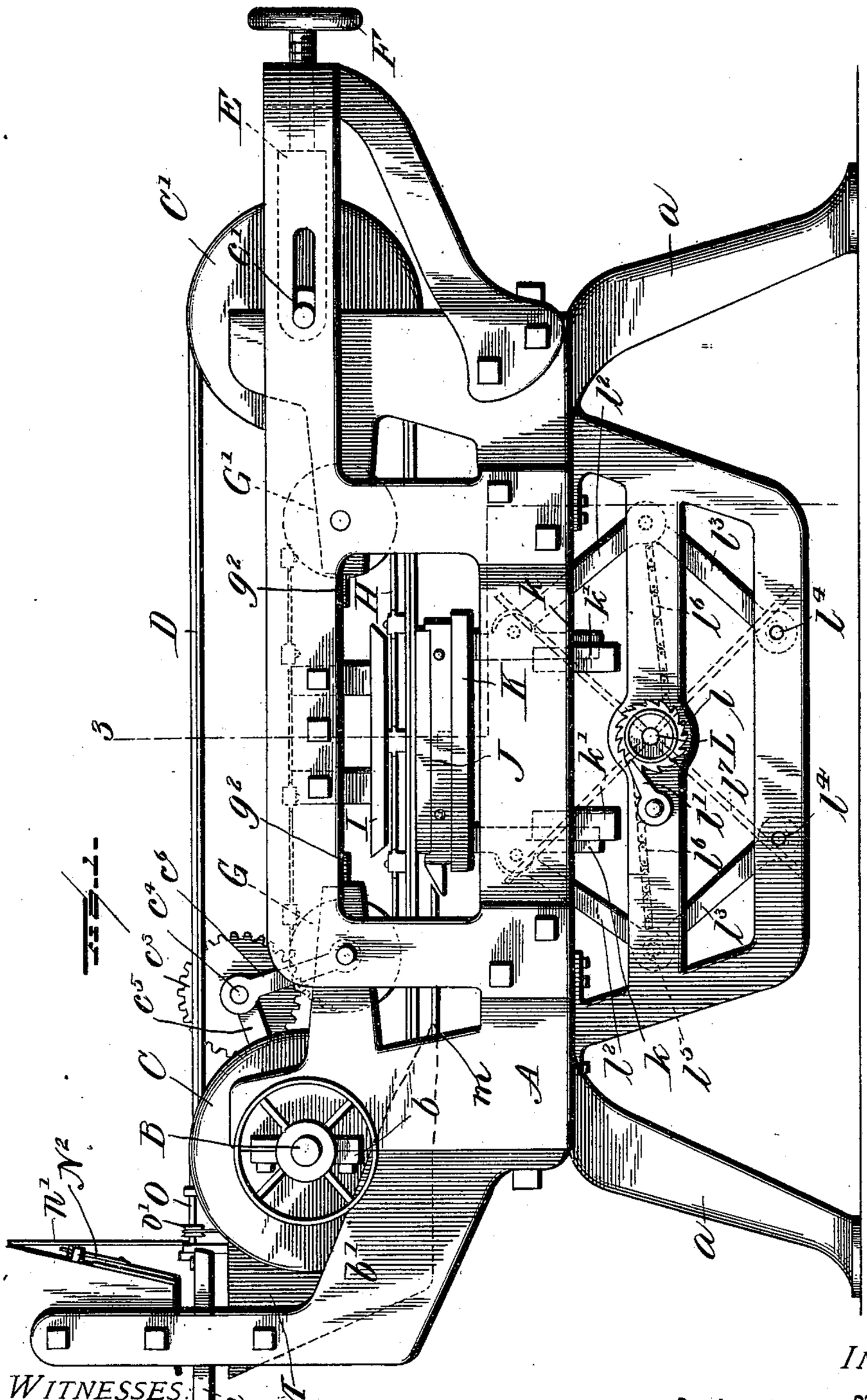
No. 675,209. Patented May 28, 1901.

W. L. GODFREY.

GRINDING AND POLISHING MACHINE.

(Application filed Jan. 24, 1901.)

(No Model.) 3 Sheets—Sheet 1.



WITNESSES:
Wm. F. Doyle.
D. K. Moore

INVENTOR
William L. Godfrey.
BY Whittaker & Grennell.
Attorneys

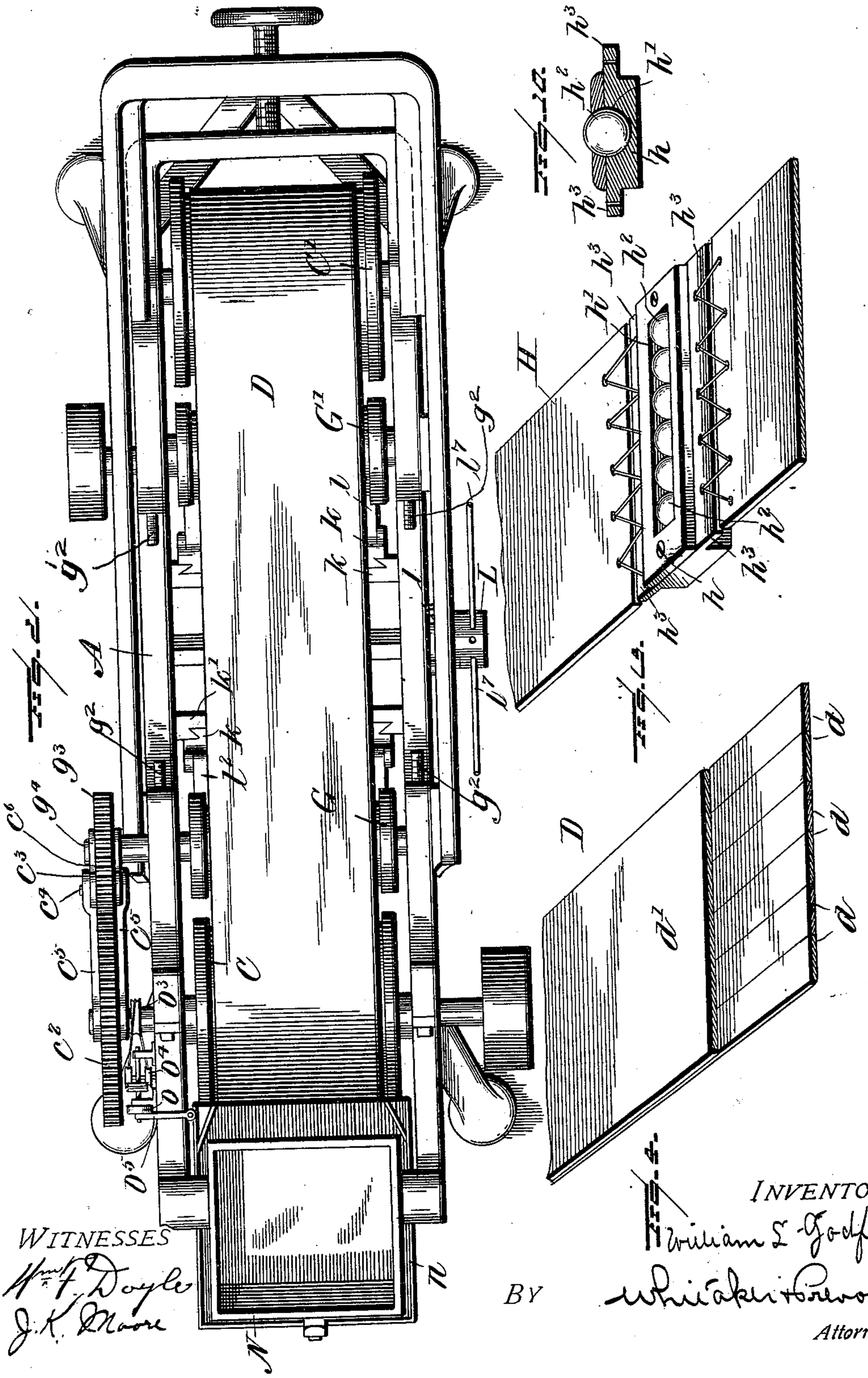
No. 675,209. Patented May 28, 1901.

W. L. GODFREY.

GRINDING AND POLISHING MACHINE.

(Application filed Jan. 24, 1901.)

(No Model.) 3 Sheets—Sheet 2.



WITNESSES

Wm. F. Doyle

J. K. Moore

INVENTOR

William L. Godfrey.

BY Whittaker & Howson

Attorneys.

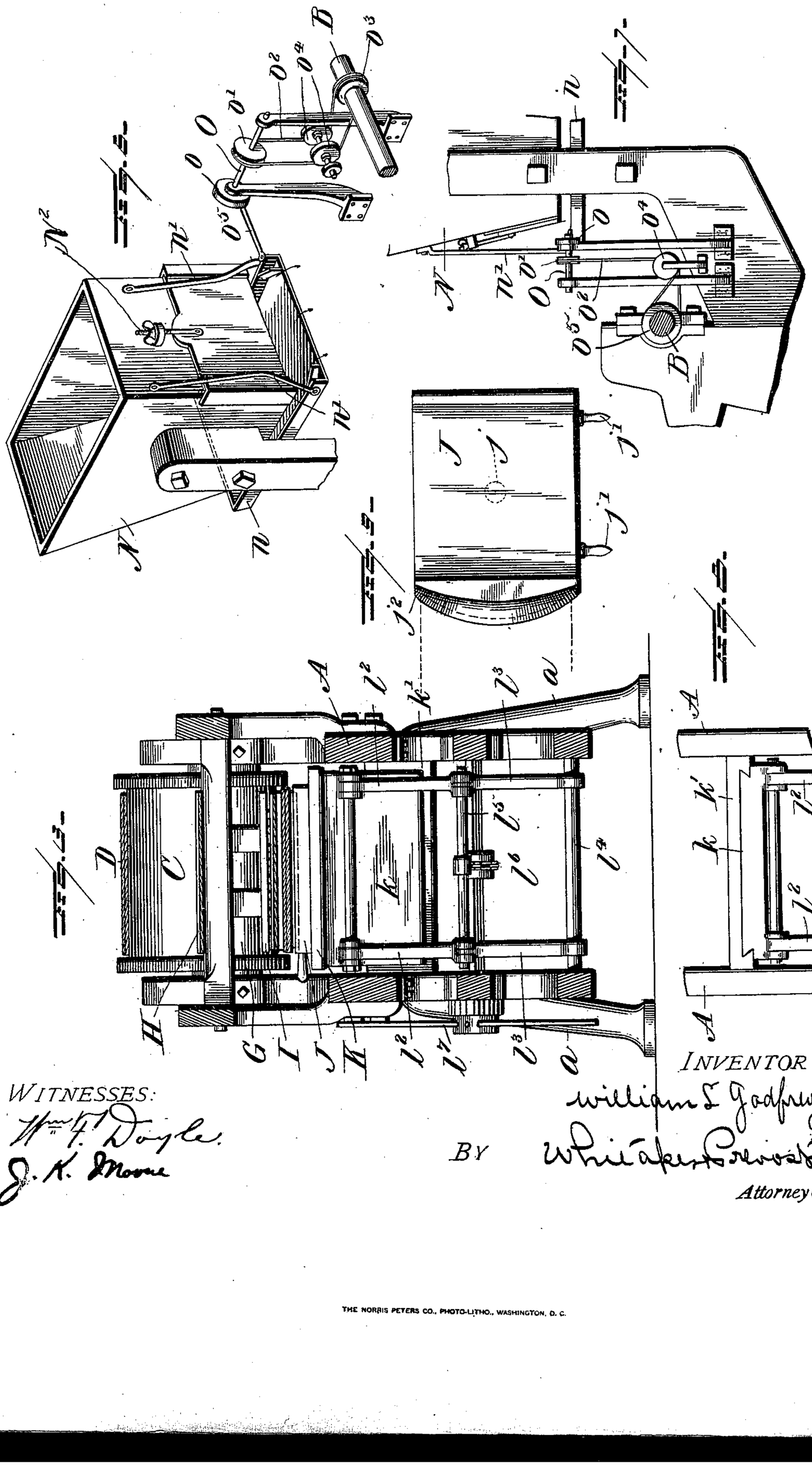
No. 675,209. Patented May 28, 1901.

W. L. GODFREY.

GRINDING AND POLISHING MACHINE.

(Application filed Jan. 24, 1901.)

(No Model.) 3 Sheets—Sheet 3.



WITNESSES:
Wm. F. Doyle.
J. K. Moore

INVENTOR
William L. Godfrey.
BY Whittaker & Wright.
Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM L. GODFREY, OF BROOKLYN, NEW YORK, ASSIGNOR OF TWO-THIRDS TO THOMAS ROBERTSON AND THE NEW YORK STEEL AND COPPER PLATE COMPANY, OF SAME PLACE.

GRINDING AND POLISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 675,209, dated May 28, 1901.

Application filed January 24, 1901. Serial No. 44,580. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. GODFREY, a citizen of the United States, residing at Brooklyn, city of New York, in the county of Kings and State of New York, have invented certain new and useful Improvements in Grinding and Polishing Machines; 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.

My invention is an improvement in grinding and polishing machines, and is adapted particularly for grinding and polishing the plane surfaces of metallic articles—for example, metal plates.

My invention consists in the novel features hereinafter described, reference being had to the accompanying drawings, which illustrate one form in which I have contemplated embodying my invention; and said invention is fully disclosed in the following description and claims.

Referring to the drawings, Figure 1 represents a side elevation of a machine for polishing metal plates embodying my invention. Fig. 2 represents a top plan view of the same. Fig. 3 represents a vertical section of Fig. 1, taken on the line 3 3 and looking in the direction of the arrows. Fig. 4 is a detail view, partly in section, of my improved polishing-belt. Fig. 5 is a view of my pressure-belt, showing the side adjacent to the guide-plate. Fig. 6 is a detail perspective view of the feeding device for abrasive material. Fig. 7 is a side view of the same. Fig. 8 is a top view of one of the guides for the work-supporting carriage. Fig 9 is a top view of the work-supporting table. Fig. 10 is a cross-sectional view of one of the ball-bearing pressure-bars.

My present invention is an improvement on the machine set forth in my former patent granted January 1, 1901, No. 665,207.

In the drawings, A represents the framework of the machine, which is supported upon suitable legs *a*.

B represents the driving-shaft of the machine, mounted in bearings *b* and provided with a suitable driving-pulley B′. Upon the shaft B is mounted a flange drum or roller C, which is engaged by and adapted to drive the grinding and polishing belt D. C′ represents a similar flanged roller mounted upon a shaft *c*′, which is journaled in a yoke E, adapted to slide horizontally in the main frame A.

F represents a tension device for tightening the belt.

Between the upper and lower laps of the polishing-belt D, I provide a pair of drums or rollers G G′, the shafts or trunnions of which are mounted, preferably, in bearing-blocks, one or both of which are adapted to slide in recesses formed in the main frame A to receive the said blocks, and tension-screws g^2 are provided to engage said blocks, and thereby move the drums G G′ away from each other for the purpose of securing the proper tension of a second belt H, which I term the "pressure-belt" and which passes around the drums G G′.

The grinding and polishing belt D, a section of which is illustrated in Fig. 4, is a composite belt constructed as described in my former patent and composed of a series of separate belts *d d*, of suitable material, preferably leather, the said separate belts being arranged side by side and of such width and such number as to form a belt of the desired width. Upon the exterior of these separating-belts is cemented or otherwise secured a polishing or grinding surface *d*′, which is of the full width of the entire series of separate belts and is of a material suitable to receive and carry a polishing or abrading material—such as felt, walrus leather, &c.—the said polishing-surface serving also the purpose of permanently uniting all of the separate inner belts *d d*.

H represents the pressure-belt, a portion of which is illustrated in Fig. 5, which may be of any suitable material and is provided at intervals with transversely-extending pressure-bars *h*. I prefer to construct these bars as shown in Fig. 5, in which I have shown a bar formed in two parts and containing a longitudinal recess *h*′, extending nearly the entire length of the bar, the outer edges of said recess extending inward slightly to retain a series of antifriction balls or rollers h^2. The

bar h also is preferably provided with lateral flanges h^3 h^3, perforated so that it can be laced or otherwise united to sections of the belt H; but the bars h may be attached to the belt H in other ways.

I provide means for running two belts D and H so that the contiguous lower laps thereof will run at exactly the same speed and in the same direction. This may be accomplished in any desired way—for instance, by means of a train of gearing, indicated in Figs. 1 and 2, in which c^2 represents a gear-wheel on the shaft B, meshing with an idle-gear c^3, mounted on a stud c^4, and meshing in turn with a gear-wheel g^3 on the shaft or trunnion g^4 of the roller G. The stud-axle c^4 thereof is suspended by means of links c^5 and c^6 from the shaft B and shaft g^4 in a well-known way to permit the movement of the shaft g^4 without interfering with the mesh of the three gear-wheels.

I represents a horizontally-disposed guide-plate for the pressure-belt, supported from the frame A of the machine and having its ends preferably beveled or rounded, as shown, the lower face and said beveled or rounded portions being composed of hardened steel. This guide-plate is engaged by the friction balls or rollers carried by the transverse bars h of the pressure-belt, and the hardened surface of the guide-plate will reduce wear and friction to a minimum.

J represents a horizontal work-supporting table, which is pivotally mounted on the top of a vertically-movable carriage K, which is provided with depending dovetailed arms k, mounted in guides k', secured to the main frame of the machine, and the following-described devices are provided for elevating the said carriage and table.

L represents a transverse operating-shaft mounted in the main frame and provided, preferably, with a ratchet-wheel l, engaged by a pawl l', although this ratchet-wheel and pawl may be dispensed with. A pair of toggle-levers l^2 l^3 are provided at each end of the carriage K, having their upper ends pivotally connected to the arms k k and their lower ends pivoted upon cross-bars l^4 l^4, secured to the frame of the machine. A central cross-bar l^5 connects each pair of toggle-levers, and to these cross-bars are secured chains, (or other flexible connections l^6,) which are secured to the shaft L so as to be wound thereon when the shaft is turned. It will be obvious that by rotating the shaft L the chains will be wound up, thus straightening both pairs of toggle-levers and lifting the carriage K and work-table J up toward the polishing-belt. The shaft L is provided with any suitable means for revolving it—such as, for example, a series of radial arms l^7 l^7, as shown in Fig. 2 and in dotted lines in Fig. 1.

The work-table J is pivoted centrally upon the carriage by a vertical pivot j and is preferably provided with two or more handles j', by means of which it may be oscillated, so as to change the position of the plate or article being polished with respect to the polishing-belt, and thus cause the belt to travel over the plate in different directions with respect to the plate, insuring more perfect work than is obtainable where the belt always passes over the plate in the same direction. One end of the table J is also preferably formed in a curve concentric with the pivot j and beveled or sloped, as shown at j^2, to receive the end of a shallow trough or chute m, having its edge curved correspondingly and adapted to rest upon or be held above the said beveled portion j^2 of the table.

M represents a casing secured to the main frame, partially inclosing the drum or roller C, and connected with the chute m, so as to prevent the abrading material from escaping from the belt before it reaches the article to be polished.

N represents a hopper for receiving the emery, pumice, rouge, or other polishing or abrading material, said hopper being secured to the frame of the machine and being open at the bottom. Beneath the hopper is a laterally-swinging shaker or tray n, which is connected to the hopper by links n' n' n', so that it can be shaken laterally to deposit the abrasive material upon the polishing-belt. I prefer to shake the tray n automatically, and to this end I provide a pitman (crank or eccentric) o on a shaft O, mounted in brackets secured to the machine and having a pulley o', driven by a belt o^2 from a pulley o^3 on the driving-shaft, as clearly shown in Figs. 6 and 7, the belt passing over idle pulleys o^4 o^4, mounted on a suitable stud secured to the frame of the machine. The pitman o is connected by a pitman-rod o^5 with the tray or shaker n.

The hopper N is provided with a vertically-sliding gate N', which is mounted in guides secured to the hopper and provided with an adjusting device N^2 for adjusting it vertically toward and from the bottom of the tray or shaker to regulate the amount of material shaken off onto the belt.

The operation of the device will be as follows: The operator will secure the plate or article to be polished upon the work-support J and elevate the table J and the work carried thereby until the plate to be polished is forced into contact with the rapidly-moving polishing-belt D. The table J will be elevated to such a point that the desired pressure of the polishing-belt upon the plate to be polished will be secured when the transverse pressure-bars h of the pressure-belt are between the polishing-belt and the guide-plate I. As these transverse plates are located at intervals, it will be observed that the frictional resistance to the forward movement of the two belts will be much less than would be the case if the pressure were exerted upon the pressure-belt over the entire

area of the plate or article to be polished, while by reason of the fact that the bars are of the full width of the polishing-belt the entire surface of the plate or article to be polished will be treated. I am therefore enabled by my construction of apparatus to secure very uniform results and at the same time to drive my apparatus with a minimum amount of power.

What I claim, and desire to secure by Letters Patent, is—

1. In a grinding and polishing machine, the combination with an endless grinding and polishing belt, of a pressure-belt having portions contiguous thereto, a rigid guide, adjacent to the contiguous portions of said belt, transverse pressure-bars secured to said pressure-belt, provided with antifriction rolling devices to engage said guide, and means for driving said belts, substantially as described.

2. In a grinding and polishing machine, the combination with an endless grinding and polishing belt, of a pressure-belt having portions contiguous thereto, a rigid guide, adjacent to the contiguous portions of said belt, transverse pressure-bars each provided with perforated flanges adapted to be connected to sections of said pressure-belt, a series of balls mounted in each of said bars, and projecting beyond the face of the same to engage the said guide, and means for driving said belts, substantially as described.

3. In a grinding and polishing machine, the combination with an endless grinding and polishing belt, of an endless pressure-belt having portions contiguous to portions of said grinding and polishing belt, a stationary guide adjacent to said contiguous portions of said belts, a work-supporting carriage movable toward and from the said grinding and polishing belt, and a work-support mounted on said table and capable of oscillating thereon, substantially as described.

4. In a grinding and polishing machine, the combination with an endless grinding and polishing belt, of an endless pressure-belt, having portions contiguous to portions of said grinding and polishing belt, a stationary guide adjacent to said contiguous portions of said belts, a work-supporting carriage movable toward and from the said grinding and polishing belt, and means for elevating said carriage comprising, the toggle-levers, a rotatable shaft and flexible connections between said shaft and said toggle-levers, substantially as described.

5. In a grinding and polishing machine, the combination with an endless grinding and polishing belt, of an endless pressure-belt having portions contiguous to portions of said grinding and polishing belt, a stationary guide adjacent to said contiguous portions of said belts, a work-supporting carriage movable toward and from the said grinding and polishing belt, a work-support pivoted on said table and having a beveled end curved concentrically with said pivot, means for supplying abrasive material to said grinding and polishing belt and a trough extending beneath a portion of said plate and terminating above said beveled curved edge of the work-support, substantially as described.

6. In a grinding and polishing machine, the combination with an endless grinding and polishing belt, of an endless pressure-belt, having portions contiguous to portions of said grinding and polishing belt, a stationary guide adjacent to said contiguous portions of said belts, a work-supporting carriage movable toward and from the said grinding and polishing belt, a hopper for containing abrasive material, a movable shaker beneath said hopper having its discharge end adjacent to the grinding and polishing belt, and means for reciprocating said shaker, substantially as described.

7. In a grinding and polishing machine, the combination with an endless grinding and polishing belt, of an endless pressure-belt, having portions contiguous to portions of said grinding and polishing belt, a stationary guide adjacent to said contiguous portions of said belts, a work-supporting carriage movable toward and from the said grinding and polishing belt, a hopper for containing abrasive material, a movable shaker beneath said hopper, having its discharge end adjacent to said grinding and polishing belt, a shaker-operating shaft, a crank on said shaft and connections between said crank and said shaker, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM L. GODFREY.

Witnesses:
MILTON HOLLY,
H. R. FERGUSON.