No. 786,522. PATENTED APR. 4, 1905.

H. SCHUMACHER.

ASPHALT CUTTING MACHINE.

APPLICATION FILED OCT. 14, 1904.

5 SHEETS—SHEET 1.

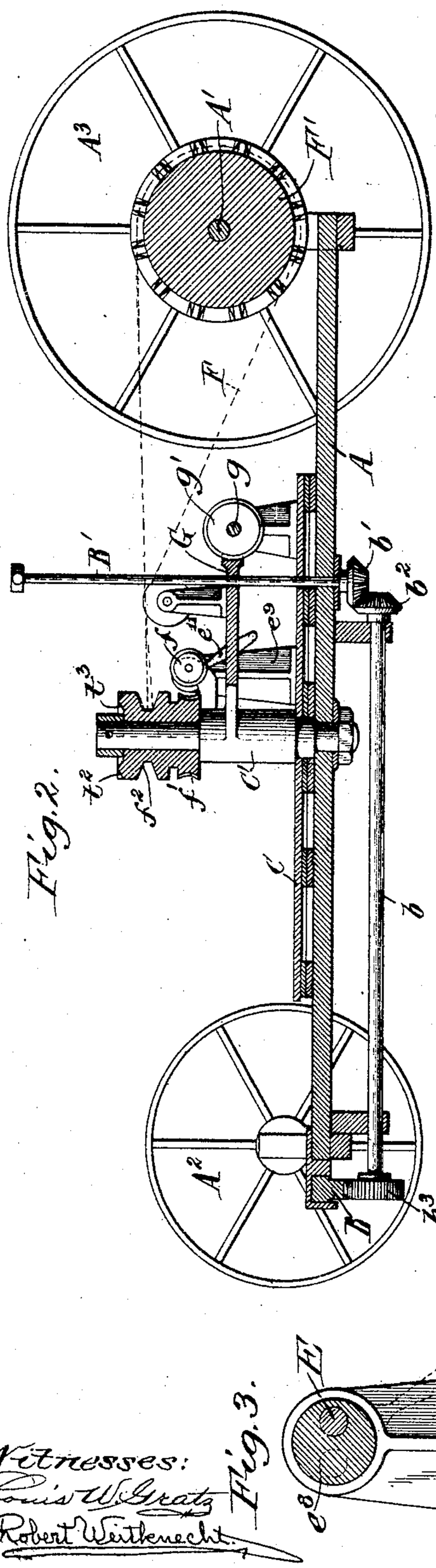

Fig. 2.

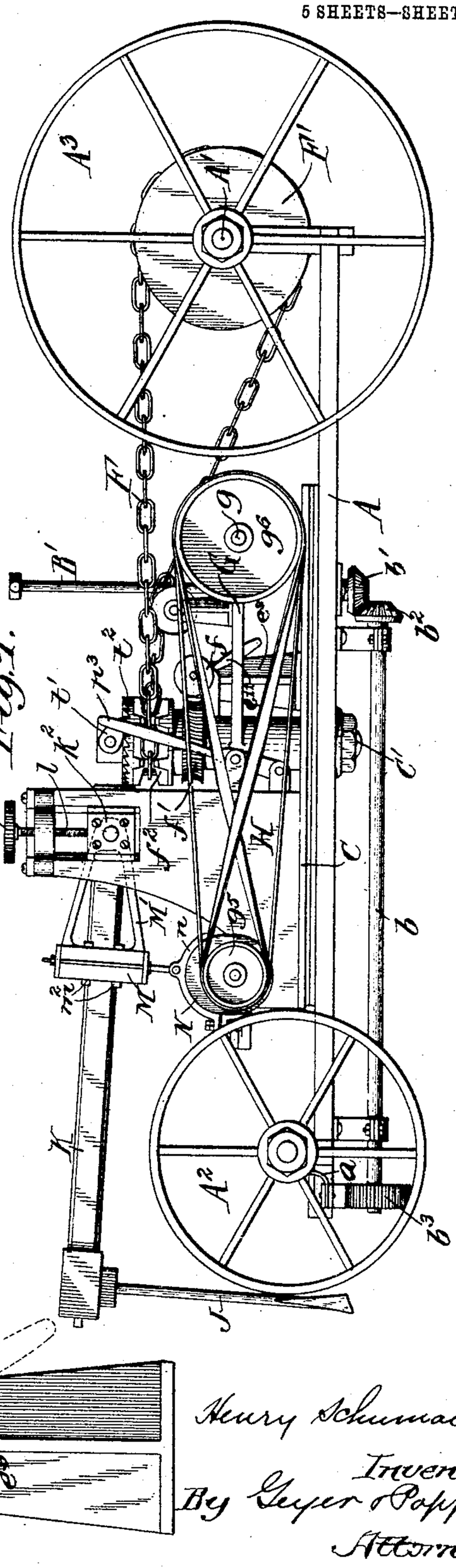

Fig. 1.

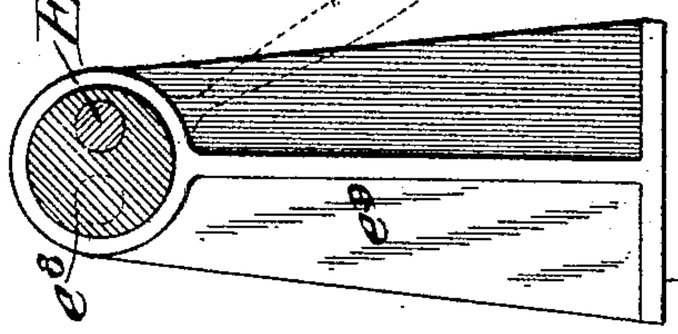

Fig. 3.

Witnesses:
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Robert Weitknecht.

Henry Schumacher,
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5 SHEETS—SHEET 2.

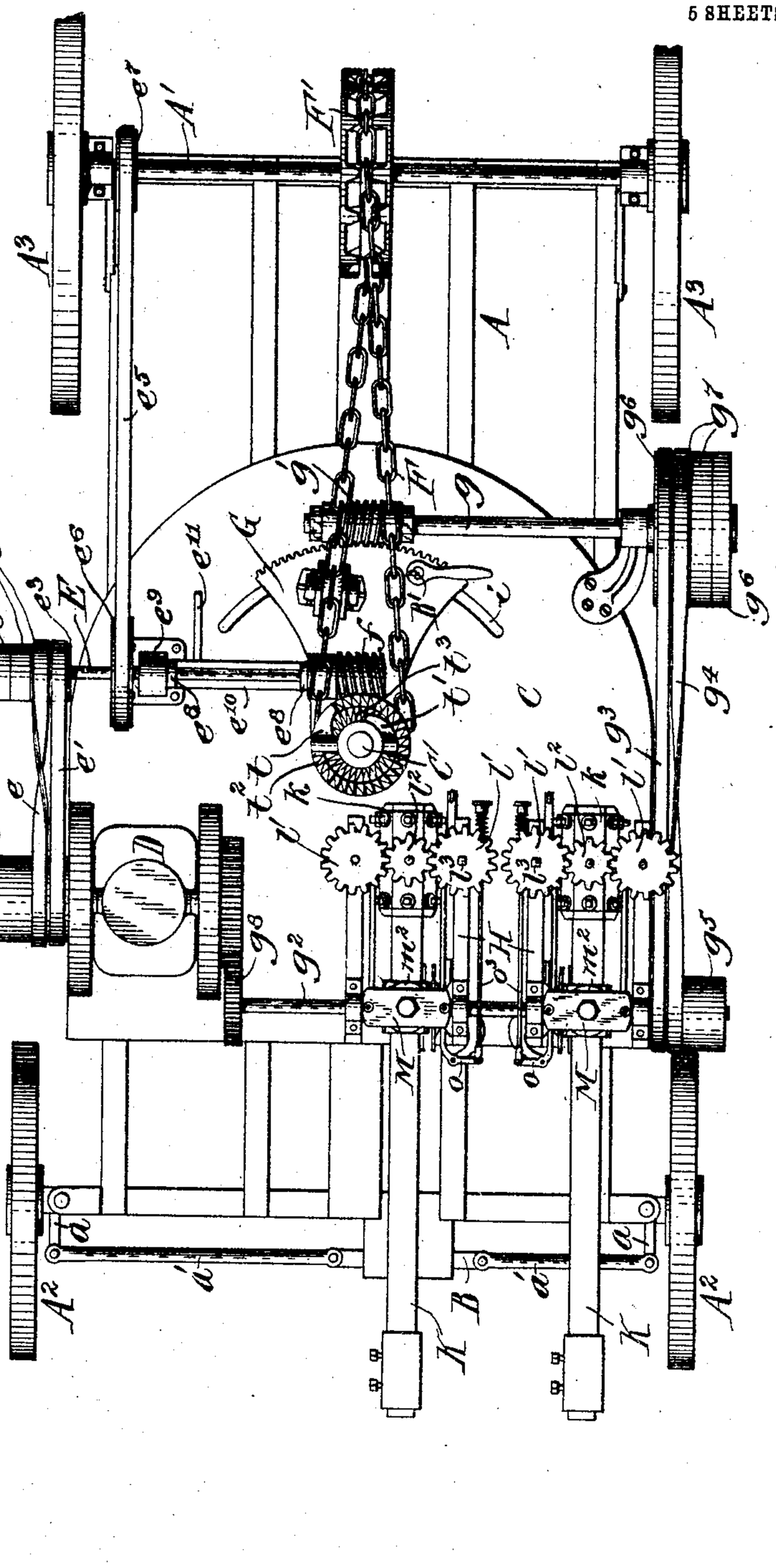

Fig. 4.

Witnesses:
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5 SHEETS—SHEET 3.

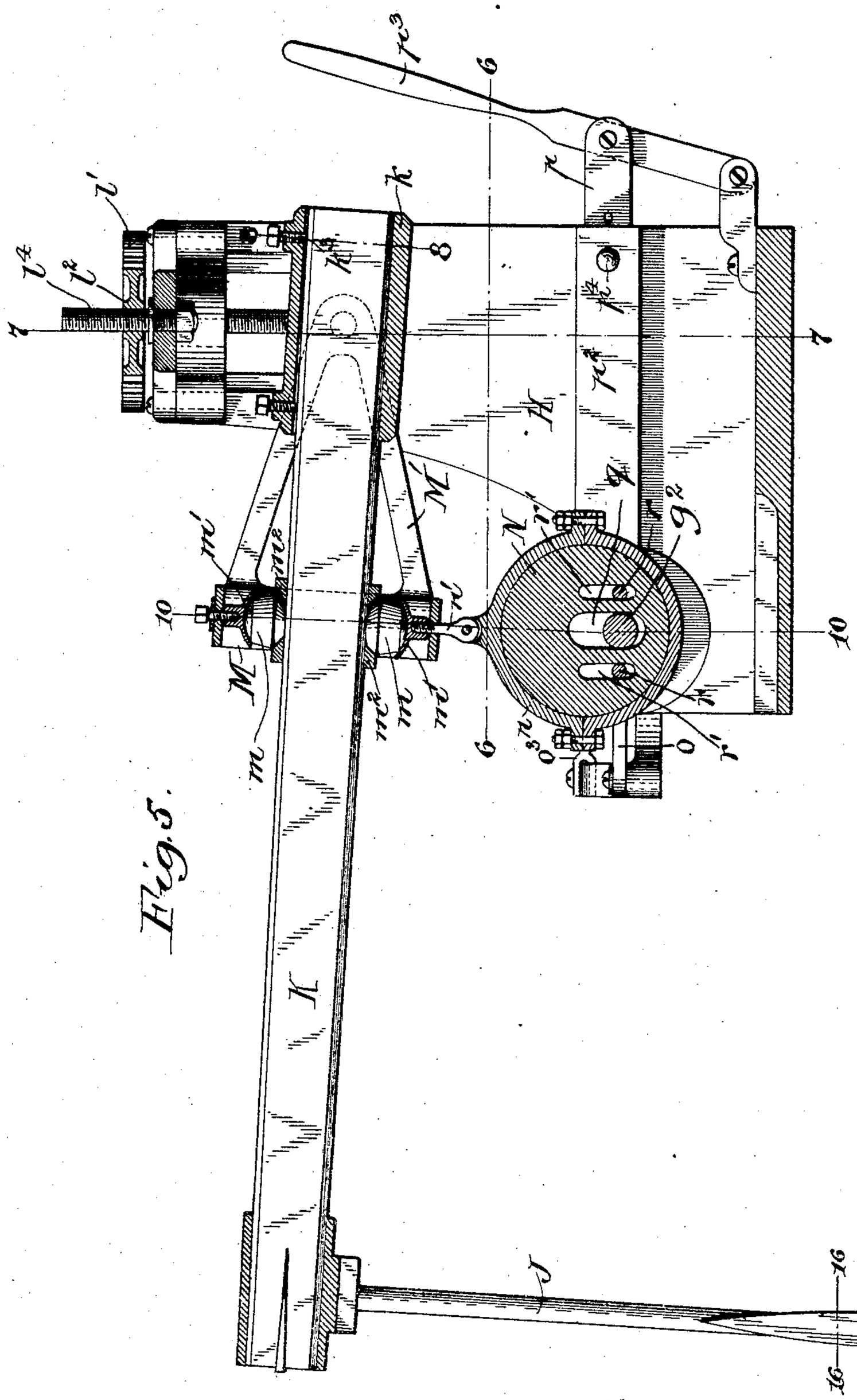

Fig. 5.

Witnesses:
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5 SHEETS—SHEET 4.

Fig. 6.

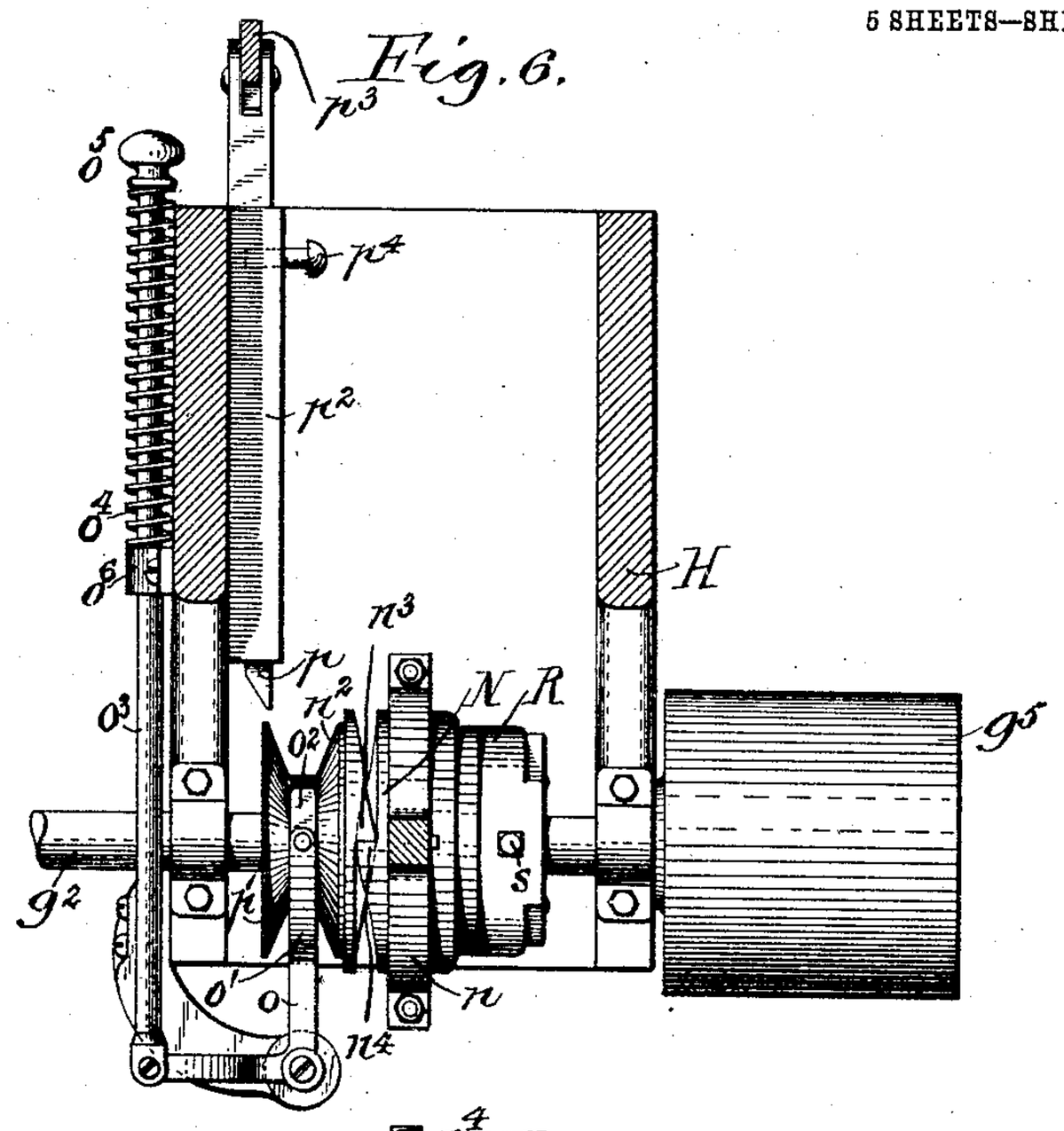


Fig. 7.

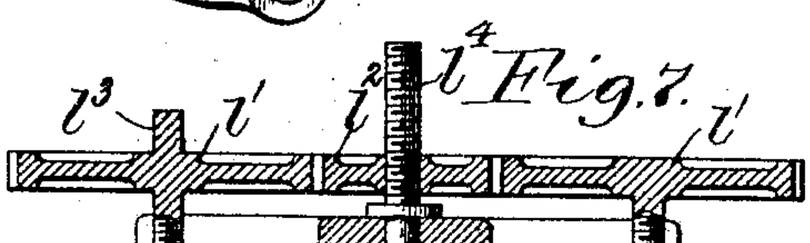


Fig. 8.

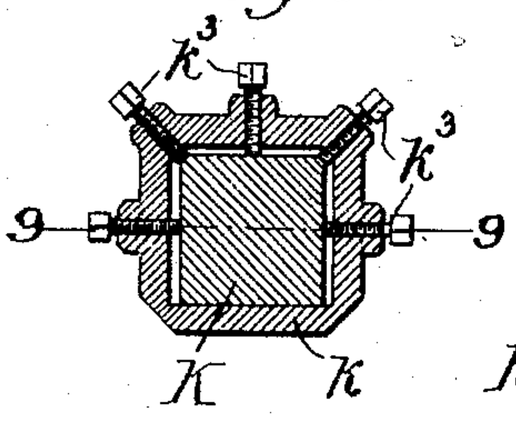
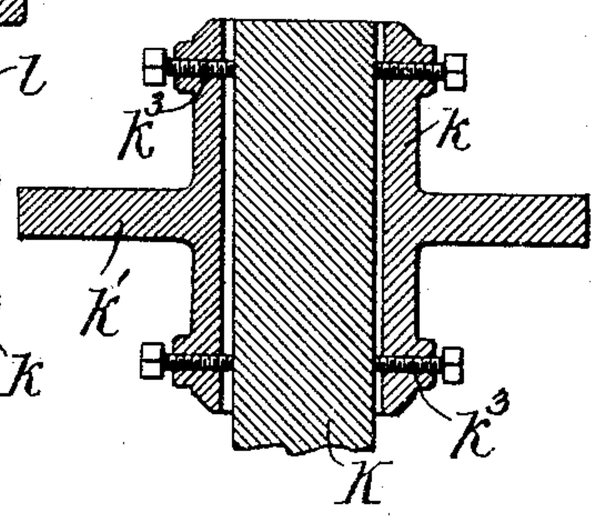
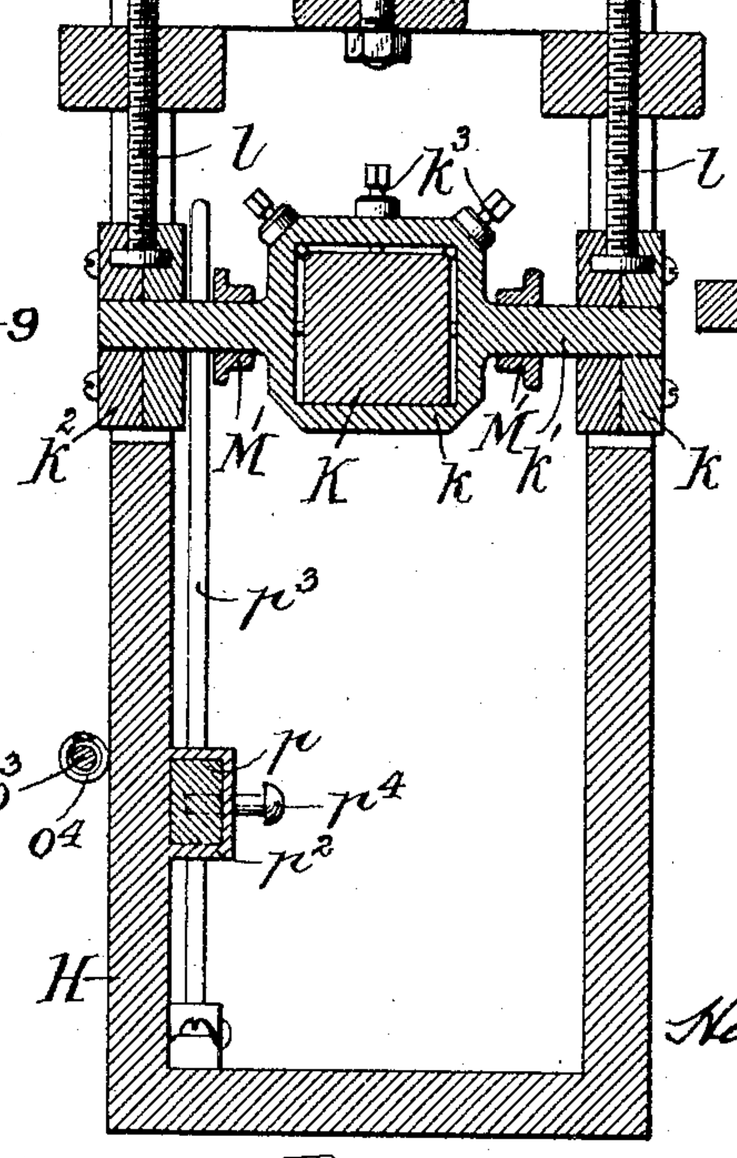


Fig. 9.





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5 SHEETS—SHEET 5.

Fig. 10.

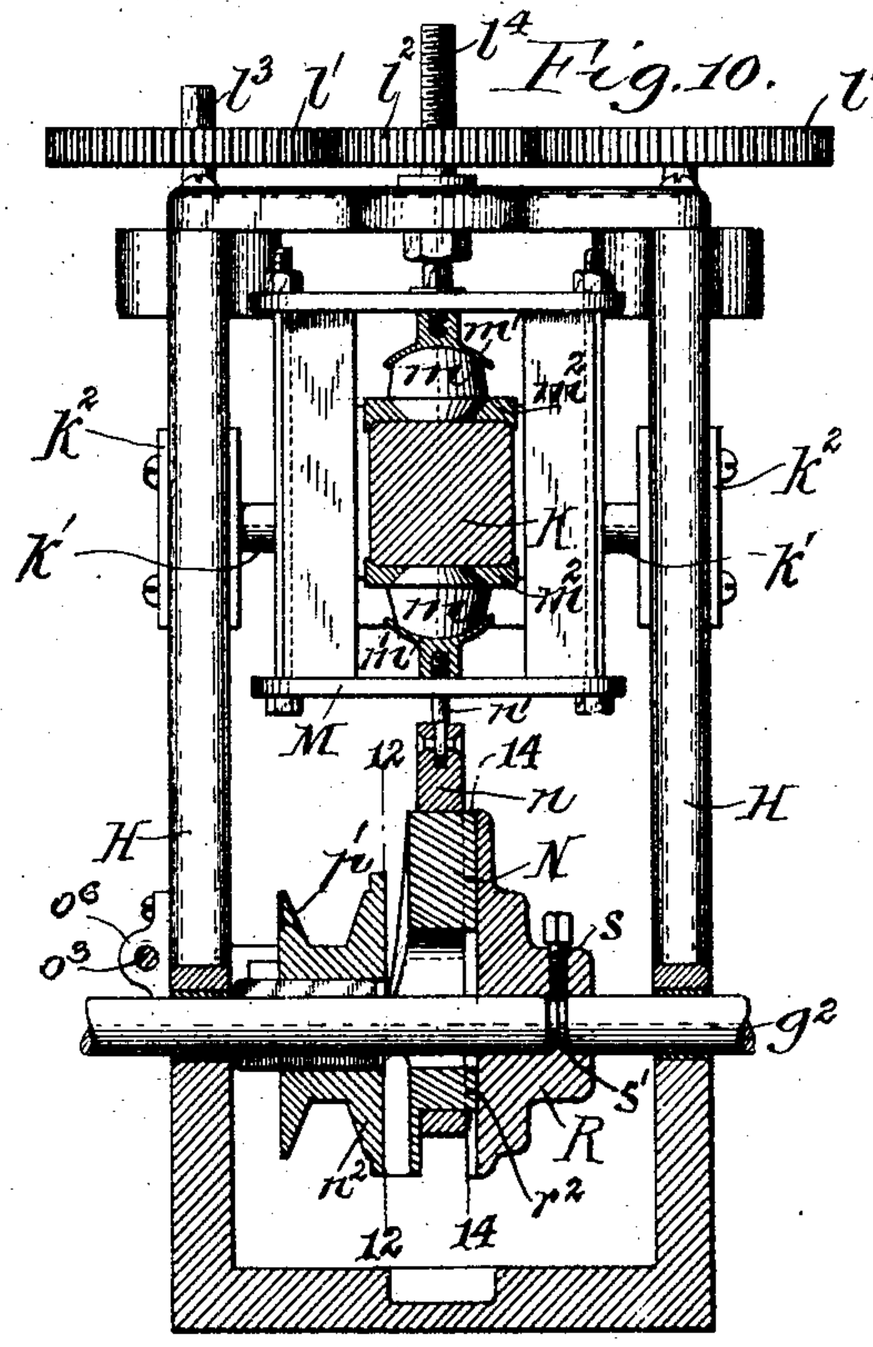

Fig. 11.

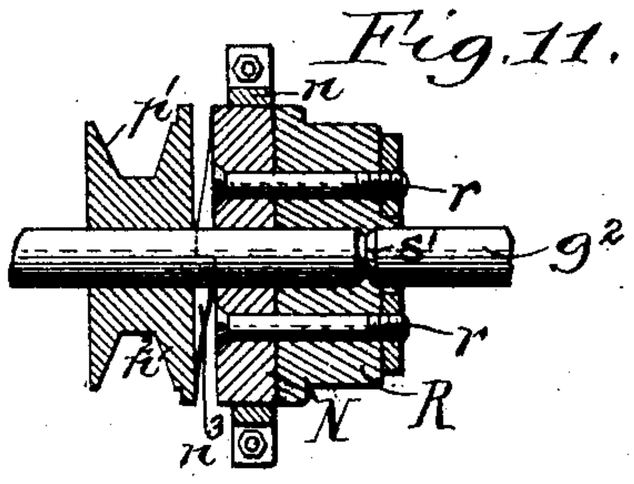

Fig. 12.

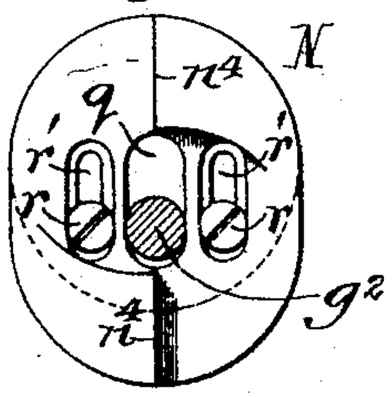

Fig. 13.

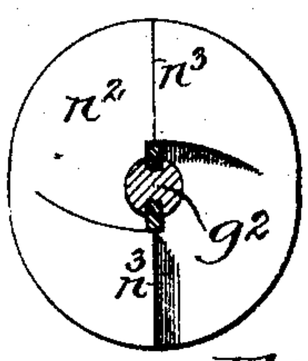

Fig. 14.

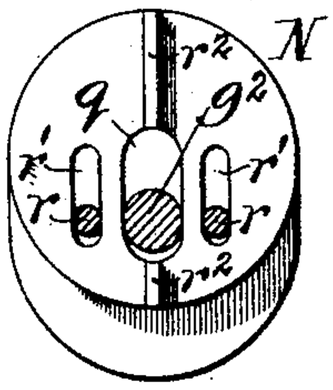

Fig. 15.

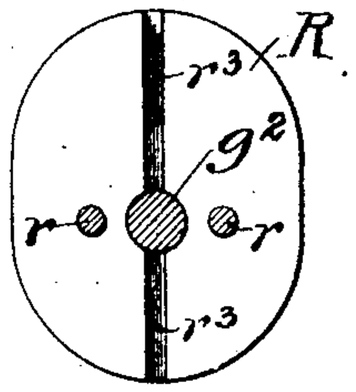

Fig. 16.

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Robert Weitknecht.

Inventor
H. Schumacher,
By Geyer & Popp, Attorneys

No. 786,522. Patented April 4, 1905.

UNITED STATES PATENT OFFICE.

HENRY SCHUMACHER, OF BUFFALO, NEW YORK.

ASPHALT-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 786,522, dated April 4, 1905.

Application filed October 14, 1904. Serial No. 228,484.

To all whom it may concern:

Be it known that I, HENRY SCHUMACHER, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Asphalt-Cutting Machines, of which the following is a specification.

This invention relates more particularly to a machine for cutting asphalt pavement in repairing the same, but is also applicable to similar apparatus, such as road-machines.

The principal object of my invention is to provide an asphalt-cutting machine which permits the cutters to be moved laterally as well as forwardly and backwardly in order to cut out pieces of different forms or outlines, according to the required repairs.

Further objects of my invention are to provide simple means for varying the stroke of the cutters and compensating for their wear and to improve the construction of the machine in other respects.

In the accompanying drawings, consisting of five sheets, Figure 1 is a side elevation of my improved machine. Fig. 2 is a sectional elevation thereof. Fig. 3 is an enlarged side elevation of one of the shaft-standards, showing the eccentric-adjusting means of the shaft. Fig. 4 is a top plan view of the machine. Fig. 5 is a sectional elevation of one of the helves and its actuating mechanism. Fig. 6 is a horizontal section in line 6 6, Fig. 5. Fig. 7 is a transverse vertical section in line 7 7, Fig. 5. Fig. 8 is a cross-section of the helve in line 8 8, Fig. 5. Fig. 9 is a longitudinal section thereof in line 9 9, Fig. 8. Fig. 10 is a transverse vertical section in line 10 10, Fig. 5. Fig. 11 is a fragmentary horizontal section of the adjustable eccentric of one of the helves. Fig. 12 is a vertical section in line 12 12, Fig. 10, looking toward the right; and Fig. 13 is a section on the same line looking toward the left. Fig. 14 is a vertical section in line 14 14, Fig. 10, looking toward the left; and Fig. 15 is a section on the same line looking toward the right. Fig. 16 is a cross-section of one of the cutters in line 16 16, Fig. 5.

Similar letters of reference indicate corresponding parts throughout the several views.

The parts of the machine are mounted on a wheeled truck or vehicle of any suitable construction, that shown in the drawings consisting of a platform A, carried at its rear end by a shaft or rear axle A′ and at its front end by short-turning steering-wheels A^2. The rear axle turns in suitable bearings on the platform and the rear wheels A^3 are fastened thereto. The horizontally-swinging spindles of the steering-wheels are provided with arms *a*, which are connected by links *a′* with a transversely-sliding rack-bar B, guided on the front portion of the platform A. As shown in Figs. 1 and 2, this rack-bar is operated by an upright steering-spindle B′ through the medium of a longitudinal shaft *b*, journaled on the under side of the platform, and connected with said shaft by bevel-gears *b′* b^2 and provided at its front end with a gear-wheel b^3, which meshes with the rack-bar.

C indicates a horizontal turn-table supported upon the platform A and rotating upon a fixed stud or post C′, rising from the platform.

D is a suitable motor, such as a gas-engine, mounted on the turn-table near one side thereof and adapted to propel the vehicle and actuate the cutters and other parts of the machine.

E is a counter-shaft mounted on the turn-table C between the motor-shaft and the rear axle A′ and to which motion is transmitted by any suitable means, such as straight and crossed belts *e e′*, running around a wide pulley e^2 on the motor-shaft and tight and loose pulleys e^3 e^4 on the counter-shaft, so that by shifting one or the other of said belts upon its corresponding tight pulleys the counter-shaft is turned forward or backward. Motion may be transmitted from the counter-shaft to the rear axle by a belt e^5 and pulleys e^6 e^7. The machine can by this means be propelled forward or backward, the driving means just described being intended more especially for transporting the machine. In addition to this main propelling mechanism the machine is provided with an auxiliary propelling mechanism for slowly advancing it while the cutters are in action. This auxiliary mechanism preferably consists of a worm *f*, secured to

the counter-shaft E and meshing with a worm-wheel f', journaled on the reduced upper end of the post C' and carrying a sprocket-wheel f^2. Motion is transmitted from the latter to the rear axle by a chain F, running around said sprocket-wheel, and a similar wheel F', secured to the rear axle, as shown in Figs. 1 and 4. In order to permit the slow-propelling mechanism to be thrown out of gear with the motor when it is desired to use the main propelling mechanism, the counter-shaft E is journaled in eccentric bearing-boxes e^8 capable of turning in circular openings in the standards e^9, which support the shaft, as best shown in Fig. 3. The two eccentric-boxes of the shaft are connected by a tie-bar e^{10}, having a handle e^{11}, by which construction the boxes can be turned simultaneously for shifting the worm f into and out of gear with the worm-wheel f' in an obvious manner. When the slow-propelling mechanism is employed, the transmission-belt e^5 is thrown off its pulleys.

The turn-table C may be actuated by any suitable means; but this is preferably accomplished by the following mechanism shown in the drawings: G is a fixed horizontal worm wheel or sector secured to the post C', and g is a transverse shaft mounted on the turn-table and carrying a worm g', which meshes with said sector, so that the rotation of the shaft in one or the other direction causes the worm to travel toward one end of the sector, thereby rotating the turn-table accordingly. The worm-shaft g is driven from a counter-shaft g^2 by straight and crossed belts g^3 g^4, running around a pulley g^5 on said counter-shaft and tight and loose pulleys g^6 g^7 on said worm-shaft. The innermost and outermost of the last-named pulleys are fast on the shaft, and the two intermediate ones are loose, so that upon shifting both belts onto the loose pulleys the turn-table is left at rest, while upon shifting either of the belts upon its respective tight pulley the turn-table is rotated in the corresponding direction. Motion is transmitted from the motor-shaft to the counter-shaft g^2 by suitable gearing g^8. This counter-shaft is journaled in standards H, mounted on the turn-table. The latter has a curved slot i for the passage of the steering-spindle B', which slot is concentric with the post C'. By mounting both the table-turning shaft g and its driving or counter shaft g^2 on the turn-table they maintain the same parallel relation in all positions of the table, preventing the driving-belts from running off the pulleys, which would be liable to occur if one of these shafts were mounted on the frame of the machine and the other on the table.

J J indicate the cutters or other tools adapted to operate upon the road or pavement, two of such cutters being shown in the drawings, although a greater or less number may be employed, if desired. These cutters are arranged side by side at the front end of the machine, and each of the same is attached by a suitable holder to the front end of a vertically-vibrating lever or helve K, mounted on the turn-table, so that the cutters can be shifted laterally in either direction by rotating the table. Each of these helves may be actuated by any suitable means; but I prefer to employ the mechanism shown in the drawings, which is constructed as follows: The rear end of the helve is seated in a sleeve or socket k, provided at its sides with trunnions k', which are supported in bearing-boxes k^2, mounted in the standards H. The helve is clamped in the sleeve k by bolts k^3, which preferably bear against the top, sides, and the upper corners thereof, as shown in Figs. 8 and 9. The interior of this sleeve is preferably somewhat larger than the helve, so that by slackening the clamping-bolts k^3 on one side of the sleeve and tightening those on the opposite side the helve may adjusted laterally at a greater or less angle to the axis of the sleeve for varying the distance between the cutters. This is a desirable feature, for instance, for cutting out a strip of asphalt pavement of a suitable width to form a trench for the conduits of electric cables. The bearing-boxes k^2 of the helve are preferably made vertically adjustable to enable the fulcrum of the helve to be raised or lowered for causing the cutters to penetrate the asphalt with a straight cut, a forward cut, or an under cut, as desired, and also to compensate for the wear of the cutters or other tools. For this purpose the bearing-boxes are guided in vertical slots in the sides of the standards and provided with upright adjusting-screws l, which are swiveled to the boxes at their lower ends, as shown in Fig. 7, while their upper portions engage in screw-threaded openings formed in the adjacent portions of the standards. These screws are provided at their upper ends with gear-wheels l' of uniform diameter and caused to turn simultaneously and uniformly by an intermediate idler or gear pinion l^2, meshing with both of said gear-wheels. One of the adjusting-screws has a square upper end l^3, adapted to receive a hand-crank (not shown) for turning the screws to adjust the bearings. In order to permit the gear-pinion l^2 to follow the vertical movements of the adjusting-screws, the same has an internally-screw-threaded hub which engages with a threaded arbor l^4, mounted on a cross-bar at the top of the standards. M is a vertically-movable actuating-yoke which is arranged in front of the sleeve k and through which the helve passes. This yoke is carried by rearwardly-extending arms or side frames M', pivoted at their rear ends upon the helve-trunnions k'. Motion is transmitted from the yoke to the helve by buffers or cushions m, of rubber or other suitable material, interposed between the yoke and the upper and lower sides of the helve. These buffers are

preferably seated between cups m', attached to the upper and lower cross-bars of the yoke, and socketed plates m^2, secured to the upper and lower sides of the helve. A vibrating motion is imparted to the yoke by any suitable means; but I prefer to employ for this purpose an eccentric N and a surrounding-strap n, which latter is connected with the bottom of the yoke by a rod n'. In the preferred construction shown in the drawings the eccentric is loose on the shaft g^2 and coupled thereto at will by a laterally-sliding clutch head or member n^2, splined to the shaft, as shown in Figs. 10 and 13, and provided on its inner side with teeth n^3, adapted to interlock with corresponding teeth n^4 on the opposing side of the eccentric for clutching the latter to its shaft. These teeth are arranged at or near the periphery of the clutch-head and the eccentric, so as to transmit power to the eccentric near its edge and obtain the most favorable driving leverage. This clutch-head is normally held in engagement with the eccentric by an elbow-lever o, one arm of which carries a yoke o', having shoes o^2, which engage in an annular groove of the clutch-head, while the other arm of said lever is connected with a sliding rod o^3, which is constantly urged rearwardly by a spring o^4. This spring surrounds the rod between a knob or shoulder o^5 thereof and a bearing o^6, in which the rod is guided. The clutch-head is disengaged from the eccentric by a sliding wedge p, arranged at right angles to the axis of the head and adapted to bear against the beveled annular face p' thereof. This wedge is guided in a horizontal socket p^2, arranged on the adjacent standard H, and is operated by a hand-lever p^3, connected to the rear end of the wedge. The wedge may be locked in its operative position by a pin p^4, passed through holes in the same and its socket, as shown in Fig. 5, or by any other suitable means.

In order to permit the stroke of the helve to be varied, the eccentric is preferably adjustable on its shaft for changing its throw. In the construction shown in the drawings, this adjustment is obtained by providing the eccentric with an elongated opening or radial slot q, through which the shaft g^2 passes and which permits the eccentric to be shifted radially on the shaft. The eccentric is adjustably secured to the inner side of a head R by transverse clamping-bolts r, carried by said head and passing through slots r', arranged in the eccentric on opposite sides of its central slot q and parallel therewith. The eccentric may also be provided with guide-ribs r^2, arranged parallel with its slots and engaging in corresponding grooves r^3, formed in the inner side of the supporting-head. These ribs relieve the bolts from shearing strains. The supporting-head is free to turn on the shaft g^2, but is held against lateral displacement thereon by a set-screw s passing through its hub and engaging in an annular groove s', formed in the shaft, as shown in Fig. 10. Upon loosening the clamping-bolts r' the eccentric can be adjusted radially on the supporting-head R, the bolts being again tightened after effecting the desired adjustment. The clutch-teeth n^3 n^4 are of sufficient width to engage with each other throughout the range of adjustment of the eccentric.

The cutters J may be of any suitable construction, but are preferably V-shaped in cross-section, with their apexes facing forwardly, as shown in Fig. 16, and are provided with pointed ends formed by beveling the cutters on their rear sides.

The machine is preferably provided with suitable means for preventing it from running downhill in case the worm f should be thrown out of gear on a comparatively steep grade. The arresting devices shown in the drawings consist of a pair of oppositely-disposed detent-pawls t t', pivoted to the upper end of the post C' and adapted to interlock, respectively, with concentric ratchet-rims t^2 t^3, formed at the upper end of the sprocket-wheel f^2. When both of these pawls are in engagement with the sprocket-wheel, they lock the same against turning and prevent rotation of the rear axle A' in either direction. When the machine is to be used, the pawls are thrown out of engagement with the sprocket-wheel f^2.

The operation of the machine is as follows: In transporting the machine the worm f is thrown out of gear with the worm-wheel f' and the axle-driving belt e^5 is left on its pulleys. The belts g^3 g^4 are shifted upon their loose pulleys, and the hand-levers p^3 are swung forward to withdraw the clutch-heads n^2 from the eccentrics N. The turn-table C and the helves K now remain at rest, while motion is transmitted from the motor to the rear axle of the machine by one of the belts e e' and the belt e^5. When it is desired to operate the cutters J, the belt e^5 is thrown off its pulleys, the worm f is moved into gear with the worm-wheel f', and the eccentrics N are clutched to the shaft g^2. The helves will now be vibrated by the eccentrics, causing the cutters to penetrate the asphalt or other surface to be operated upon, and at the same time the machine will be slowly advanced by the worm-gearing f f' and the driving-chain F, thus producing a greater or less number of parallel longitudinal cuts, according to the number of helves carried by the machine. To cause the cutters to make a transverse cut, the helves are moved laterally in either direction by means of the turn-table C, which latter is operated automatically by shifting the driving-belts g^3 g^4 upon their tight pulleys. Although the tools in making a transverse cut are moved in the arc of a circle by the turn-table, the slow forward movement of the machine largely compensates for the curvilinear movement of the

tools, causing the same to produce a practically straight transverse cut. This compound motion of the tools enables the machine to cut out pieces of pavement of any desired outline as may be required by the nature of the repairs.

My improved machine, though especially desirable for cutting asphalt pavement, may also be used for tamping or ramming purposes in constructing roads by simply substituting suitable tools for the cutters.

I claim as my invention—

1. In a machine of the character described, the combination of a truck or support, a turn-table arranged thereon, a helve mounted on the turn-table, a cutter carried by the helve, and means for vibrating the helve, substantially as set forth.

2. In a machine of the character described, the combination of a truck, a turn-table arranged thereon, a helve mounted on the turn-table, a cutter carried by the helve, means for vibrating the helve, and automatic means for simultaneously operating the turn-table and propelling the truck, substantially as set forth.

3. In a machine of the character described, the combination of a truck, a turn-table arranged thereon, a helve mounted on the turn-table and carrying a cutter, means for actuating the turn-table, and propelling means for the truck constructed and timed to substantially compensate for the curvilinear movement of the cutter, substantially as set forth.

4. In a machine of the character described, the combination of a truck, a turn-table journaled thereon, a helve mounted on the turn-table and carrying a cutter, a motor, gearing for turning said table interposed between the same and the motor, gearing for propelling the truck interposed between the motor and an axle of the truck, and means for connecting and disconnecting the last-named gearing from said axle, substantially as set forth.

5. In a machine of the character described, the combination of a truck, a turn-table journaled thereon, a helve mounted on the turn-table and carrying a cutter, a motor carried by the turn-table, actuating-shafts for the turn-table and the helve both mounted on the turn-table, and power-transmitting means connecting said shafts with the motor, substantially as set forth.

6. In a machine of the character described, the combination of a truck, a turn-table journaled thereon, a helve mounted on the turn-table and carrying a cutter, a motor carried by the turn-table, actuating-shafts for the turn-table and the helve both mounted on the turn-table, power-transmitting means connecting said shafts with the motor, a third shaft driven by the motor and also mounted on the turn-table, and gearing connecting the last-named shaft with an axle of the truck, substantially as set forth.

7. In a machine of the character described, the combination of a truck and a motor mounted thereon, of worm-gearing interposed between the motor and an axle of the truck, for slowly propelling the truck, a turn-table journaled on the truck, worm-gearing interposed between the motor and the turn-table, a movable tool mounted on the turn-table, and means for actuating the tool, substantially as set forth.

8. In a machine of the character described, the combination of a truck or support carrying a fixed gear-wheel, a turn-table journaled on the truck, a shaft carried by the turn-table and having a gear-wheel which meshes with said fixed wheel, means for turning said shaft, and a movable tool mounted on the turn-table, substantially as set forth.

9. In a machine of the character described, the combination of a truck having a fixed stud or post, a gear-wheel secured to said stud, a turn-table journaled on the truck, a shaft mounted on the turn-table and having a gear-wheel which meshes with said fixed gear-wheel, a helve supported on the turn-table and carrying a tool, an actuating-wheel journaled on said stud, power-transmitting means connecting one of the axles of the truck with said actuating-wheel, and driving means for the actuating-wheel, substantially as set forth.

10. In a machine of the character described, the combination of a truck or support having a stud or post, a worm-sector secured to said post, a turn-table journaled on the post, a shaft mounted on the turn-table and having a worm which meshes with said sector, a movable tool carried by the turn-table, and means for actuating the tool, substantially as set forth.

11. In a machine of the character described, the combination of a truck or support having standards, a sleeve or socket pivoted to said standards, a helve seated in said sleeve and capable of angular adjustment therein, and a tool carried by the helve, substantially as set forth.

12. In a machine of the character described, the combination of a truck or support having standards, a sleeve or socket pivoted to said standards, a helve seated in said sleeve and capable of angular adjustment therein, clamping-bolts for adjustably securing the helve in the sleeve, and a tool carried by the helve, substantially as set forth.

13. In a machine of the character described, the combination of a truck or support having standards, a helve pivoted to said standards by a vertically-movable fulcrum, means for adjusting said fulcrum, a tool carried by the helve, and actuating means for the helve, substantially as set forth.

14. In a machine of the character described, the combination of a truck or support having standards, vertically-movable bearing-boxes guided in the standards, adjusting-screws connected with said bearing and each provided

with a gear-wheel, an idler connecting said gear-wheels, a helve having trunnions journaled in said bearing-boxes, and a tool carried by the helve, substantially as set forth.

15. In a machine of the character described, the combination of a truck or support having standards, a helve pivoted to the standards and carrying a tool, a driving-shaft carrying a sliding clutch member, and an actuating-eccentric for the helve mounted on said shaft, the eccentric and the clutch member being provided on their opposing sides with clutch-teeth arranged near the periphery thereof, substantially as set forth.

16. In a machine of the character described, the combination of a truck or support having standards, a helve pivoted to the standards and carrying a tool, a driving-shaft carrying an eccentric capable of radial adjustment thereon, and a strap surrounding the eccentric and connected with the helve, substantially as set forth.

17. In a machine of the character described, the combination of a truck or support having standards, a helve pivoted to the standards and carrying a tool, a driving-shaft having a head, an actuating-eccentric for the helve carried by said head and capable of radial adjustment thereon, and a clutch member rotating with the shaft and adapted to engage with the eccentric, substantially as set forth.

18. In a machine of the character described, the combination of a truck or support having standards, a helve pivoted to the standards and carrying a tool, a driving-shaft having a head, an actuating-eccentric for the helve having a radial slot through which the shaft passes, and means for clamping the eccentric to said head, substantially as set forth.

19. In a machine of the character described, the combination of a truck or support having standards, a helve pivoted to the standards and carrying a tool, a driving-shaft having a loose head, an actuating-eccentric for the helve provided with a radial slot through which said shaft passes, a clamping-bolt passing through the head and a slot in the eccentric, and a sliding clutch member carried by the shaft and adapted to interlock with the eccentric, substantially as set forth.

Witness my hand this 11th day of October, 1904.

HENRY SCHUMACHER.

Witnesses:

C. F. GEYER,

E. M. GRAHAM.