J. F. WICKS.

CARD GRINDING MACHINE.

No. 171,075. Patented Dec. 14, 1875.

Fig. 1.

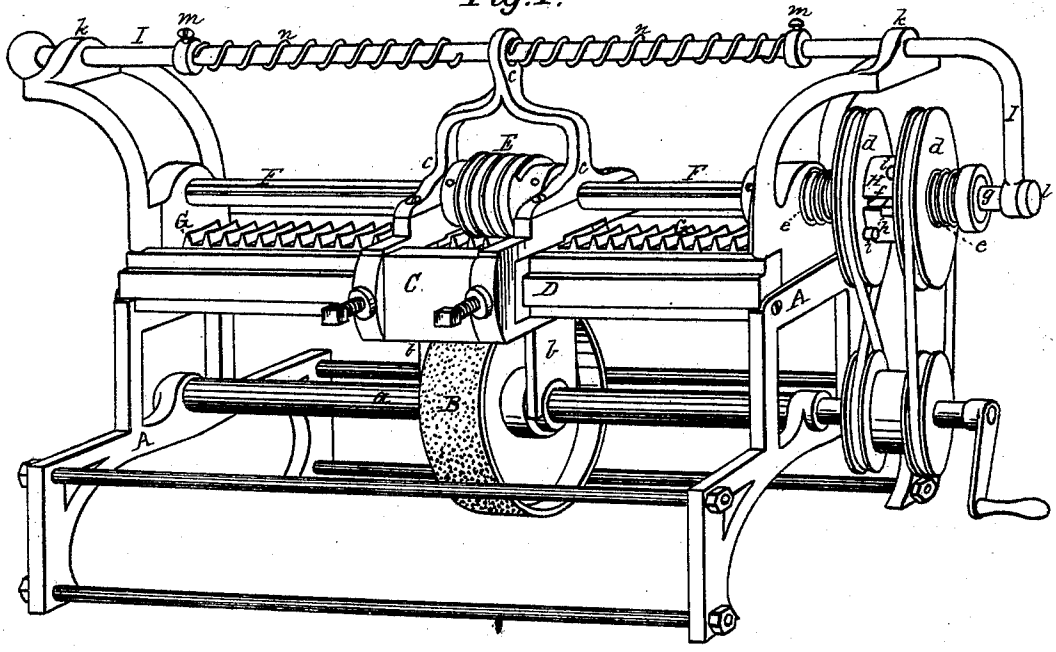
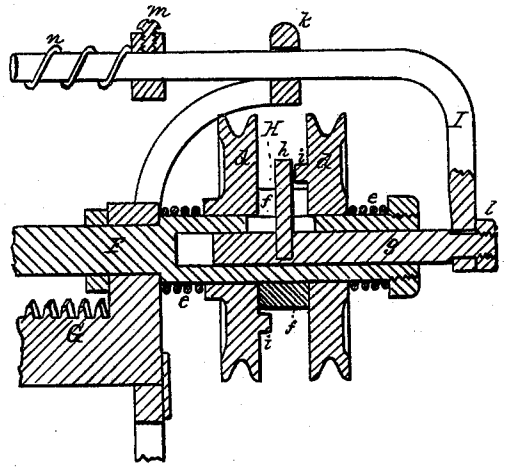


Fig. 2.



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IMPROVEMENT IN CARD-GRINDING MACHINES.

Specification forming part of Letters Patent No. **171,075**, dated December 14, 1875; application filed July 24, 1875.

To all whom it may concern:

Be it known that I, JOSEPH F. WICKS, of the city of Providence, county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Card-Grinding Machines; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description thereof.

My said improvement relates solely to machines for grinding cotton and woolen cards.

In some cases the card-cylinders must be detached from the carding-engine and placed in the grinding-machine, while in other cases the grinding-machine may be attached to the frame of the carding-engine, and be operated in grinding the card-cylinders, while they occupy their normal positions.

I seek and practically attain, by reason of my improvements, economy in construction, accuracy in operation, great durability, a capacity for traversing the grinding-wheel only over the distance actually required, regardless of the extent of said traversing movement, and a capacity for permitting it to operate without any traversing movement whatever while located at any desired point within the range of its traversing movement.

My invention consists partially in the combination of a grinding-wheel mounted on a splined shaft, and a traversing grinding-wheel carriage mounted on a bed-slide, with a stationary rack and a traversing worm-gear connected to the grinding-wheel carriage, and driven by a splined shaft and loose pulleys, and controlled by a clutch and an automatic shipper.

In machines of this general class the grinding-wheels have heretofore derived their traversing movement either by means of endless belts, chains, or long screws. Neither the belt nor the chain machines have ever been, thus far, able to practically compete with the "screw" machines, and it is in competition with this latter class that I place my improved machine, as it possesses all their desirable features, and many which they do not possess.

The "screw" machines, as heretofore constructed, have either a long screw, which is alternately rotated in opposite directions, or a long endless screw rotated always in one direction. The screw which alternately rotates in opposite directions, if excessively used in grinding, which requires a movement over a small portion of the screw, causes that portion to be unduly worn, to its material detriment in operation when its whole extent is to be traversed. With the reverse-cut or endless screw, revolving in one direction only, no traversing movement can be attained except throughout its entire length. Both forms of screw are expensive and short-lived, compared with other portions of the machine.

The distinctive features of my machine are a stationary rack and a revolving traversing worm-gear, which, by engaging with the teeth of the rack, imparts to the grinding-wheel carriage its traversing movement. In point of economy their cost is much less than that of the long screw and its tap or the endless screw, while their capacity for wear is such that the life of these parts is equal fully to the life of any of the other operative portions of the machine.

With the rack and worm-gear I prefer to employ a reciprocally-rotated slotted traversing shaft, which controls the traversing movement of the carriage, an automatic shipper, and a clutch composed of a slotted collar on the shaft, a sliding rod within the shaft, and a finger attached to the sliding rod, and extending radially therefrom through the shaft and collar.

Another feature of my invention has for its object the reduction to a minimum of the wearing tendency of the operative mechanism of a card-grinding machine. It is well known that the grinding element, whether it be a natural stone or an artificial compound of abrasive matter and an adhesive agent, must of necessity, in operation, be continually discharging particles which, on being deposited upon surfaces subjected to frictional contact, result in the speedy wear of said surfaces. Various modes of construction have been heretofore devised with a view to obviating this difficulty; but I know of no card-grinding machine prior to my invention in which most

or all of the vital operative portions of the traversing mechanism are not directly exposed to the receipt of these abrasive particles, and the undue wear of those parts incident thereto. This feature of my invention consists in the combination, with a grinding-wheel carriage and a traversing mechanism, of a grinding-wheel, and a splined driving-shaft located below the bed-plate, and the traversing mechanism, whereby the abrasive particles from the grinding-wheel are discharged below and out of range of the traversing mechanism.

To more particularly describe my invention I will refer to the accompanying drawings, in which Figure 1 represents, in perspective, a machine embodying the several features of my invention. Fig. 2 represents in longitudinal section the clutch of the traversing mechanism.

In Fig. 1, A denotes the frame of the machine. I show no special provision for attaching the machine to a carding-engine, nor such a construction of the frame as will admit of the adjustment of one end of the frame, so as to adapt it to carding-engines of different widths. These provisions are not new, and no portion of my invention relates thereto. It is to be understood, however, that the frame of the machine may be varied in its form to meet the several requirements incident to its general or special use. As shown, the machine is arranged to operate on a carding-cylinder detached from its engine. B denotes the grinding-wheel, which is revolved by the splined shaft *a*, provided with a driving-crank or belt-pulley. C denotes the grinding-wheel carriage, which either imparts to the grinding-wheel a traversing movement on its driving-shaft *a*, or prevents it from having any such movement by limiting it while revolving to any desired point on said shaft. The carriage C is mounted on the bed-plates, as at D, so that it may slide thereon from one end of the machine to the other. It is provided on both sides with a gib and set-screws, whereby it may be adjusted, so as to freely slide without possibility of undue lateral movement. It is also provided with arms, as at *b*, which project downward and encircle the driving-shaft *a*, and loosely confine the grinding-wheel to the space between them by contact of their lower ends with the hub ends of the wheel. The carriage has also at its ends upward extensions, which unite together above after the manner of an arch, as at *c*. Between the inner faces of these upward extensions is the traversing gear, as at E. F denotes a slotted traversing shaft, on which the traversing gear is loosely mounted, and operatively connected therewith by a spline in the gear, which enters the slot in the shaft in a manner well known. G denotes a stationary rack-gear, extending from end to end of the frame, and located between the sides of the bed-plate. The teeth of the traversing gear engage with the teeth of the rack, so that when the traversing shaft F is revolved the grinding-wheel carriage is made to traverse to and fro on the bed plate, according to the direction in which said shaft may be revolved. The traversing shaft F is revolved by means of two tight pulleys on the driving-shaft *a*, two loose pulleys on the outer end of the traversing shaft, a straight belt, a crossed belt, and a clutch, which, by engaging alternately with the two loose pulleys, imparts to the traversing shaft the requisite revolution alternately in opposite directions. Each of the two loose pulleys *d* is provided with a cushioning-spring, as at *e*, which encircles the traversing shaft, and abuts in one instance against the end of the frame of the machine and the adjacent face of the inner pulley, and in the other instance against the outer face of the outer pulley and the adjacent face of a nut on the outer end of the shaft. These springs relieve the pulleys from any undue shock during the operation of the clutch. The clutch is shown at H. It is composed of a slotted collar on the traversing shaft, as at *f*, located between the loose pulleys *d*, a sliding rod, as at *g*, fitted to slide in a cylindrical chamber in the end of the traversing shaft F, and a finger, as at *h*, which projects radially from the sliding rod *g* through a slot in the traversing shaft and the slot in the collar *f*. The loose pulleys are provided on their inner sides with laterally-projecting studs, as at *i*. These studs, on engaging with the finger *h*, cause the traversing shaft to revolve. The pulley with the straight belt imparts to said shaft a forward movement, and drives the grinding-wheel carriage toward the opposite end of the machine, while the crossed-belt pulley induces a return movement.

As in many other machines of this general class, the reversing movement is effected by a shipper automatically actuated by the grinding-wheel carriage. I denotes the shipper, which is fitted to slide-bearings in the top of each end of the frame, as at *k*. At one end it is bent downward and loosely embraces the end of the sliding rod *g*. The traversing rod has a shoulder and a nut, as at *l*, between which the end of the shipper is so embraced that the sliding rod and shipper will move together longitudinally, while the sliding rod *g* is free to revolve with the traversing shaft.

It will be seen that the sliding rod *g*, its finger *h*, slotted collar *f*, and traversing shaft all revolve together, and that therefore no wear is induced on these parts except that incident to a longitudinal movement.

It is not broadly new to thus construct a clutch, and I therefore limit this portion of my invention to the specific combination thereof with the traversing rod of a grinding-machine, whether said rod be arranged to operate traversing gears, as herein shown, or whether said rod be a screw, whereby the traversing movement is effected.

The shipper is loosely embraced by the upward extension *c* of the grinding-wheel carriage, and is provided with collars, as at *m*,

which are fixedly adjustable on the shipper by set-screws. Expansive spiral springs, as at *n*, encircle the shipper, (as heretofore in grinding-machines,) for the purpose of inducing prompt but easy movement of the shipper by the carriage.

In operation, if the machine be set for grinding throughout the full extent of its traversing movement, the collars *m* are moved closely adjacent to their respective ends of the frame of the machine. On revolving the driving-shaft the traversing rod is rotated, the carriage driven to the opposite end of the machine until it has compressed the spring beyond it, so that the shipper will be driven in the same direction, and the finger *h* thereby disengaged from the stud on the straight-belt pulley, and engaged with the crossed-belt pulley, whereby the traversing shaft is revolved in the opposite direction and the wheel-carriage returned, until the shipper is also returned to its former position, and so on indefinitely.

It will be seen that by adjusting the shipper-collars *m* the traversing movement may be limited to any desired extent, even to a fraction of the width of the face of the grinding-wheel.

The slotted collar *f* is of such a length that the clutch-finger *h* may be located midway between its ends and be out of possible contact with the studs of the loose pulleys. Therefore, if the shipper-collars be loosened, the wheel-carriage may be conveyed to any desired point, the finger *h* centrally located in the slot of collar *f*, and the grinding-wheel operated without any traversing movement. This is of great practical value, because, as in grinding cards, for instance, at a "smash," it enables the wheel to thoroughly work up that portion without unduly grinding other portions. This capacity of operating the grinding-wheel at any desired point is found in card-grinders heretofore constructed.

It is obvious that the worm-gear and rack are less liable to wear than the screws, and less liable to operate imperfectly when worn; also, that so far as cost of construction is concerned it is largely in favor of the rack and gear.

In the endless-screw machines the pivoted lug which operatively connects the carriage with the screw is especially liable to wear, and frequently requires renewal.

It will also be seen that while in operation the discharge of abrasive matter from the wheel is directed downward and away from the traversing mechanism.

I am aware that in machines for cutting stone, as heretofore constructed, sliding beds for holding the stone and rotary cutters capable of being traversed laterally across the surface of the stone have been employed. In these machines the cutters are of course below the mechanism whereby they are traversed, in order that they may operate on the upper surface of the stone as it lies on the sliding bed. I am not aware, however, of the previous existence in a card-grinding machine of a grinding-wheel located below the traversing mechanism, nor am I aware of the previous existence of any card-grinding machine in which the grinding-wheel could be so located with reference to the traversing mechanism without a complete reorganization of the entire machine.

Having thus described my invention, I claim as new and of my own invention—

1. In a card-grinding machine, the combination of a grinding-wheel, its driving-shaft, and a grinding-wheel carriage mounted on a slide, with the stationary rack and the worm-gear, operated by a traversing shaft arranged to be revolved in opposite directions, and controlled by a clutch and an automatic shipper, substantially as described.

2. In a card-grinding machine, the combination, with a grinding-wheel carriage mounted on a slide and a traversing mechanism for moving the carriage on its slide, of a grinding-wheel mounted on a splined shaft controlled by the carriage, and located below the carriage and traversing mechanism, substantially as described, whereby the entire moving portions of the machine are so located with reference to the grinding-wheel that they are not liable to contact with abrasive matter thrown from the wheel, as set forth.

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