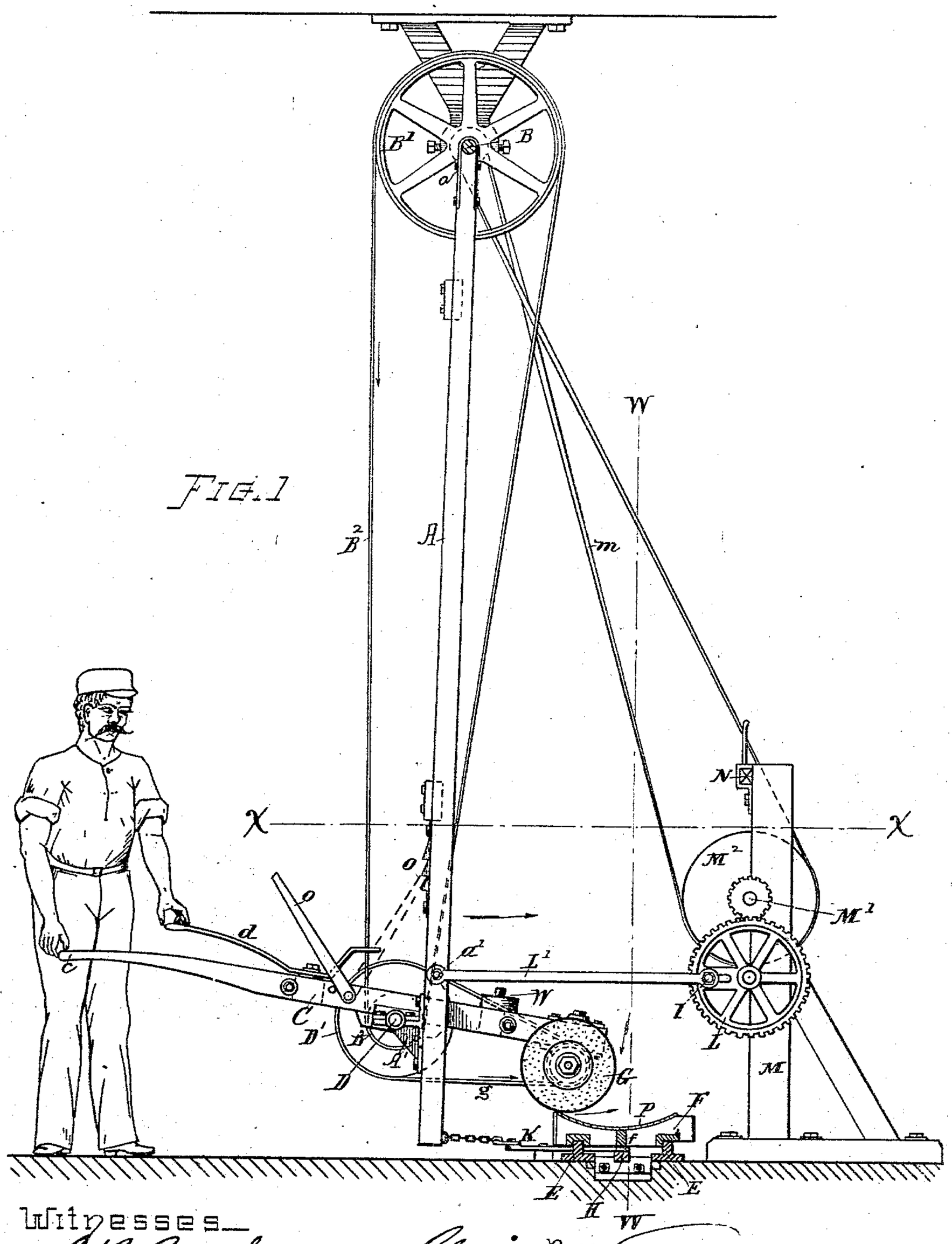
(No Model.) 3 Sheets—Sheet 1.

G. W. TAFT.

MACHINE FOR GRINDING AND POLISHING ROAD SCRAPER BLADES, &c.

No. 411,839. Patented Oct. 1, 1889.

FIG. 1



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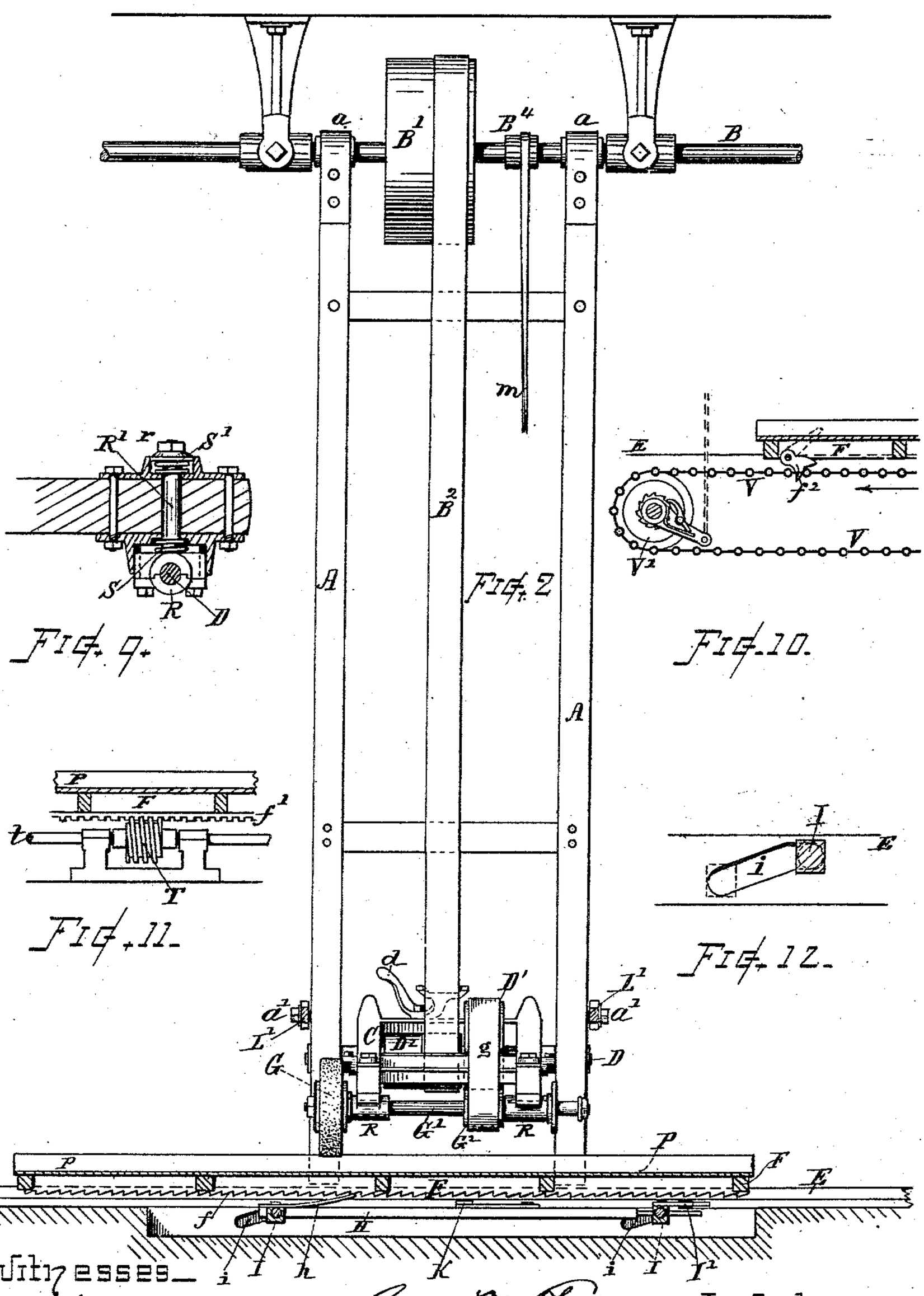

FIG. 9.

FIG. 2

FIG. 10.

FIG. 11.

FIG. 12.

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(No Model.) 3 Sheets—Sheet 3.

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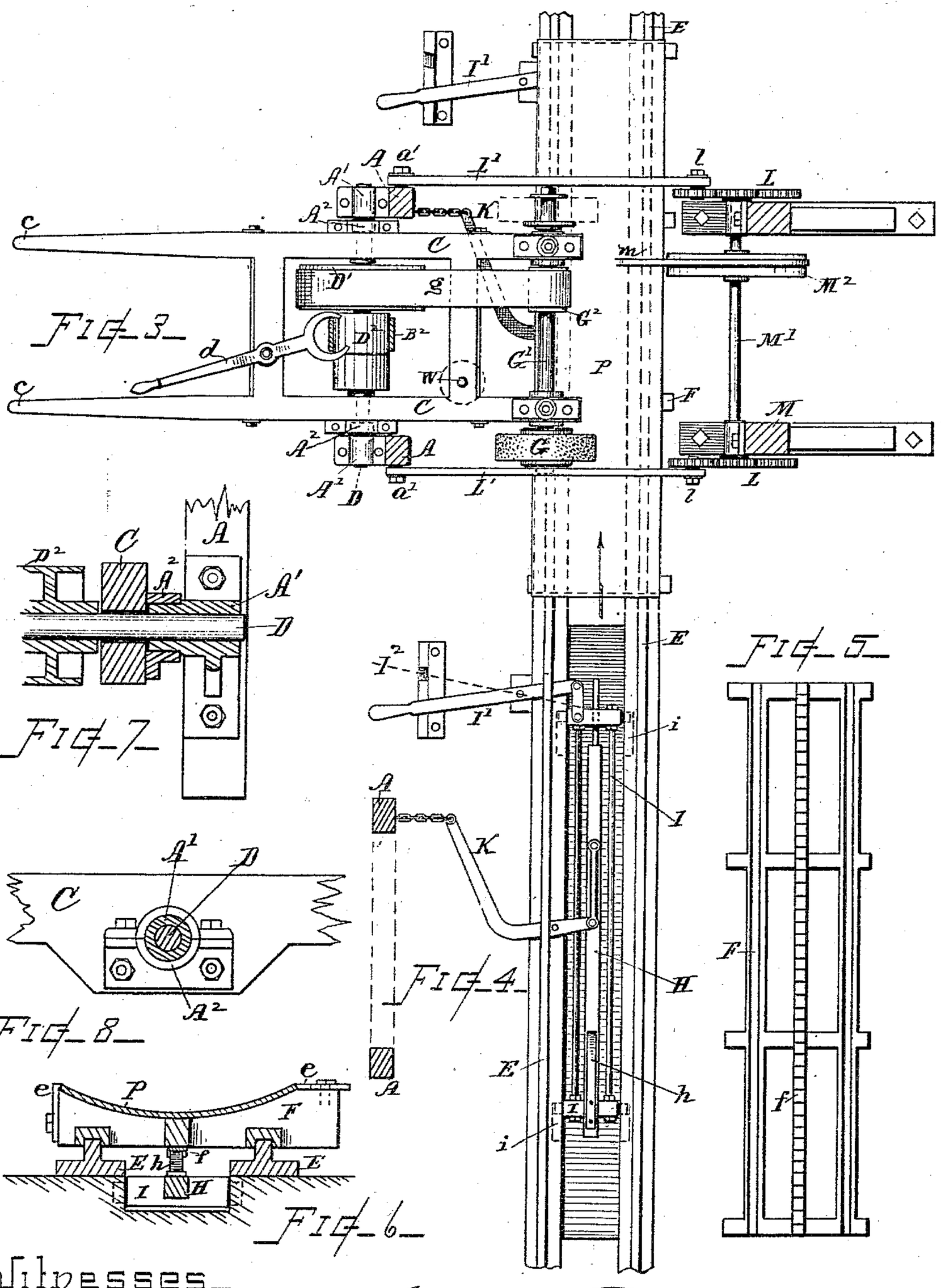

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UNITED STATES PATENT OFFICE.

GEORGE WARNER TAFT, OF KENNETT SQUARE, PENNSYLVANIA.

MACHINE FOR GRINDING AND POLISHING ROAD-SCRAPER BLADES, &c.

SPECIFICATION forming part of Letters Patent No. 411,839, dated October 1, 1889.

Application filed April 10, 1889. Serial No. 306,676. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WARNER TAFT, a citizen of the United States, residing at Kennett Square, in the county of Chester and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Grinding or Polishing Road-Scraper Blades and other Curved Metal Plates, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

The object of my present invention is to provide a practical and efficient mechanism for grinding and polishing road-scraper blades and other large and heavy metal plates having curved or irregular shaped surfaces, and to improve the construction in grinding or polishing mechanism of the class named, so that the same will be better adapted for the purpose stated, convenient for attendance and operation in heavy works, effective and flexible for automatically following the curvature of the plate with the grinding or polishing wheel, and having improved facilities for automatically feeding forward the plate, as required. These objects I attain by mechanism the nature, construction, and operation of which is explained in the following description, the particular subject-matter claimed being hereinafter definitely specified.

In the drawings, Figure 1 is a side view of my improved machine arranged for grinding and polishing curved road-scraper blades. Fig. 2 is a section at line *w w* through the feed-carriage, looking toward the grinding-wheel and its operating mechanism. Fig. 3 is a horizontal section or plan view of the machine at line *x x*, Fig. 1. Fig. 4 is a plan view of the feedway and the carriage-feed mechanism. Fig. 5 is a bottom view of the carriage. Fig. 6 is a transverse section of the feedway, the carriage, and the plate supported thereon. Figs. 7 and 8 show details of the supporting-bearing that forms the connecting-joint between the swinging frame and tilting wheel-carrier. Fig. 9 shows a yielding journal-box for supporting the grinder-shaft in connection with the end of the carrier-frame. Figs. 10 and 11 show modifications in the feed mechanism for propelling the carriage. Fig. 12 shows the detail of the inclined drop for throwing the feed-pawl out of engagement from the ratchet on the carriage.

In reference to parts, A denotes the supporting-frame or swing-jack, consisting of two upright bars, which are suspended by suitable bearings *a* at their upper ends upon the overhead driving-shaft B, which latter is supported in hanger-bearings from the ceiling or roof-frame of the factory or in other suitable manner. At or near the lower ends of the frame or swing-jack A there is pivotally attached a tilting grinder carrier or frame C, consisting of two side pieces rigidly connected together with transoms, and provided at the rear end with suitable journal-boxes, in which rotates the horizontally-disposed shaft G′, whereon is mounted the grinding or polishing wheel G. At the junction of the frames A and C an operating-shaft D is arranged, which shaft rotates in bearings A′ fixed on the frame A, and which in connection with the carrier-bearings forms the axis, pivoting-hinge, or fulcrum that connects the parts, and on which the grinder-carrier C rocks, affording to the wheel G a rise and dip movement for following the curvature of the plate without variation in the relative position of the axis of the center shaft D as to its distance from the grinder-shaft G′ and driving-shaft B. The forward end of the carrier C is provided with handles *c*, whereby said carrier can be rocked or tilted up and down by the attendant for raising the grinding-wheel from the work or depressing it thereon. The tilting wheel-carrier can, if desired, be supported by bearings directly upon the shaft D; but preferably the bearings are made as shown in Figs. 7 and 8, wherein the bearing-box A′, attached to the swing-frame, is made with an extension, and a bearing-box A^2 is fixed on the side of the carrier-frame and supported on said extension of the shaft-bearing, so that the shaft D runs free in the bearing A′, while the weight of the carrier-frame C is borne by the outer bearing A^2 instead of on the shaft, and the parts can be freely tilted without interfering with or creating friction on the shaft D. A driving-pulley D′ is mounted on the center shaft

D, from which a belt *g* runs onto the pulley G^2 of the grinder-shaft G'. Tight and loose pulleys D^2 are also arranged on said center shaft for the operating-belt B^2, that runs from the driving-pulley B', fixed on the overhead shaft B, between the swing-bars, as illustrated. A suitable belt-shipper *d* is attached to the carrier-frame C for shifting the belt B^2 from the tight to the loose pulley, and vice versa.

Extending transversely to the swing-frame, or in a direction parallel with the axis of the grinder-shaft, is a feedway or guide-tracks E, on which runs the work-supporting table or feed-carriage F, whereon the plate P, to be ground or polished, is supported. Said carriage is best made, as shown in Fig. 5, removable from the tracks, and is provided with a ratchet *f*, or other suitable means, whereby it can be fed forward at short intervals as the grinding or polishing proceeds. Dogs *e* are provided on the carriage for retaining the plate P in position thereon.

In the present instance the mechanism shown for advancing the carriage F consists of a reciprocating bar H, having the spring-pawl *h* fixed thereon, said bar being connected or linked to a swinging lever K, arranged to be operated by the lower end of the swing-jack A, as indicated in Fig. 4, or in other equivalent manner. The reciprocating bar H is mounted on a sliding frame I, having at its ends projections that are supported in inclined recesses *i*, as illustrated in Figs. 2, 4, and 12. Said frame is connected to a shifting-lever I', whereby it can be moved longitudinally to carry its supporting projections to either end of the inclined recesses *i*. When said shifting-lever and frame are at a position with the supports at the high end of the inclines, as indicated on the drawings, the pawl *h* on the reciprocating bar is in engagement with the ratchet *f* for feeding forward the carriage F in the direction shown by the arrow on Figs. 3 and 4 as the bar H reciprocates; but when the lever I' is shifted to the position indicated by the dotted line I^2 on Fig. 4 then the supports of the frame I are carried to the lower end of the inclines, (see dotted lines, Fig. 12,) and the reciprocating bar with the spring-pawl is thereby dropped sufficiently to prevent the pawl engaging the ratchet-teeth on the carriage, thus stopping the forward-feeding action.

Swinging motion is imparted to the frames A and carrier C for passing the grinder-wheel back and forth over the surface of the plate. This in the present instance is effected by means of crank-wheels L and connecting-rods L'. The crank-wheels are mounted on a shaft that turns in bearings on a suitable frame M at the rear of the feedway, this shaft being parallel with the grinder-shaft and the wheels provided with wrist-pins or cranks *l* from which two connecting-rods L' extend to the sides of the frame A, to which they are pivoted at *a'*. The crank-wheels are gears and are operated by pinions from an operator-shaft M', having tight and loose pulleys M^2, onto which a driving-belt *m* runs from a small pulley B^4 on the overhead driving-shaft B.

N indicates a shipper for shifting the belt *m* to stop and start the swinging action of the grinding mechanism. The crank-pins *l* are preferably adjustable for varying the length of their throws. If desired, cams or any other suitable mechanism may be used in place of cranks for reciprocating the connecting-rods L'.

A suitable stop or dogging device O is provided for retaining the carrier C in tilted position with the grinding-wheel raised or elevated away from the work when desired.

The grinding-wheel can be made to bear upon the work with greater or less force by adding weight upon one end of the carrier-frame, so as to give greater or less preponderance to that end of said frame on which the grinder-shaft is mounted. The weights can be confined thereon by a stud, as at W, or by other suitable means.

The journal-boxes for the grinder-shaft can be fixed rigidly on the carrier-frame, or they can be constructed for yielding action, as preferred. In the latter case the journal-box R is provided with a stud or spindle R', that extends through the frame, (see Fig. 9,) and has arranged in connection therewith springs S and S' above and below the frame. One of said springs is arranged between the journal-box and a plate fixed on the under side of the carrier-frame, and the other spring is arranged between a nut or washer *r* on the stud or neck R' and a plate fixed on the top of the carrier-frame, the springs thus acting in either direction and taking the shock and jar of the grinding.

The grinder-shaft is best arranged for using a grinding-wheel on either of its ends, and such wheels may be used on one or both ends, as desired.

In lieu of a reciprocating bar with the pawl and ratchet, as shown, for moving the carriage a shaft *t* can be extended longitudinally along the feedway and provided with a worm-screw T to engage with a rack *f'* on the carriage F, as in Fig. 11, the carrier being advanced by rotation of said worm-screw; or, again, if preferred, a drive-chain V, running around sprocket-wheels V' at the ends of the feedway, can be employed, the carriage F in this case being provided with a grip or dog f^2 for engagement with and disengagement from said chain for starting and stopping the feed. In this case a pawl-and-ratchet mechanism can be connected with a sprocket-wheel for moving the chain V forward, as indicated in Fig. 10.

In the operation of the machine the scraper blade or plate P, supported on the carriage F, is moved forward until the first end of said plate is at the position of the grinding-wheel G. The feed mechanism is thrown into action and the belts B^2 and *m* shipped onto the

tight pulleys. The attendant then, taking hold of the handles *c*, drops the grinding-wheel to working position and guides the movement of the wheel until it has ground sufficiently far onto the end of the plate to avoid any liability of running off or derangement. He then releases the handles and allows the machine to run automatically until it has ground the surface to the opposite edge of the plate. The frame A swings back and forth with a pendulous motion, while the tilting of the grinder-carrier C allows the grinding-wheel to rise and fall to accommodate the curvature or variations in the surface of the plate, the carriage being automatically moved forward by its feed mechanism at each successive movement of the grinder-wheel across the surface. When it is desired to change the plates, the attendant shifts the belts to the loose pulleys, presses down the handles of the carrier-frame, thereby lifting the grinding-wheel up out of the way, and throws in the dog-bar O for supporting it in position, and then, by throwing over the lever, drops the pawl from the ratchet, releasing the carriage so that it can be run back or forward clear from the grinder to a position where the finished plate can conveniently be removed and another plate put in its place.

In practice two or more grinding-machines of the kind shown are arranged in relation to each other at positions substantially as indicated by Figs. 3 and 4. A single feedway E extends across both machines, so that the work-supporting carriages can move forward the entire distance for transferring the plates direct from one grinder to the other. The first grinding mechanism is provided with a coarse grinding-wheel for roughing off the surface of the plates, and the following mechanism with a finer grinding-wheel for finishing or polishing the surface. With this arrangement of grinding mechanism, plates can be placed on the carriage at one end of the feedway, their surfaces ground and polished, and then removed from the carriage at the other end of the feedway without intermediate handling of the heavy plates. The carriage being a comparatively light skeleton frame can then be readily taken up and carried back to the first end of the feedway for receiving another plate. In this way, with two or more carriages, successive plates can be worked forward one after another, and the surface-finishing performed in a very convenient, easy, and expeditious manner.

It will be understood that I do not claim, broadly, a swing-frame for supporting a grinding or polishing wheel, as swing-frames in different forms have been common and well known in the art previous to my present invention.

What I claim as of my invention, to be secured by Letters Patent, is—

1. In a machine for the purpose specified, the combination of the swinging bars, a centrally-pivoted upwardly and downwardly yielding grinder-carrier disposed between the lower ends thereof, and an intermittently-movable work-supporting carriage mounted on tracks that extend laterally beneath the end of said carrier, with feed mechanism actuated from said swing-bars for advancing said carriage synchronously with the vibrations of the swinging grinder, substantially as set forth.

2. In a machine for the purpose set forth, the carrier-frame, its side bars having the bearings R of the grinder-shaft mounted at one end thereof and provided with handles *c* at the opposite end and pivotally supported to afford tilting action, in combination with the two backwardly and forwardly swinging supporting-bars A, the laterally-extended feedways E, and the movable work-supporting table or carriage traveling on said ways, substantially as set forth.

3. In a machine for the purpose specified, the combination, with the swing-frame having side bars A A suspended from the overhead shaft, the wheel-carrier frame disposed between said side bars, flexibly connected thereto, and carrying the center shaft, grinder-shaft, grinding-wheel, and driving-belts, as shown, of the vibrator-gears having wrist-pins adjustable therein for varying the length of throw, connecting-rods from the wrist-pins pivoted to the opposite sides of said swing-frame, the actuating-gears, back shaft M', pulley M^2, and belt *m*, substantially as described, for rotating said vibrator-gears, as and for the purpose set forth.

4. In a machine for the purpose specified, the combination, with the swing-frame suspended from the overhead shaft and the tilting carrier flexibly connected with said swing-frame, as shown, of the center shaft, its journal-bearings forming the hinge or fulcrum axis for said carrier, the grinder-shaft carrying a grinding or polishing wheel mounted in bearings on said carrier, driving-belts for rotating said shaft and wheel, the feedway or guiding-tracks extending laterally in relation to the swing of said frame, and the work-supporting carriage movable longitudinally on said tracks, substantially as set forth.

5. In a machine for the purpose specified, the combination of the swing-frame suspended from the overhead driving-shaft, the upwardly and downwardly swinging grinder-carrier flexibly connected thereto, the center shaft, the grinder shaft and wheel supported on the rear end of said carrier, the work-supporting carriage running on the transversely-disposed feedway-guides, vibrating gear for imparting motion to said swing-frame, and feed-actuating mechanism automatically operated from said swing-frame for imparting movement to said carriage, substantially as set forth.

6. In a machine for the purpose specified, the combination, with the swing-frame, tilting carrier, and grinding-wheel, and laterally-moving carriage provided with a ratchet or

engaging devices, of the reciprocating bar and pawl or its equivalent, and the actuating-lever operated by said swing-frame to effect movement of said carriage, as set forth.

7. The combination of a plurality of grinders, each comprising a swing-frame, and a tilting carrier provided with a grinding-wheel mounted and operating thereon, a feedway common to said grinders, a carriage adapted for sustaining a scraper-blade or uneven plate, movable on said feedway for advancing it forward beneath the several grinding-wheels, and mechanisms, substantially as described, for automatically imparting pendulous motion to said grinders and for advancing said carriage, as and for the purpose set forth.

8. In a machine for the purpose specified, the removable carriage adapted for supporting a road-scraper-blade plate, in combination with swinging frame, tilting grinder-carrier, grinding mechanism, the carriage guiding-way, and feed-actuating mechanism, substantially as described, for the purpose set forth.

9. In a machine for the purpose specified, the combination, with the carriage, its guideway and feed-operating lever and ratchet, of an engaging pawl and pawl-supporter for moving said carriage, and a throw-off lever connected therewith for starting and stopping the feed of the carriage, substantially as set forth.

10. In a machine for the purpose specified, the combination, with the carriage F, its ratchet *f*, of the reciprocating bar H, carrying the pawl *h*, the shifting-frame K, supported by inclined guides *i*, and the shifting-lever *l*, substantially as set forth.

11. In a machine for the purpose specified, the journal-supporting boxes A′ for the center shaft provided with extensions, and the supporting-boxes A^2, attached to the carrier and mounted on said extensions, in combination with the swing-frame and tilting carrier, substantially as set forth.

12. In a machine for the purpose specified, the yielding journal-boxes for supporting the grinder-shaft, in combination with the rocking carrier swing-frame and work-supporting carriage, substantially as set forth.

13. In a machine for the purpose specified, the combination, with the swing-frame A and grinder carrier-frame C flexibly connected thereto and having the grinding-wheel shaft mounted in journal-boxes at one of its ends and handles *c* at its other end, of the adjustable stop-dog O, substantially as described, for temporarily sustaining said carrier with the grinding-wheel elevated.

Witness my hand this 26th day of March, A. D. 1889.

GEORGE WARNER TAFT.

Witnesses:
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