J. H. PRUGH.

SURFACING AND POLISHING MACHINE.

APPLICATION FILED JAN. 2, 1908.

928,154. **Patented July 13, 1909.**

6 SHEETS—SHEET 1.

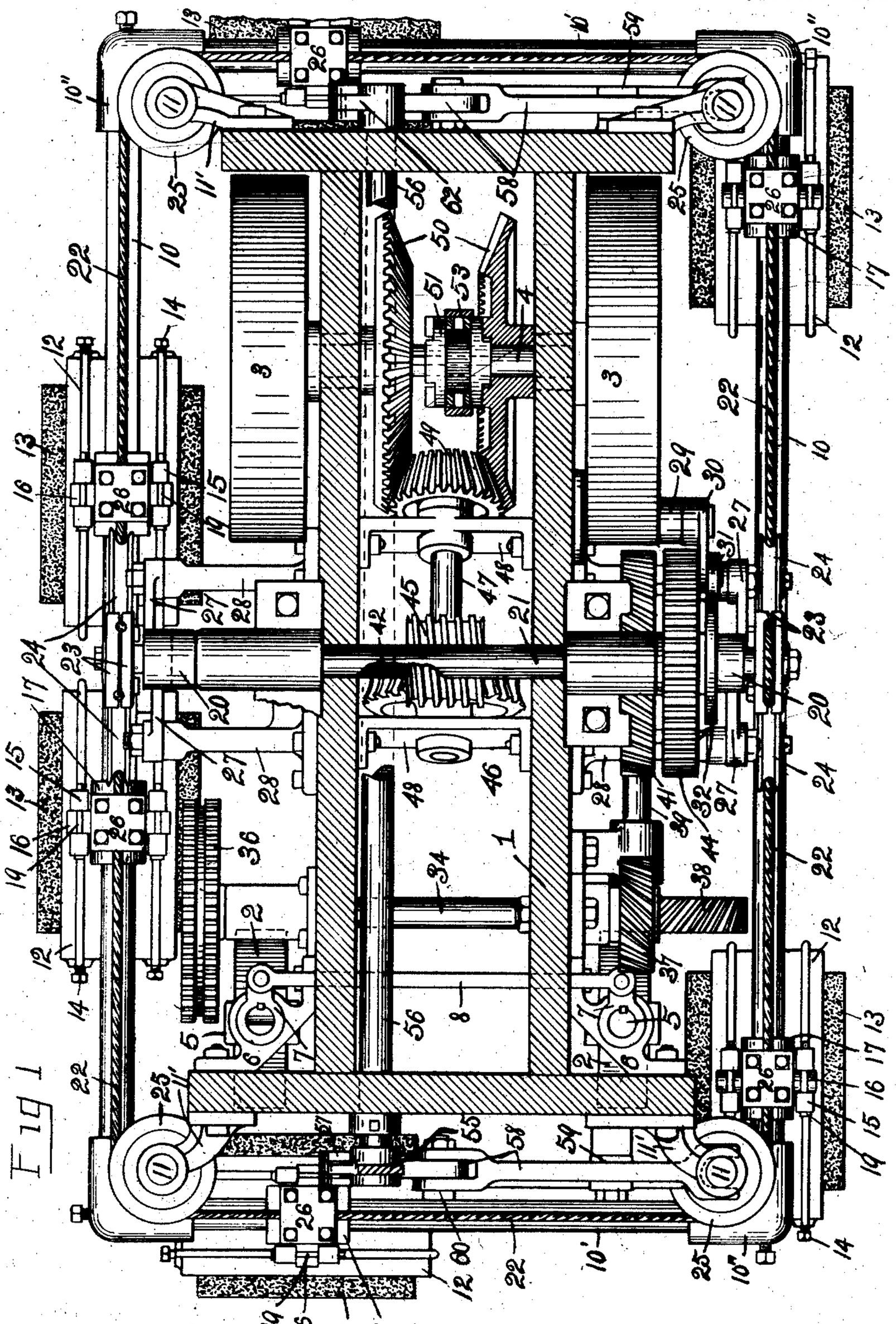


Fig 1

WITNESSES:

O. C. Walter

Hazel B. Nett

INVENTOR.

John H. Prugh,

By Owen & Owen,

His attys.

J. H. PRUGH.

SURFACING AND POLISHING MACHINE.

APPLICATION FILED JAN. 2, 1908.

928,154.

Patented July 13, 1909.

6 SHEETS—SHEET 2.

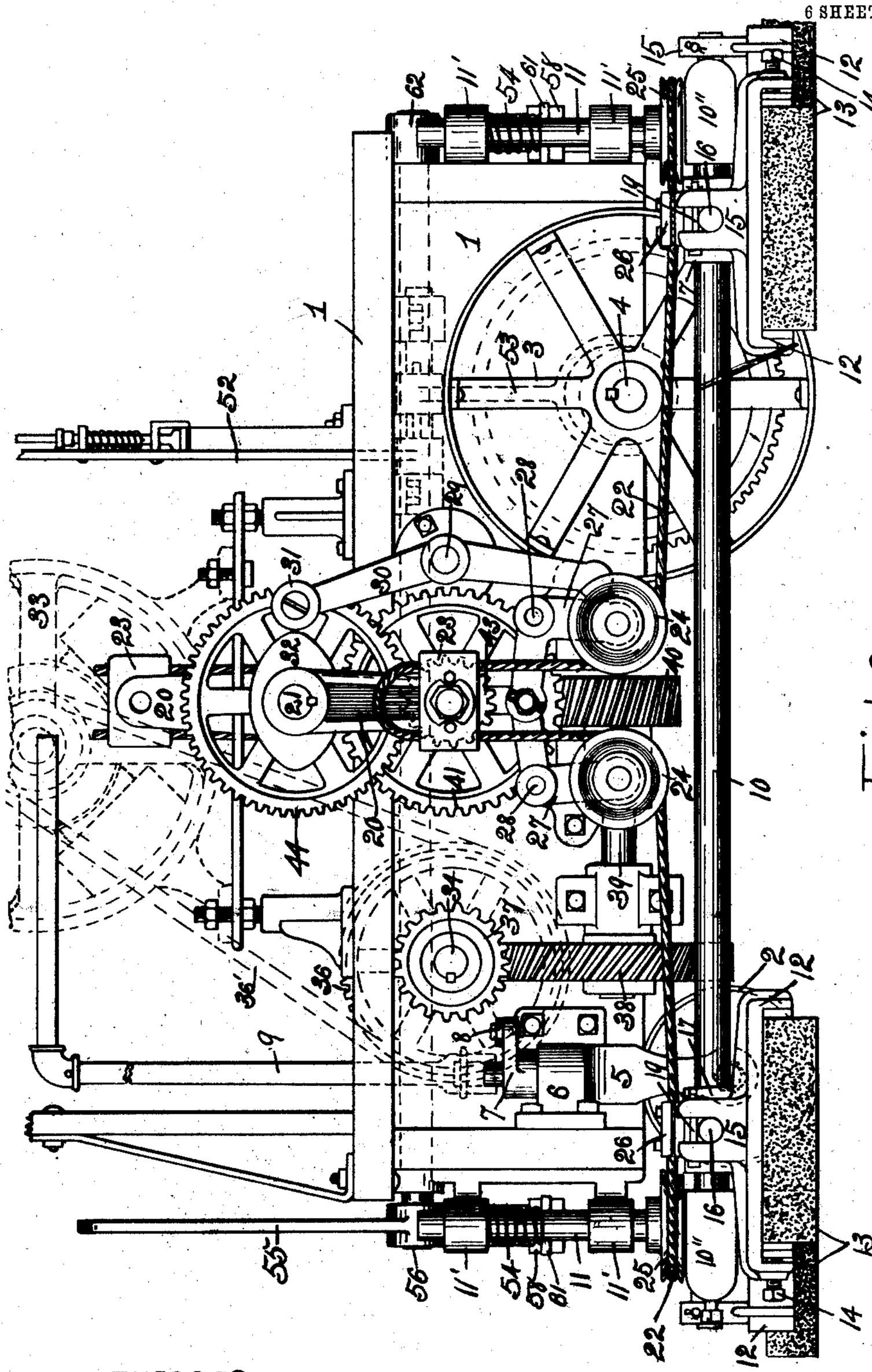


Fig. 2.

WITNESSES:

O. C. Walter

Hazel B. Hiett

INVENTOR,

John H. Prugh,

By Owen & Owen,

His attys.

J. H. PRUGH.

SURFACING AND POLISHING MACHINE.

APPLICATION FILED JAN. 2, 1908.

928,154. Patented July 13, 1909.

6 SHEETS—SHEET 3.

Fig. 4.

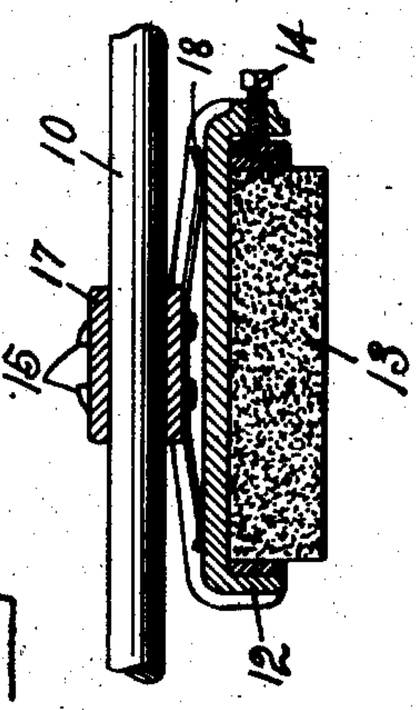
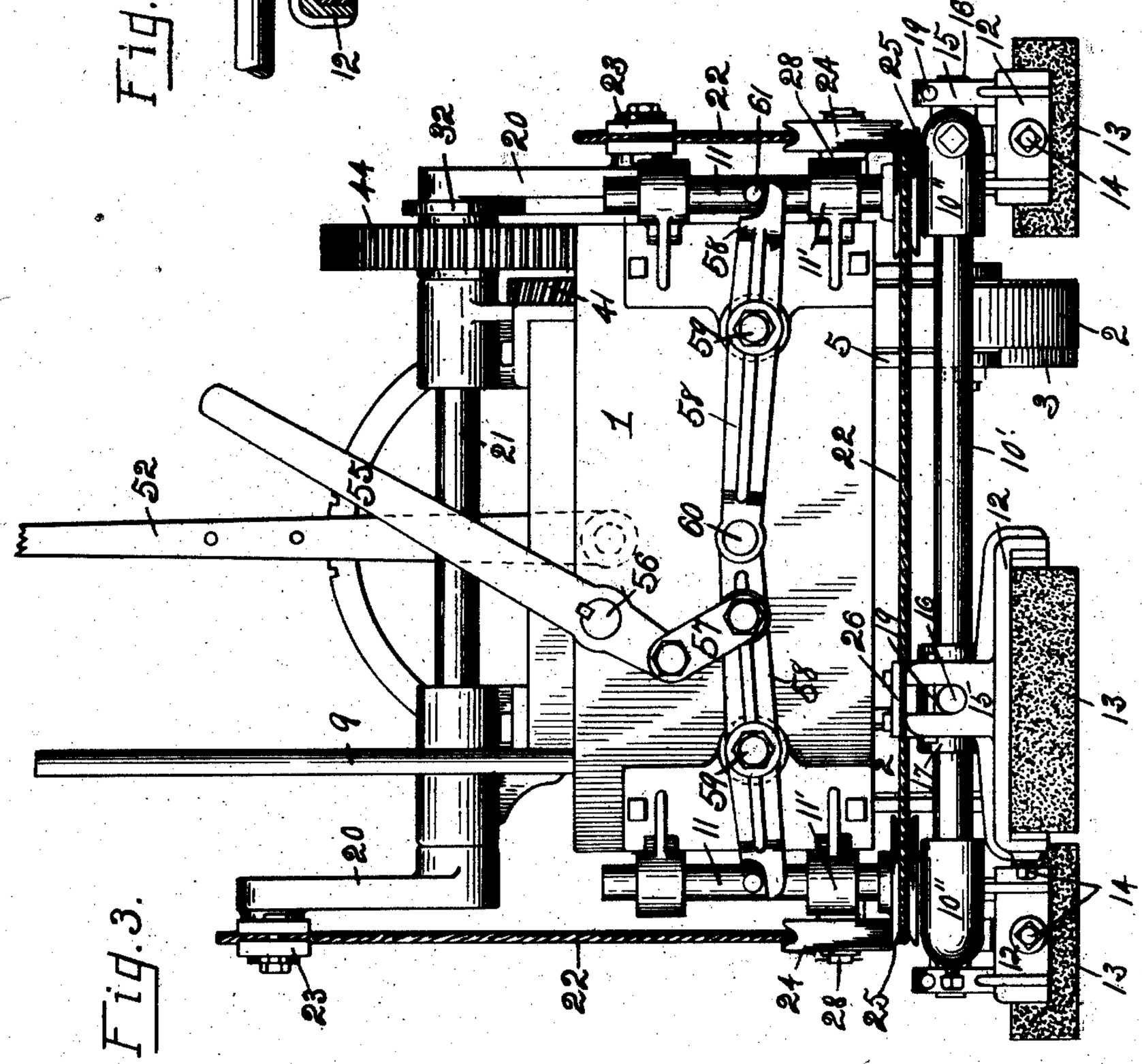


Fig. 3.



WITNESSES:

D. C. Walter

Hazel B. Hiett

INVENTOR.

John H. Prugh,

By Brown & Brown,

its attys.

J. H. PRUGH.

SURFACING AND POLISHING MACHINE.

APPLICATION FILED JAN. 2, 1908.

928,154.

Patented July 13, 1909.

6 SHEETS—SHEET 4.

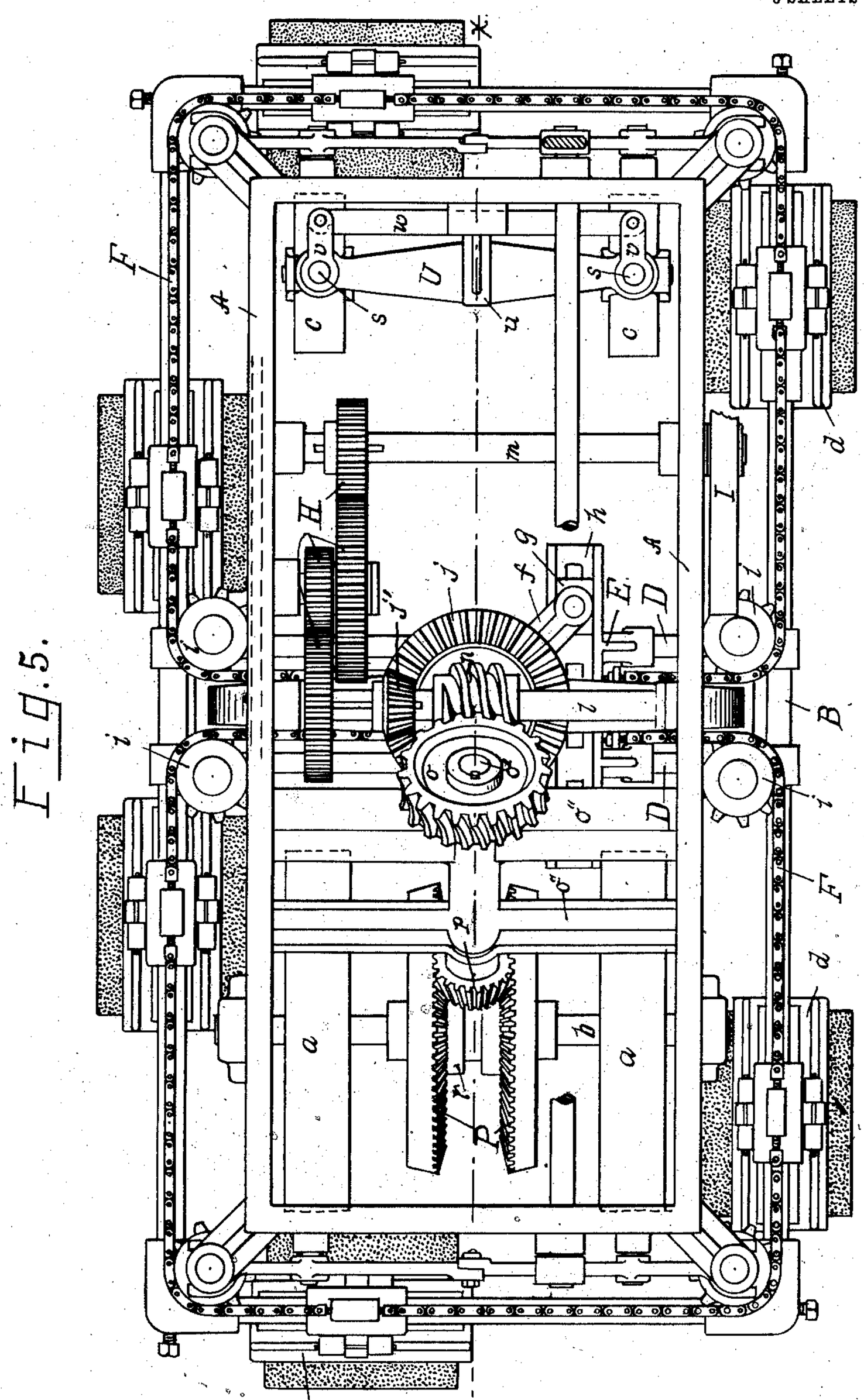


Fig. 5.

WITNESSES:

D. C. Walter

Hazel B. Hiett

INVENTOR.

John H. Prugh,

By Owen & Owen,

His attys.

J. H. PRUGH.

SURFACING AND POLISHING MACHINE.

APPLICATION FILED JAN. 2, 1908.

928,154.

Patented July 13, 1909.

6 SHEETS—SHEET 5.

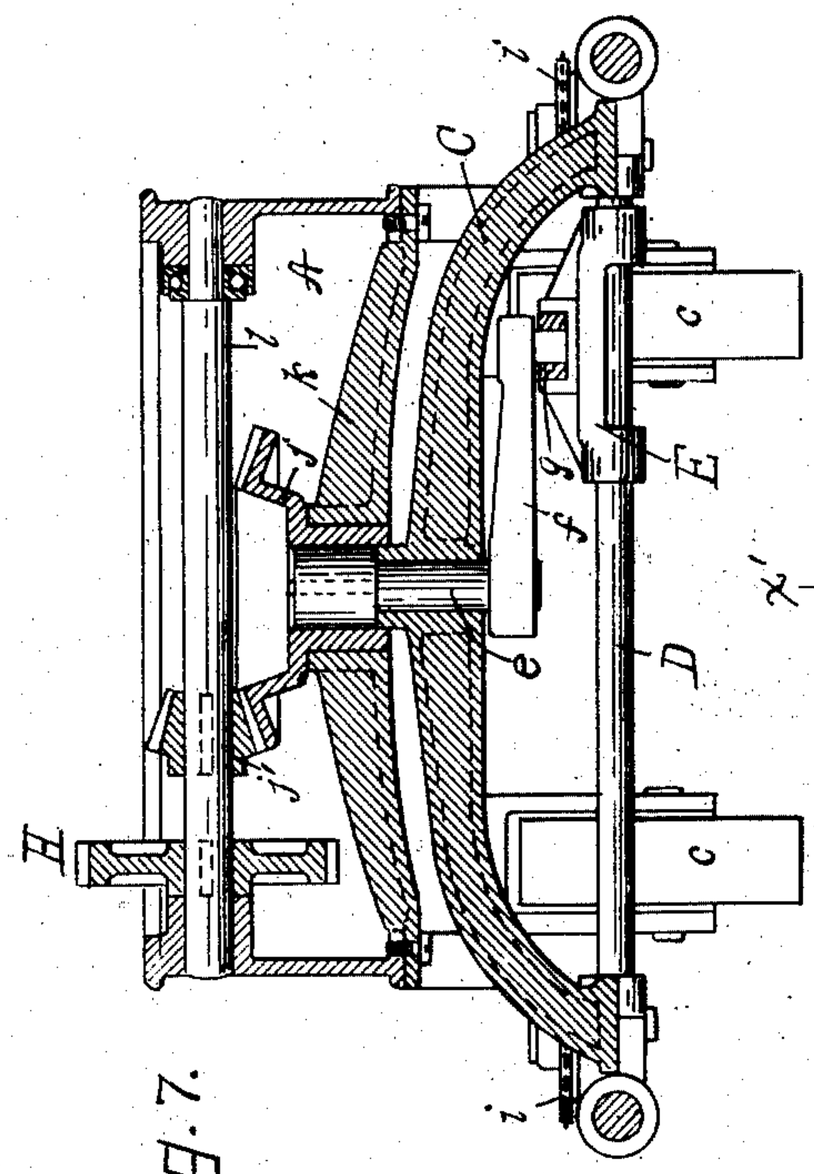


Fig. 7.

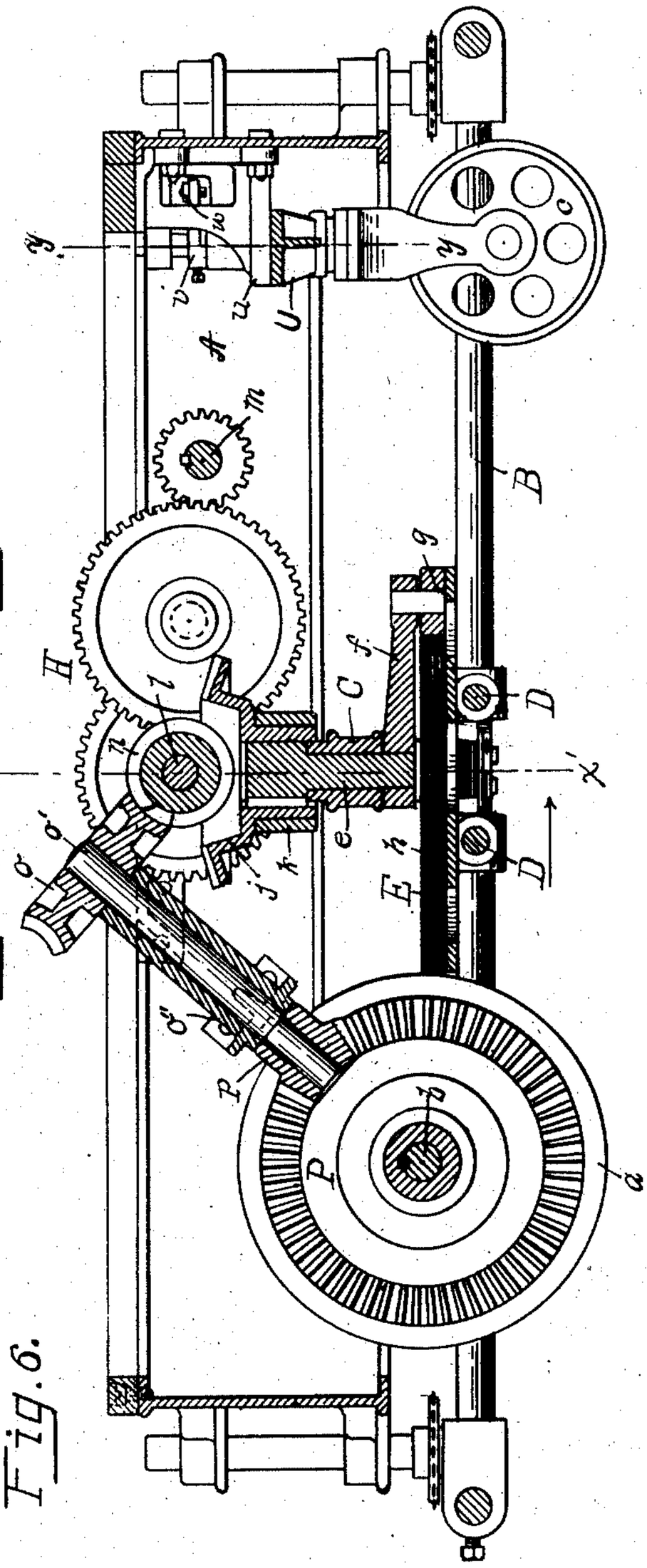


Fig. 6.

WITNESSES:

D. C. Walter

Hazel B. Hiett

INVENTOR.

John H. Prugh,

By Owen & Owen,

His attys.

J. H. PRUGH.

SURFACING AND POLISHING MACHINE.

APPLICATION FILED JAN. 2, 1908.

928,154.

Patented July 13, 1909.

6 SHEETS—SHEET 6.

Fig. 8.

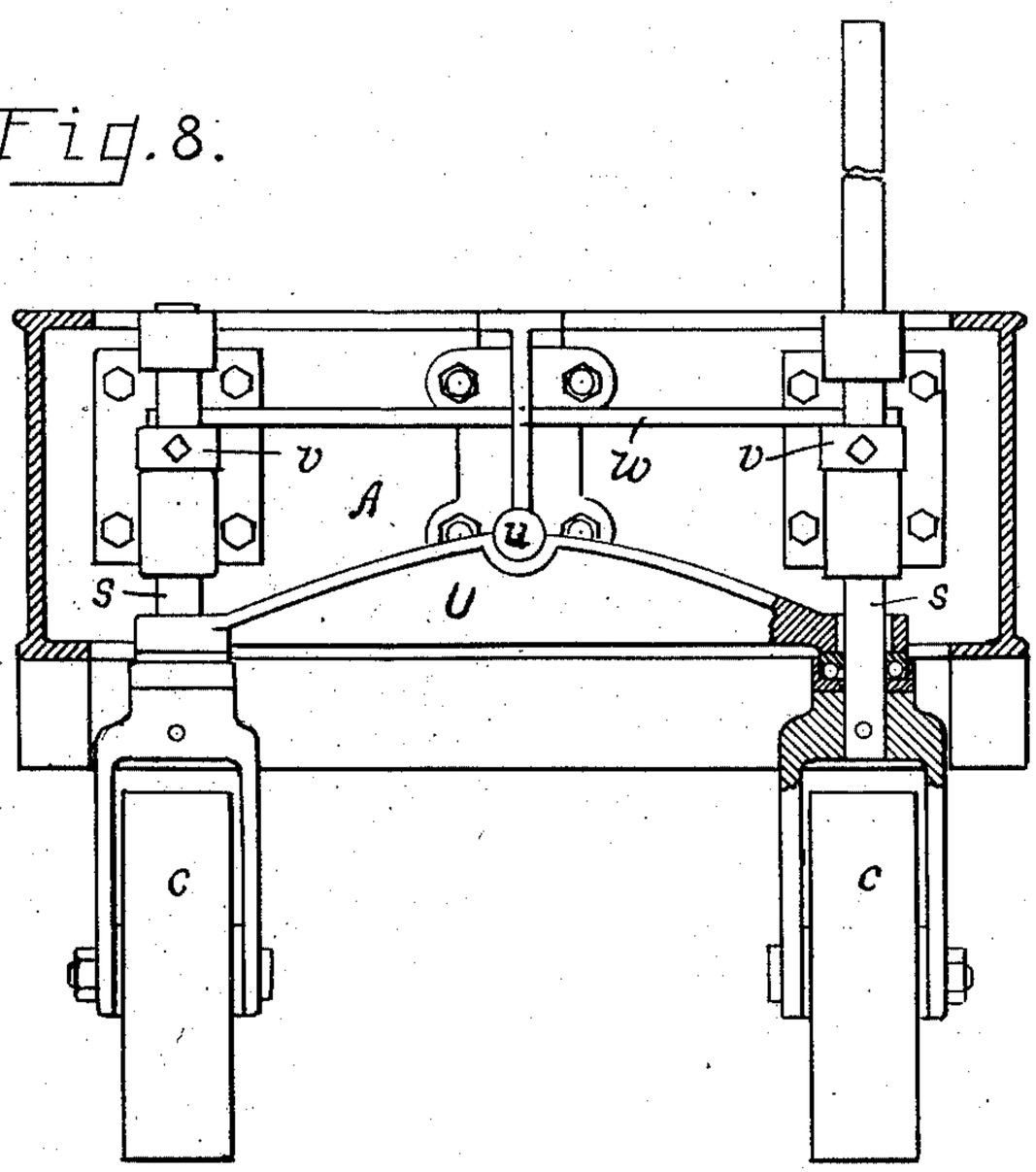
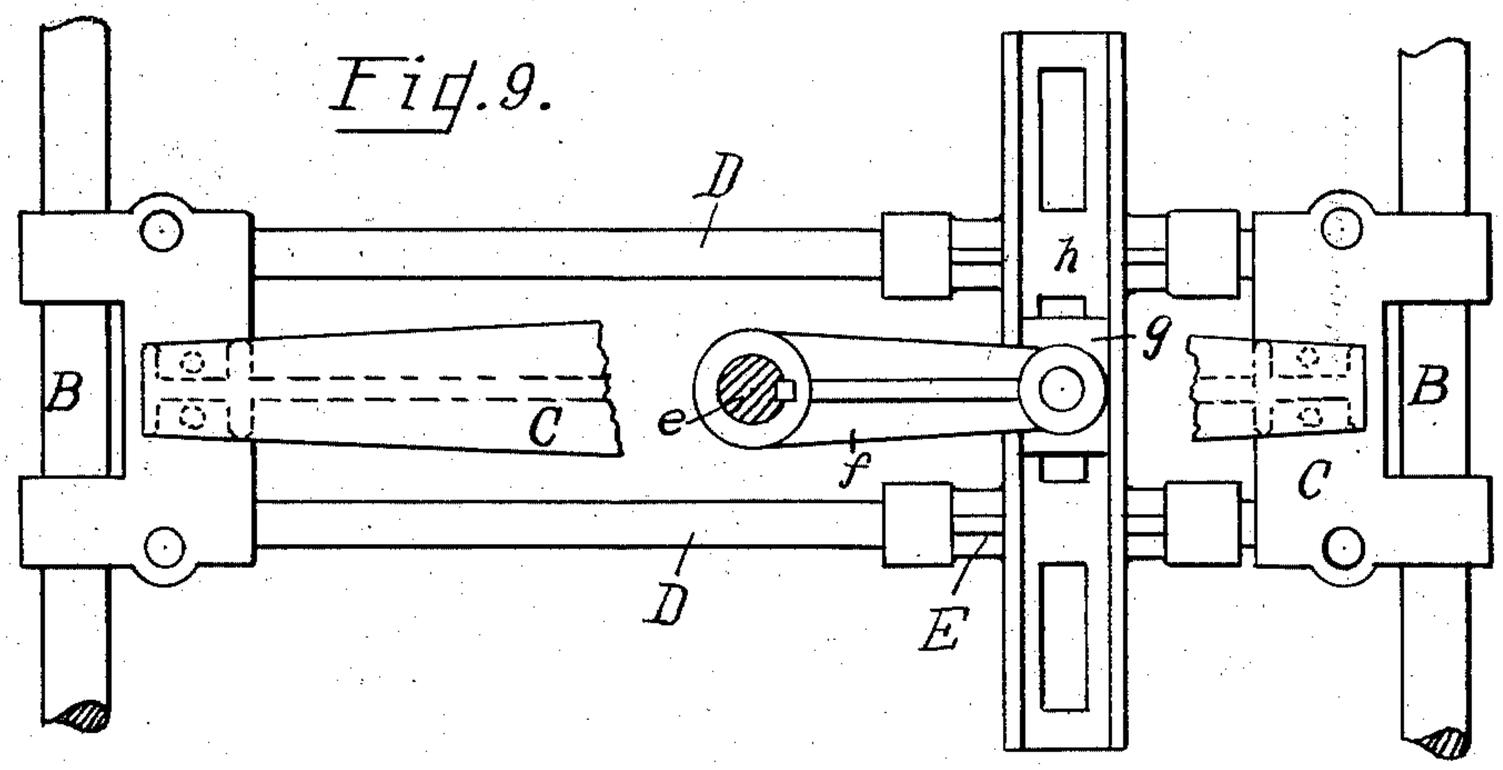


Fig. 9.



WITNESSES:

D. C. Walter

Hazel B. Hiett

INVENTOR.

John H. Prugh,

By Owen & Owen,

His attys.

UNITED STATES PATENT OFFICE.

JOHN H. PRUGH, OF TOLEDO, OHIO, ASSIGNOR TO THE AMERICAN FLOOR SURFACING MACHINE COMPANY, OF TOLEDO, OHIO, A CORPORATION OF ARIZONA TERRITORY.

SURFACING AND POLISHING MACHINE.

No. 928,154. Specification of Letters Patent. Patented July 13, 1909.

Application filed January 2, 1908. Serial No. 409,048.

To all whom it may concern:

Be it known that I, JOHN H. PRUGH, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented a new and useful Surfacing and Polishing Machine; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to floor surfacing machines, and is particularly designed for the smoothing and polishing of mosaic, stone and other like floors, but is not restricted to such use.

The object of my invention is the provision of a highly efficient machine of this class, which is provided with simple and improved mechanism for imparting movements to a plurality of abrading-members arranged about the same, whereby the members move in unison and a portion of them in different directions to abrade the surfaces over which they move, the capacity of the machine is increased, and the practicability and commercial value thereof enhanced.

The operation, construction and arrangement of the parts of the invention are fully described in the following specification, and illustrated in the accompanying drawings, in which,—

Figure 1 is a plan view of the machine embodying my invention, with the top or platform of the frame and the parts supported thereby removed. Fig. 2 is a side elevation of the machine. Fig. 3 is an end elevation thereof with the motor removed. Fig. 4 is a central vertical section of an abrading-block and its carrying part. Fig. 5 is a top plan view of a modified form of the machine embodying my invention, with the top or platform and the parts supported thereby removed. Fig. 6 is a vertical longitudinal section taken on the dotted line $x\ x$ in Fig. 5. Fig. 7 is a vertical transverse section taken on the dotted line $x'\ x'$ in Fig. 6. Fig. 8 is a vertical transverse section of the machine frame on the dotted line $y\ y$ in Fig. 6 with a portion of the parts in the plane with such line also in section, and Fig. 9 is an enlarged top view in detail of the crank-arm, which operates the abrading-blocks, and the associated parts.

Referring to Figs. 1, 2, 3 and 4 of the drawings, 1 designates a suitable frame, which is shown as being supported at one end by a set of caster-wheels 2, 2, and at the other end by traction wheels 3, 3, which latter are carried at the ends of a shaft 4 suitably journaled in the sides of the frame transversely thereof. The caster-wheels 2, 2 are mounted in forks 5, which have their heads journaled in bearing-brackets 6 secured to the frame, and provided above said brackets with crank-arms 7, which are connected together by a rod 8 by means of which they are caused to turn in unison. One fork-head carries a steering-handle 9 for controlling the turning movements of the caster-wheels.

Surrounding the frame portion of the machine is a frame comprising the side-bars or rods 10, the end-bars or rods 10′, and the corner coupling members 10″. While this frame is shown as being rectangular in form it may be of any other shape as it may be desired to direct the courses of movement of the abrading members. Rigidly rising from the coupling members 10″ are stems 11, which have free vertical movements in bearing bosses 11′ secured to the frame 1 at the corners thereof, as shown. The bars 10 and 10′ are intended to form horizontal guides for guiding the reciprocatory movements of the holders 12, each of which carries an abrading-block 13 of carborundum, sandstone, or other suitable abrading material, two of said holders being shown as operating on each side bar and one on each end bar. The arrangement of the blocks, however, is optional with the user. The holders 12 have their under surfaces suitably shaped to receive the blocks 13, which are retained therein by means of set-screws 14, and have their upper surfaces formed with laterally-spaced bearing-bosses 15, which are forked to form bearings for receiving the studs 16 projecting laterally from sleeves 17. These sleeves slide on the bars 10 and 10′ and have bowed springs 18 secured to the under sides thereof with their arms extending longitudinally of the holders 12 and bearing against their tops at opposite ends of the sleeves, as shown in Fig. 4, thus enabling the holders 12 and their blocks 13 to have yielding oscillatory

movements relative to their sleeves 17. A pin 19 passes through the furcations of the bosses 15 and engages the associated stud 16 to retain it to its seat in the boss.

The six abrading-blocks with which I have shown the machine as being equipped, have the requisite reciprocatory movements communicated thereto from the cranks 20, at the opposite ends of the crank-shaft 21, through the medium of a cable, chain or other suitable draft-agent 22. The two crank-arms 20 project in opposite directions, and have their wrist-pins provided with clamps 23 intended to be tightened to firmly grip the cable 22. This cable may either comprise a single piece or be formed of connected sections, and has its ends attached to the clamps 23 of one crank-arm at opposite sides of the wrist-pin, from which it passes downward and in opposite directions under the sheaves 24, thence around the two corner sheaves 25 at the ends of the frame 1 and continues toward the center of the frame, passing under the sheaves 24 at the opposite side of the frame from which it started and thence upwardly to and attaching to the clamps 23 of the other crank-arm, as shown, thus forming an endless cable around the machine. The cable 22 is securely attached to the sleeve 17 of the block-holders 12 by means of clamping-plates 26, and is adapted, when operated by a rotation of the crank-shaft 21, to impart simultaneously reciprocatory movements to the block-holders 12 on their respective guide-rods 10 and 10′. The two holders 12 on each rod 10 are attached to the cable on opposite sides of the set of sheaves 24, and are so arranged that they are both at their limits of outward movements when the wrist-pin on the side therewith is at its lowest point of movement, and vice versa when the wrist-pin is at its highest point of movement, as shown, thus causing the blocks of a pair and also those on opposite sides of the machine to have opposed movements. The corner sheaves 25 are loosely mounted on the stems 11, which rise from the coupling members 10″ of the block-carrying frame, while the sheaves 24 are carried by the vertical arms of the bell-crank levers 27, which are fulcrumed to brackets 28 projecting from the sides of the frame 1, and have their horizontal arms in loose pivotal connection, as shown in Fig. 2, to cause an oscillation of one to communicate a like movement to the other of the pair.

Fulcrumed to a boss 29 at each side of the frame 1 is a vertically-disposed lever 30, the upper end of which carries a roller 31 for working on the face of a cam 32 fixed to the crank-shaft 21, while the lower end thereof bears against the outer edge of the vertical arm of one of the bell-levers 27 of the associated pair, whereby an outward movement of the upper end of the lever 30 imparts a converging oscillatory movement to the pair of sheaves 24 carried by the levers 27. The purpose of this mechanism is to move the pairs of sheaves 24 when the associated crank-arms are at their lowest and highest points of movement so as to draw the cable taut and take up the slack therein, as it is found in practice that when the cranks are in these positions, at which points the directions of movement of the abrading-blocks is reversed, the cable becomes slack and will jump the sheaves if no means for tightening the same is provided. By reference to Fig. 2 it will be seen that the cam 32 is elliptical in shape and has its major axis disposed transversely of the crank-arm 20, thus effecting an outward movement of the upper end of the lever 30 when a crank is both at its lowest and highest points of movement.

A motor 33 is mounted on the platform 1 and communicates motion to a shaft 34 mounted transversely of the frame through a sprocket-wheel 36 on said shaft and sprocket-chain 36′. A small spiral-gear 37 on this shaft meshes with and drives a larger spiral-gear 38 on the center-shaft 39, which shaft is mounted in suitable bearings longitudinally of the frame and carries a second spiral-gear 40, which meshes with a spiral-gear 41 carried by the shaft 42. This latter shaft is mounted transversely of the frame 1 directly beneath the crank-shaft 21 and carries a small spur-gear 43, which communicates rotation to the crank-shaft through a larger spur-gear 44 thereon. It will thus be seen that the speed of rotation of the crank-shaft is very materially reduced from that of the motor, thereby imparting a comparatively slow reciprocatory movement to the abrading-members. The shaft 42 also carries at its center a worm 45, which drives a worm-gear 46 carried by a counter-shaft 47. The shaft 47 is journaled in cross-pieces 48 secured intermediate the sides of the frame 1 and carries at one end a bevel-gear 49, which meshes with the opposed beveled-gears 50, 50 loosely carried by the shaft 4 on which the traction-wheels 3, 3 are mounted. Feathered on the shaft 4 between the gears 50, 50 is a movable clutch-member 51, which is adapted to be thrown into engagement with a clutch surface on either gear by an operation of the lever 52, which controls a shipper-arm 53. It will thus be seen that the machine may have a very slow movement communicated thereto in either direction when the machine is in operation.

The abrading-members may be permitted to freely rest upon the surface to be operated on due to their own gravity and that of the guide-frame and supported parts, or, if desired, the downward pressure of such members may be increased by the provision of compression-springs 54, on the stems 11, as

shown in Fig. 2, or in any other suitable manner. A raising or lowering of the guide-frame and attached blocks is effected by a proper oscillation of the lever 55, which is carried at one end of a rock-shaft 56 extending longitudinally of the frame 1 and projecting from its ends. The lower end of the lever 55 is extended beyond the shaft 56 and pivotally connected to one end of a link 57, the other end of which is slidingly pivoted to one of a pair of horizontal levers 58, 58. These levers are fulcrumed to the frame end, as at 59, 59, and have their inner ends loosely pivoted together, as at 60, and their outer ends forked to straddle the contiguous stems 11 of the guide-frame and engage the under sides of oppositely projecting studs 61 of said stems, thus causing a lowering of the inner ends of the levers 58, which is effected by a straightening of the toggles formed by the lever 55 and link 57, to raise the stems and attached parts. The lifting mechanism at the opposite end of the machine is the same except that in place of the lever 58 a crank-arm 62 is carried by the shaft 56 and connects with the link 57 at such end.

The operation of this construction of machine is as follows:—The abrading-members being lowered in contact with the surface to be operated on and the motor started, a slow rotation of the desired speed is communicated to the crank-shaft 21 from the motor through the intermediate reducing gearing, and a very slow tractive movement imparted to the machine, provided, of course, the clutch-member 51 is in engagement with either gear 50, as shown. As the oppositely-disposed crank-arms 20, 20 revolve, the attached draft-cable 22, which passes entirely around the machine and to which the frames carrying the abrading-blocks are suitably attached, is caused to have longitudinal movements first in one direction and then in the other, such movements being reversed at each passing of a vertical plane by the crank-arms, thus imparting corresponding reciprocatory movements to the abrading members. At the instant of reversal of each movement of the cable 22 the levers 30 are automatically moved by the cam 32 to effect a converging movement of the sheaves 24 of each set so as to take up the slack then present in the cable to prevent its jumping from the sheaves and also to prevent a sudden starting or topping of the abrading-blocks as their movements are reversed, thus obviating the jerking movement and noise which would otherwise be present. It will be apparent that the movements of the end abrading-members are transversely of the machine, and that the movements of the side abrading-members are longitudinally of the machine, with the blocks of each set moving away from each other on a downstroke of the associated crank-arm and toward each other on an upstroke of such crank-arm. The slow tractive movement of the machine during the operation of the abrading-members causes the abrading actions of such members to be uniformly distributed over the entire floor surface.

In Figs. 5, 6, 7 and 8, which illustrate what is found in practice to be the preferred form of my invention, A designates the main frame, which is suitably supported by the traction-wheels *a*, carried by the shaft *b*, and by the caster-wheels *c*; B the guide-frame which carries at its sides and ends the sliding frames *d* in which the abrading-blocks are mounted, and is shown as being adjustably carried by the main frame and as having its vertical adjustment controlled in the same or substantially the same manner as shown and described with reference to Figs. 1 to 4 of the drawings.

The principal change in the modified form of my machine over that previously described resides in the abrading-block operating-mechanism which I will now describe.

Mounted below the frame A transversely thereof with their ends suitably secured to the opposite headed ends of the yoke-member C are two spaced parallel bars D on which the cross-head E is suitably mounted for sliding movement longitudinally thereof, as shown. A vertical shaft *e* is journaled centrally in the yoke-member C and carries at its lower end a crank-arm *f*, the wrist-pin of which carries a block *g*, which when the crank-arm revolves is intended to slide longitudinally in the guide-groove *h* provided in the cross-head E transversely of its path of movement, thus causing a revolution of the crank-arm to impart a reciprocatory movement to the cross-head. The draft-cables or chains F, which are guided around the ends of the machine and attached to the abrading-block frames *d* over which they pass, have their ends extended inwardly around suitable guide members *i*, carried by vertical spindles rising from the headed ends of the yoke C, and attached to opposite sides of the cross-head, as shown, thus making the cross-head a connecting link between the cable ends and causing a reciprocation of the cross-head to impart corresponding movements to the draft-agents and attached blocks.

The upper end of the crank-shaft *e* is enlarged or headed to adapt it to shoulder against the upper end of the yoke bearing in which it is journaled to limit its downward movement therein, and is feathered within the hub of a bevel-gear *j* to enable the yoke and associated parts above described to rise and fall with the guide-frame B, to the side bars of which the headed ends of the yoke are attached, as shown. The hub of the bevel-gear *j* is extended from its lower side and journaled in a bearing pro-

vided in the cross-beam *k*, which connects the sides of the frame A. The bevel-gear *j* meshes with a smaller bevel-gear *j'* carried by the transverse shaft *l*, the ends of which are journaled in suitable bearings in the frame sides. The requisite rotation is communicated to the shaft *l* from the drive-shaft *m* through the properly proportioned train of gears H, said shaft *m* being journaled in the frame sides and carrying a pulley I at one end thereof without the frame, which pulley connects with a motor on the platform of the frame. The shaft *l* also carries at its center a worm *n*, which drives a worm-wheel *o* carried at the upper end of a counter-shaft *o'*. This shaft is journaled in cross-pieces *o''* secured intermediate the sides of the frame A and carries at its lower end a bevel-gear *p*, which meshes with the opposed bevel-gears P P loosely carried by the shaft *b* on which the traction-wheels *a* are mounted. The relative rotation of the gears P P and shaft *b* is controlled by a sliding clutch part *r* in the same manner as described with reference to Fig. 1.

The manner of connecting the caster-wheels *c* to the machine frame is also slightly changed over that shown in Figs. 1 and 2, in order to enable said wheels to accommodate themselves to any unevenness in the surface over which they are passing without destroying the level position of the frame. This is accomplished by connecting the fork-heads *s* of the caster-wheels by a bolster-beam U, the ends of which loosely receive the fork-heads and seat on the fork tops, as shown. The bolster-beam is provided on its upper side with a suitable bearing in which the horizontal pivotal bearing part *u* of the machine frame rests, thus adapting the beam to have oscillatory movement relative to the frame. *v v* designate lever-arms on the fork-heads *s*, which arms are connected by the cross-piece *w* to adapt the wheels to turn in unison.

It is apparent that the operation of the modified construction of my machine is similar to that of the construction first described, except that instead of connecting the draft-cable ends to the wrist-pin blocks of the vertically-revolving crank-arms, as in the latter case, the cable ends are connected to the horizontal reciprocatory cross-head E, which is actuated by the movement of the horizontally revolving crank-arm *f*. With this form of movement the movements of the abrading-blocks are automatically slackened at the points of reversal of their movements due to the action of the cross-head and crank-arm when the movements of the cross-head are reversed, thus obviating a sudden stopping and starting of the blocks and the consequent injurious effect thereof.

I wish it understood that I do not wish to restrict myself to the exact details of construction and arrangement of the parts shown and described, as obvious modifications other than those shown will occur to persons skilled in the art.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is,—

1. In combination, an angular guide frame, abrading-members carried by different portions of said frame and guided thereby to have movements in courses which are angled relative to each other, and mechanism for moving the blocks over their respective courses.

2. In a surfacing-machine, a flexible draft-member guided horizontally around a portion of the machine and having spaced portions for movement transversely of the machine, means guiding the movements of said draft-member, abrading-blocks attached to the opposed transversely movable portions of the draft-member, and mechanism for moving said draft-member to impart reciprocatory movements to said blocks.

3. In a surfacing-machine, a frame, wheels supporting the frame, a draft-member guided around a portion of the frame and having a portion movable transversely of the direction of movement of the frame, an abrading-block attached to the transversely movable portion of the draft-member, and mechanism for imparting slow tractive movement to the frame and reciprocatory movements to the draft-member and attached block over their courses of movement.

4. In combination a wheeled frame, guide-bars spaced longitudinally of the direction of movement of the frame and disposed transversely thereof, abrading-blocks movably carried by said bars and mechanism for imparting slow tractive movement to the frame and reciprocatory movements to the abrading-blocks transversely of the direction of movement of the frame.

5. In a surfacing-machine, abrading-members mounted for reciprocatory movements on opposite sides of the machine, a flexible draft-member attached to the abrading-members, and mechanism for operating the draft-member to impart simultaneous reciprocatory movements to the abrading-member disposed on opposite sides of the machine.

6. In a surfacing-machine, a draft-member, means guiding the draft-member to have an angular course of movement, a plurality of abrading-blocks attached to the draft-member and reciprocating means attached to the draft-member between two of the blocks of the series, thus dividing the draft-member into two sections whereby the abrading-members of each section are reciprocated in opposite directions.

7. In a surfacing-machine, an angular frame, abrading-blocks slidingly carried by the different angled portions of the frame, a flexible draft-member attached to the blocks, means guiding the draft-member to have an angled course of movement, and mechanism for causing the draft-member to have forward and backward movements over its course.

8. In a surfacing-machine, an angular frame, sheaves mounted at the corners and sides of said frame, abrading-blocks slidingly carried by the frame, a draft-cable attached to the blocks and guided by the sheaves, and mechanism for moving the draft-cable to impart reciprocatory movements to the blocks.

9. In combination, a rectangular frame, abrading-blocks slidingly carried by said frame, a draft-cable attached to the blocks, mechanism for imparting reciprocatory movements to the cable, said mechanism being disposed transversely of the frame intermediate its ends and being attached to opposed sides of the cable, and means guiding the movements of the cable.

10. In combination in a surfacing-machine, guide-bars at the sides thereof, abrading-members having their movements guided by said bars, a single element attached to the several abrading-members on both sides of the machine, and mechanism for moving said element to impart backward and forward movements in unison to the abrading-members.

11. In combination, a rectangular frame, a wheel support therefor, abrading-blocks slidingly carried by the sides and ends of said frame, a flexible member guided relative to said frame and attached to the blocks, and mechanism for imparting slow tractive movements to the support and reciprocatory movements to the flexible member.

12. In a surfacing machine, a plurality of abrading members, a reciprocatory block carried by the machine, means guiding the movements of the block; a flexible draft-member having its ends attached to said block and its intermediate loop portion guided around a portion of the machine and attached to said abrading-members, and mechanism for reciprocating said block to impart movement to the draft and abrading members.

In testimony whereof I have hereunto signed my name to this specification in the presence of two subscribing witnesses.

JOHN H. PRUGH.

Witnesses:
C. W. Owen,
Hazel B. Hiett.