C. BARTELS.

GRINDING MACHINE.

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1,100,704. Patented June 23, 1914.

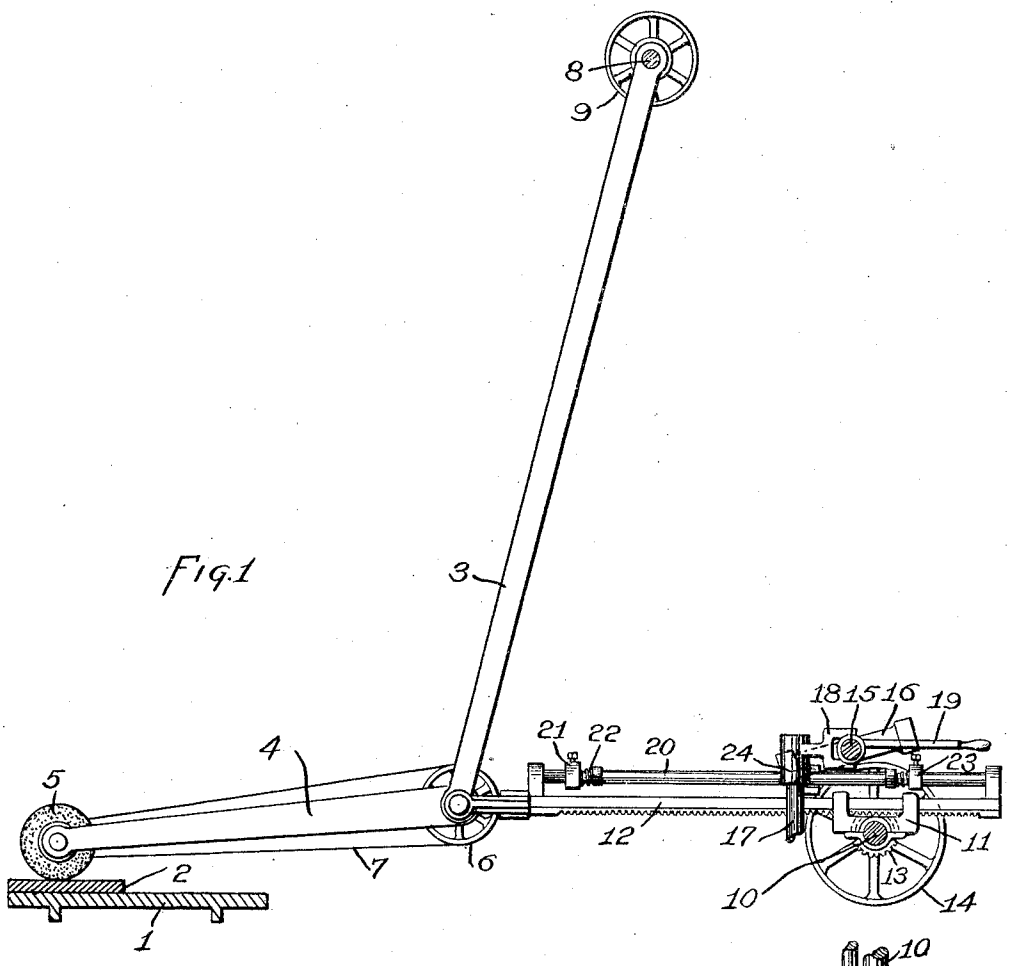


Fig. 1

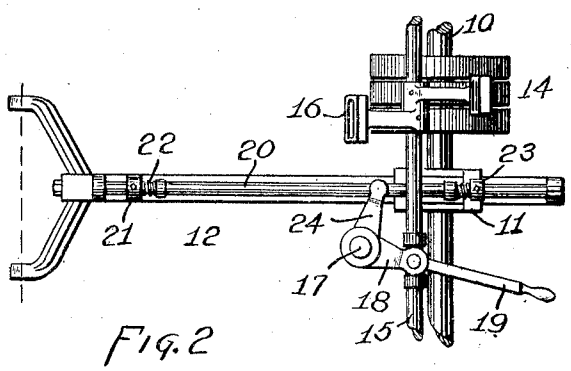


Fig. 2

Witnesses:
Geo. Johnson
M. S. Belden.

Carl Bartels
Inventor
by James W. See
Attorney

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CARL BARTELS, OF HAMILTON, OHIO, ASSIGNOR TO THE MOSLER SAFE COMPANY, OF NEW YORK, N. Y.

GRINDING-MACHINE.

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To all whom it may concern:

Be it known that I, CARL BARTELS, a citizen of the United States, residing at Hamilton, Butler county, Ohio, have invented certain new and useful Improvements in Grinding-Machines, of which the following is a specification.

There is a type of grinding machine, for grinding generally flat surfaces, in which the grinding wheel is journaled in the free end of a vertically vibratable horizontal arm mounted for endwise motion so as to traverse the wheel across the face of the work, power mechanism being provided to give this endwise motion to the arm. The sidewise traverse of the wheel relative to the work is accomplished by shifting either the arm or the work. The rear end of the arm is generally suspended by a swinging link, and the free end of the arm is generally connected with suitable counterbalancing and handling devices, and suitable transmission devices, involving belting, are arranged to get motion to the wheel.

The power device for traversing the wheel across the work has generally been of such character that the speed of traverse would vary in an undesirable manner at different points in the length of the path of the wheel. For instance, in machines of this class the traverse of the wheel across the work has generally been effected by means of a continuously rotating crank moving the wheel back and forth through the medium of a pitman. The crank-shaft would turn at uniform speed and when the crank-pin was at its upper and lower centers, it would be giving to the wheel a maximum rate of advancing travel, while when the crank-pin was at the horizontal quarters it would be giving no travel to the wheel, and the rate of travel for the wheel would vary between zero to maximum four times at each turn of the crank-shaft. It is the aim of my invention to render the rate of travel of the wheel uniform, and thus avoid the undesired effects of crank transmission. The irregular rate of wheel traverse referred to has two disadvantages, the loss of time in wheel traverse, and the varying effect of wheel action due to its rate of traversing advance while rotating at a constant speed.

My invention relates to improvements in this general type of grinding machine and its aim is to secure a uniform traverse of the wheel across the work without interfering in any degree with the flexibility of the articulate system carrying the wheel.

My invention will be readily understood from the following description taken in connection with the accompanying drawing in which:—

Figure 1 is a side elevation, part vertical section, of a grinding machine of the type above referred to, but embodying an exemplification of my invention: and Fig. 2, a plan of the power mechanism for reciprocating the wheel.

In the drawing:—1, indicates the work-receiving table, which is usually arranged for endwise feeding motion: 2, the work secured thereto, which is to have its upper surface acted upon by the grinding wheel: 3, the swinging suspension arm: 4, the wheel-arm having its rear end pivoted to the foot of the suspension arm, and carrying the grinding wheel at its forward free end: 5, the grinding-wheel, carried in the wheel-arm: 6, a pulley at the pivot uniting the two arms: 7, a belt from this pulley to the pulley on the spindle of the grinding-wheel: 8, a driving-shaft, to be suitably driven by power, and disposed at and forming the pivot for the upper end of the suspension arm: and 9, a pulley on this shaft, which may be belted to pulley 6 or to a pulley alongside pulley 6.

All of the parts thus far referred to are, or may be as usual, and subject to any of the usual modifications of these parts in the type of grinding machine under consideration.

I will now proceed to describe the exemplification of my power mechanism for reciprocating wheel-arm 4 endwise in traversing the wheel across the work.

Proceeding with the drawing:—10, indicates a shaft with its axis parallel with the axes of the wheel and the pivots of the two arms, this shaft being disposed a considerable distance to the rear of the work-table, the pivot at the lower end of the suspension arm lying between this shaft and the wheel: 11, a yoke swiveled on shaft 10: 12, a rack arranged to slide in the yoke, in a direction at right angles to the axis of shaft 10, the forward end of this rack being pivoted to the suspension arm, and preferably at the pivot uniting the suspension arm and the wheel arm, as illustrated: 13, a pinion ro-

tated by shaft 10 and gearing with the rack: 14, a set of one tight and two loose pulleys secured to shaft 10, after the manner usual where a shaft is to be driven in alternating directions by means of open and crossed belts: 15, a shifter-rod mounted parallel with shaft 10: 16, belt-shifters secured to this rod at the set of pulleys 14: 17, a vertical pivot shaft: 18, an arm mounted on this shaft and engaging between collars on the shifter-rod: 19, a handle by means of which arm 18 may be oscillated by hand: 20, a rod carried fixedly by the rack: 21, a stop-collar secured adjustably to rod 20 at the forward portion of the rod: 22, a spring upon rod 20 at the rear face of collar 21: 23, a similar spring-provided stop-collar mounted adjustably upon the rear portion of rod 20: and 24, an arm fast with arm 18 and having its free end in position to be engaged by stop-collars 22 and 23 as the rack reciprocates.

Shaft 10 is to be slowly rotated by power by belts to pulleys 14, the direction of rotation of the shaft being dependent on whether the open or the crossed belt is upon the fast pulley of the set. The rotation of this shaft, in counter-clockwise direction in Fig. 1, will move the rack to the left and traverse the grinding-wheel to the left across the work. At any time while this leftward motion of the grinding-wheel is taking place, handle 19 may be manipulated, in an obvious manner, to reverse the direction of motion of the shaft. The hand-lever may be manipulated to bring about reciprocating traverses of the grinding-wheel in such length of travel as may be desired. In these reciprocations of the rack the yoke swivels freely on shaft 10 so that any change of the pivot at its forward end in a vertical direction, as imposed by the swinging of the suspension arm, is uninterfered with and the general flexibility of the system unimpaired. While the grinding wheel may thus be making its fore-and-aft trips across the face of the work the advance of the wheel in an axial direction relative to the work is to be effected by a feeding movement of either the wheel or the work, as is usual in grinding machines of the type in question.

While the length of the trips of the grinding wheel across the work and the times at which the reversals of the direction of trip shall take place can be accomplished by hand in the manner which has been indicated, means are provided for automatically shifting the belts so that the wheel may keep up a continuous series of excursions as long as required by the character of the work. The automatic shifting of the belts is brought about by the engagement of stop-collars 21 and 23 with arm 24. Disregard, for the present, the fore-and-aft width of the piece of work illustrated in Fig. 1. Assume the grinding-wheel to be traveling to the left. When stop-collar 23, which travels with the rack, engages arm 24 it will automatically shift the belt and reverse the motion so that the grinding-wheel will make a trip to the right, and when stop-collar 21 engages arm 24 it will again shift the belts and reverse the direction of motion of the parts and the wheel will make another trip to the left, and so on and on. The stop-collars are to be adjusted to such position on rod 20 that the reversals of the direction of motion of the parts will take place at such points as correspond with the desired length of trip of the grinding-wheel across the work. Springs 22 at the inner faces of the stop-collars will compress when they engage arm 24 and remain more or less under compression while the belts are being shifted, their reaction tending to complete the shifting of the belts in case the rack happens to come to rest before the belts are completely shifted.

I claim:—

1. A grinding machine of the class described comprising, a shaft adapted to be turned in either direction, a yoke swiveled upon the shaft, a rack mounted to slide in the yoke in a path at right angles to the axis of the shaft, a connection between one end of the rack and the part of the machine carrying the grinding-wheel, a pinion carried by the shaft and engaging the rack, and means for reversing the direction of motion of the shaft, combined substantially as set forth.

2. A grinding machine of the class described comprising, a shaft adapted to be turned in either direction, a yoke swiveled upon the shaft, a rack mounted to slide in the yoke in a path at right angles to the axis of the shaft, a connection between one end of the rack and the part of the machine carrying the grinding-wheel, a pinion carried by the shaft and engaging the rack, means for reversing the direction of motion of the shaft by hand, and automatic means for reversing the direction of motion of the shaft, combined substantially as set forth.

3. A grinding machine of the class described comprising, a shaft adapted to be turned in either direction, a yoke swiveled upon the shaft, a rack mounted to slide in the yoke in a path at right angles to the axis of the shaft, a connection between one end of the rack and the part of the machine carrying the grinding-wheel, a pinion carried by the shaft and engaging the rack, a set of pulleys mounted on the shaft and adapted for the turning of the shaft in either direction by the shifting of belts, a belt-shifter adapted to move such belts on the pulleys, and a hand-lever connected with the belt-shifter, combined substantially as set forth.

4. A grinding machine of the class described comprising, a shaft adapted to be turned in either direction, a yoke swiveled upon the shaft, a rack mounted to slide in the yoke in a path at right angles to the axis of the shaft, a connection between one end of the rack and the part of the machine carrying the grinding-wheel, a pinion carried by the shaft and engaging the rack, a set of pulleys mounted on the shaft and adapted for the turning of the shaft in either direction by the shifting of belts, a belt-shifter adapted to move such belts on the pulleys, a pair of stop-collars adjustable along the length of the rack, a pivoted arm connected with the belt-shifter, and an arm connected with said pivoted arm and arranged in the path of said stop-collars, whereby the belt shifter will be moved and the motion of parts reversed at the ends of trips of the rack, combined substantially as set forth.

5. A grinding machine of the class described comprising, a shaft adapted to be turned in either direction, a yoke swiveled upon the shaft, a rack mounted to slide in the yoke in a path at right angles to the axis of the shaft, a connection between one end of the rack and the part of the machine carrying the grinding-wheel, a pinion carried by the shaft and engaging the rack, a set of pulleys mounted on the shaft and adapted for the turning of the shaft in either direction by the shifting of belts, a belt-shifter adapted to move such belts on the pulleys, a pair of stop-collars adjustable along the length of the rack, a pivoted arm connected with the belt-shifter, an arm connected with said pivoted arm and arranged in the path of said stop-collars, whereby the belt shifter will be moved and the motion of parts reversed at the ends of trips of the rack, and a hand-lever connected with said arms, combined substantially as set forth.

6. A grinding machine of the class described comprising, a shaft adapted to be turned in either direction, a yoke swiveled upon the shaft, a rack mounted to slide in the yoke in a path at right angles to the axis of the shaft, a connection between one end of the rack and the part of the machine carrying the grinding-wheel, a pinion carried by the shaft and engaging the rack, a set of pulleys mounted on the shaft and adapted for the turning of the shaft in either direction by the shifting of belts, a belt-shifter adapted to move such belts on the pulleys, a pair of stop-collars adjustable along the length of the rack, springs at the inner faces of said stop-collars, a pivoted arm connected with the belt-shifter, and an arm connected with said pivoted arm and arranged in the path of said stop-collars, whereby the belt shifter will be moved and the motion of parts reversed at the ends of trips of the rack, combined substantially as set forth.

CARL BARTELS.

Witnesses:
J. PAUL SCUDDER,
M. S. BELDEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."