerted upon the surface of the work step-by-step from light load to full load during the continuous rotation of the aforesaid grinding and polishing unit.

2. A machine of the character described, comprising a gravity controlled burnishing and polishing unit, including a vertically adjustable shaft, a head secured to the lower end thereof, arbors journaled in the head, abrading shoes secured to the arbors, gears connecting the arbors for imparting a planetary motion thereto with respect to the main shaft, a vertically adjustable supporting sleeve for the main shaft, and means for positively controlling the sleeve to permit the weight of the burnishing and polishing unit to be exerted upon the surface of the work step-by-step from light load to full load.

3. A machine of the character described, comprising a gravity controlled burnishing and polishing unit, including a vertically adjustable shaft, a head secured to the lower end thereof, arbors journaled in the head, abrading shoes secured to the arbors, gears connecting the arbors for imparting a planetary motion thereto with respect to the main shaft, a vertically adjustable threaded sleeve for the support of the shaft, and means in threaded union with the sleeve for raising and lowering the same, whereby the weight of the burnishing and polishing unit may be exerted upon the surface of the work step-by-step from light load to main load.

In testimony that I claim the foregoing I have hereunto set my hand at New York, in the county of New York and State of New York.

JAMES CARRIE.