

No. 709,019.

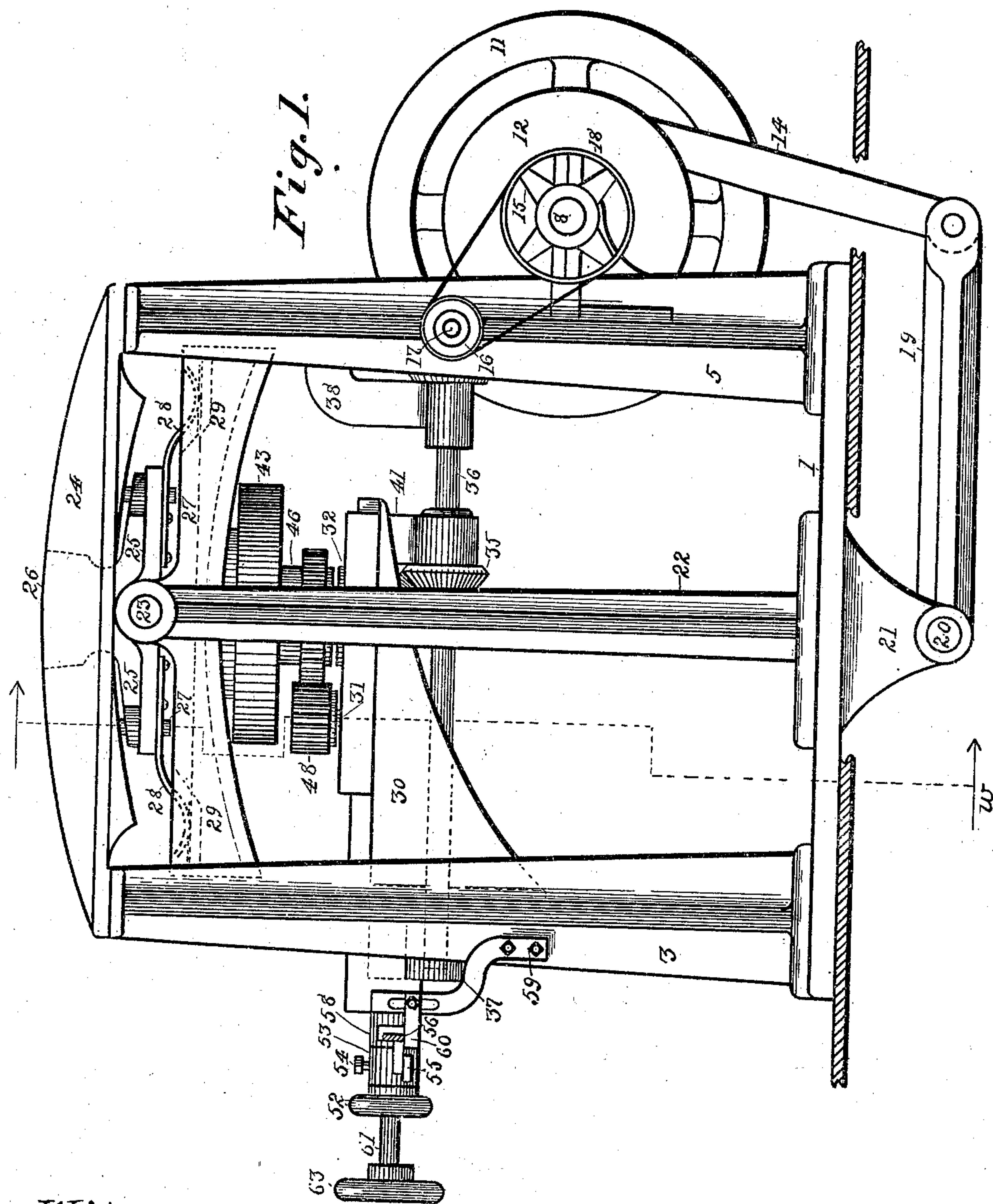
W. LAHODNY.  
MACHINE FOR GRINDING GLASS.

Patented Sept. 16, 1902.

(No Model.)

(Application filed Jan. 24, 1902.)

4 Sheets—Sheet 1.



Witnesses:

W. B. Borman  
Maude Givier.

Inventor:

William Lahodny  
by Humphrey & Humphrey,  
Attorneys.

No. 709,019.

Patented Sept. 16, 1902.

W. LAHODNY.  
MACHINE FOR GRINDING GLASS.

(Application filed Jan. 24, 1902.)

(No Model.)

4 Sheets—Sheet 2.

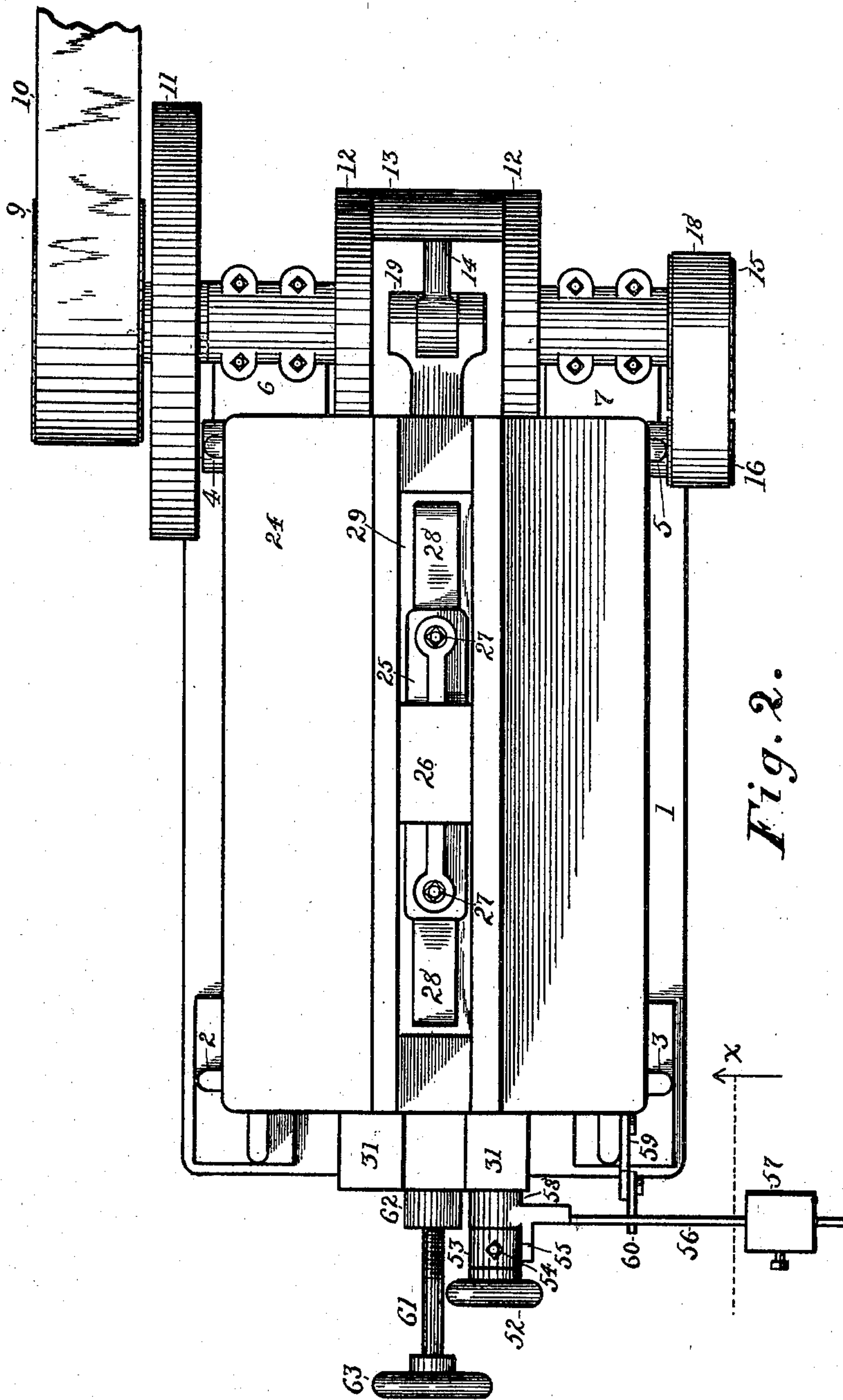


Fig. 2.

Witnesses:

Chas. B. Brown  
Maudel Grissler.

Inventor:

William Lahodny  
by Humphrey Humphrey,  
Attorneys.

No. 709,019.

Patented Sept. 16, 1902.

W. LAHODNY.  
MACHINE FOR GRINDING GLASS.

(Application filed Jan. 24, 1902.)

(No Model.)

4 Sheets—Sheet 3.

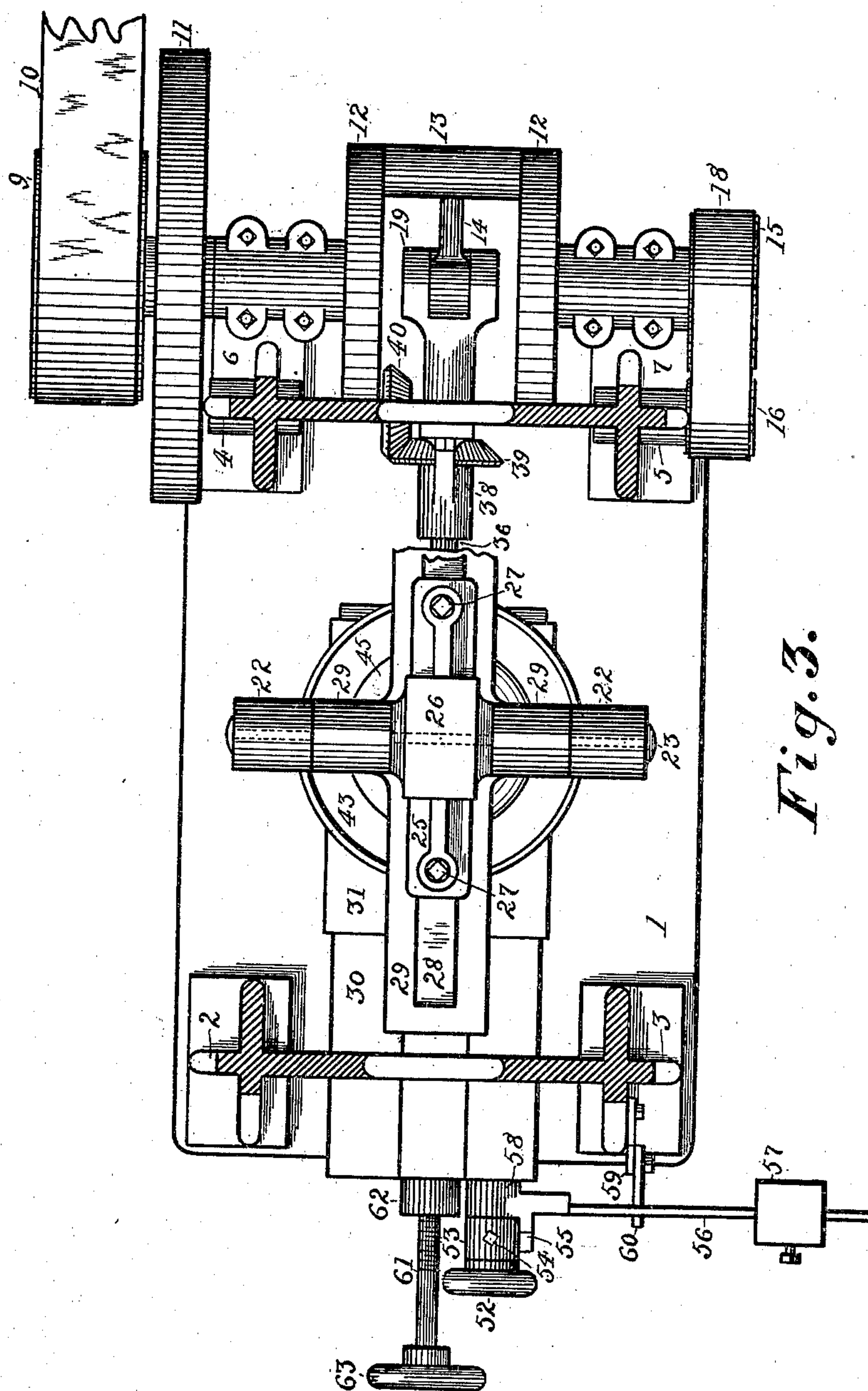


Fig. 3.

Witnesses:

Attest B. Bauman  
Maude Grissler.

Inventor:

William Lahodny,  
by Humphrey Humphrey,  
Attorneys.



W. LAHODNY.  
MACHINE FOR GRINDING GLASS.

(Application filed Jan. 24, 1902.)

(No Model.)

4 Sheets—Sheet 4.

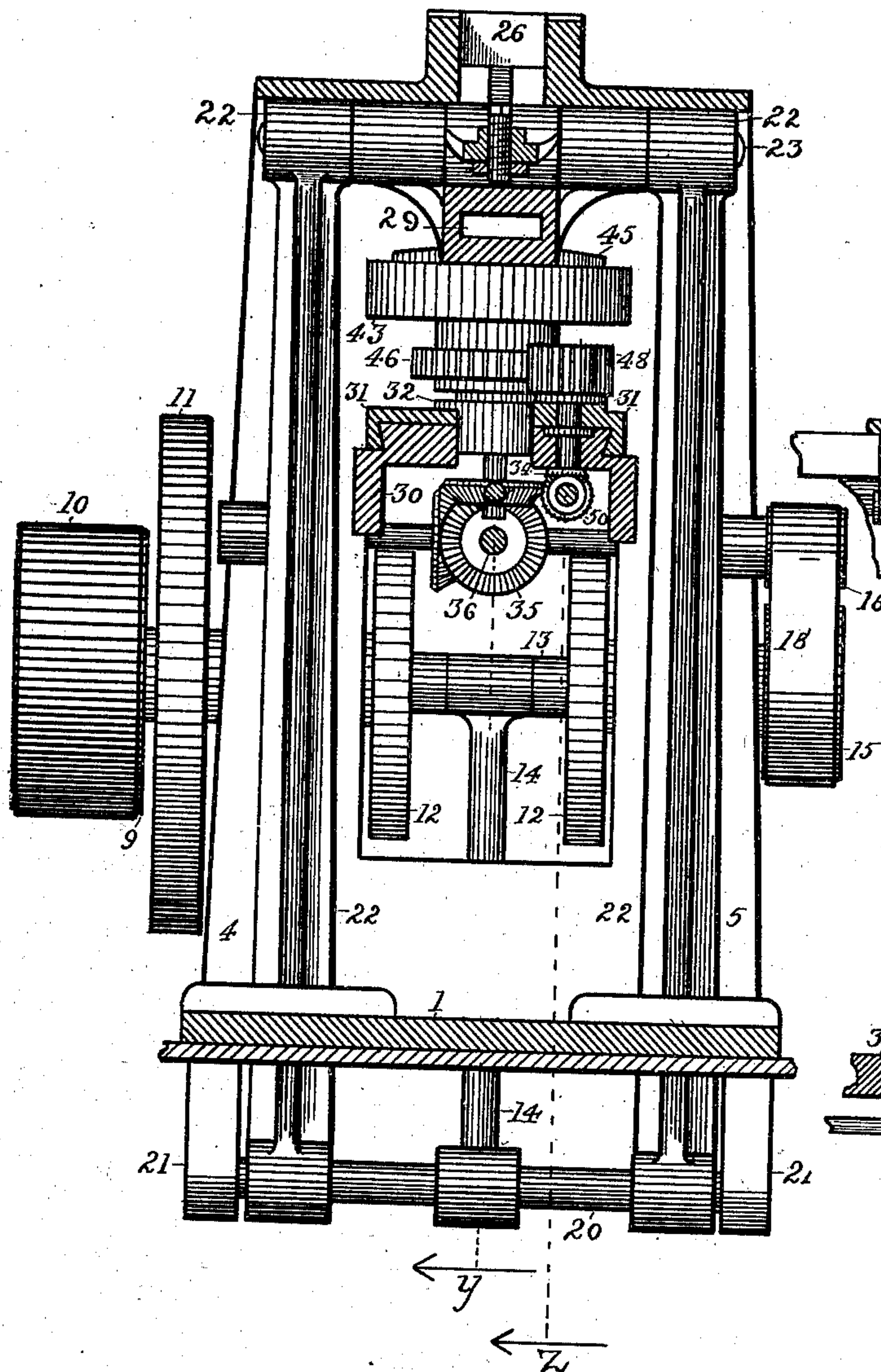


Fig. 4.

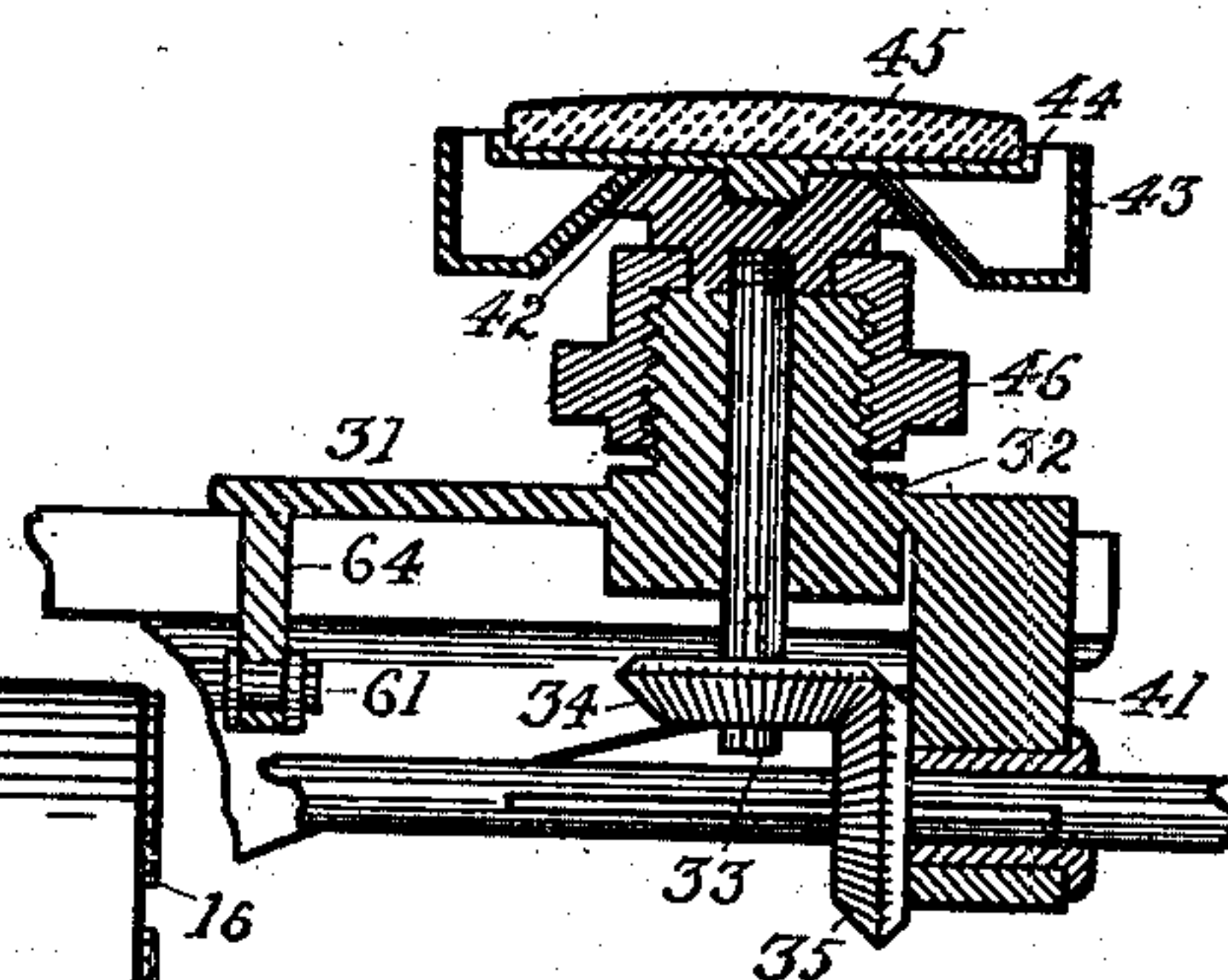


Fig. 5.

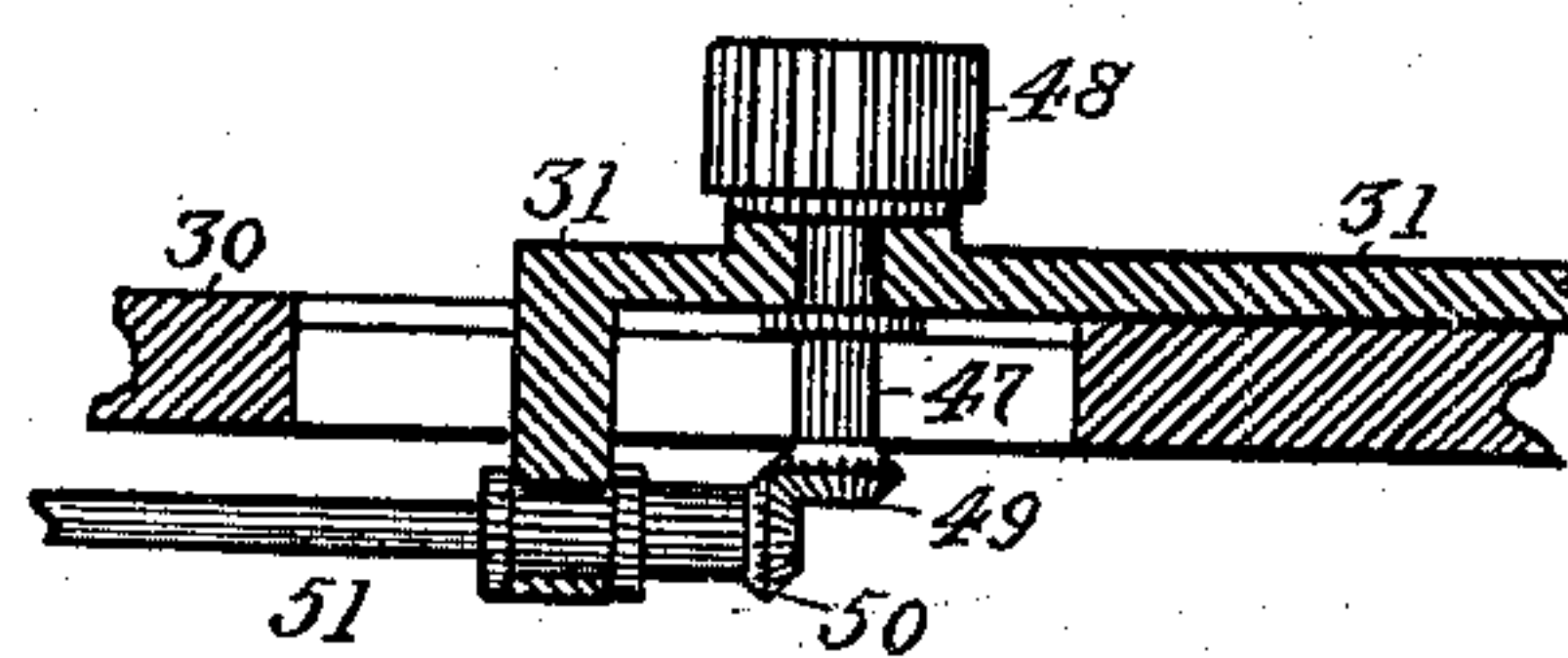


Fig. 6.

Witnesses:

W. H. Borman.  
Maude Grissler.

Inventor:

William Lahodny,  
by Humphrey & Humphrey,  
Attorneys.



# UNITED STATES PATENT OFFICE.

WILLIAM LAHODNY, OF AKRON, OHIO.

## MACHINE FOR GRINDING GLASS.

SPECIFICATION forming part of Letters Patent No. 709,019, dated September 16, 1902.

Application filed January 24, 1902. Serial No. 91,066. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM LAHODNY, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented a certain new and useful Improvement in Machines for Grinding Glass, of which the following is a specification.

My invention has relation to improvements in machines for grinding and polishing convex surfaces, and it has especial relation to the production of a machine capable of grinding and polishing convex mirrors, lenses, &c.

The object of my invention is to produce a machine which shall accurately and rapidly grind and polish convex surfaces and in which the degree of pressure exerted on the surface to be ground by the grinding mechanism can automatically be regulated.

To attain the aforesaid objects, my invention consists in the peculiar and novel construction, arrangement, and combination of parts hereinafter described and then specifically claimed, reference being had to the accompanying drawings, forming a part of this specification, and in which drawings similar reference-numerals indicate like parts in the different figures.

Figure 1 is an elevation of the machine with one lever in section at the line *x* of Fig. 2; Fig. 2, a plan. Fig. 3 is a plan with the top removed, showing certain portions in section. Fig. 4 is a section at the line *w* of Fig. 1. Fig. 5 is a section of a portion of the mechanism at the line *y* of Fig. 4. Fig. 6 is a similar view on the line *z* of Fig. 4.

In the drawings, 1 is a bed-plate resting on any suitable support, as a floor, and rising from the corners of this bed-plate are four posts 2, 3, 4, and 5. Extending between the posts 2 and 3 and 4 and 5 are thin webs, through which webs are openings where necessary to clear the adjacent machinery. On the posts 4 and 5 are brackets 6 and 7, supporting a revoluble shaft 8, having at one end a large driving-pulley 9, rotated by a belt 10 from any convenient source of power. On the shaft 8 and adjacent to the pulley 9 is a large balance-wheel 11. Between the brackets 6 and 7 are two cranks 12 12, united by a pin 13, attached to which pin is a connecting-rod 14. On the opposite end of the shaft 8 from the pulley 9 is a smaller pulley 15.

This pulley 15 is arranged to rotate a smaller pulley 16 by means of a belt 18 mounted on the end of a shaft 17, revolubly supported in boxes in the posts 4 and 5. The lower end of the connecting-rod 14 is pivotally attached to a substantially horizontal connecting-rod 19, the opposite end of the connecting-rod 19 being keyed to a transverse shaft 20, supported in hangers 21, attached to the under side of the bed-plate 1. Fastened tightly on the shaft 20 and arranged to rock therewith are two upright parallel arms 22, which are united at their tops by a transverse shaft 23, fastened by means of keys irrevolubly in the arms 22.

Mounted on the top of the four posts 2, 3, 4, and 5, is a plate 24, having extending centrally nearly its entire length a slot, and on either side of this slot the top plate 24 is turned abruptly to form, in connection with this slot, a longitudinal way. Mounted on the shaft 23, centrally between the arms 22, is a T-head 25, fastened by means of a key irrevolubly on the shaft. This T-head 25 has an upright block 26, which is arranged to exactly fit the slot in the top 24, and as the T-head rocks backward and forward this block 26 will serve to steady this motion. Near each end of the arms of the T-head are circular bosses, through which and meshing therein are adjusting-screws 27. Fastened to the under side of the T-head are downwardly-acting springs 28 for a purpose to be stated. Revolubly suspended from the shaft 23 is a rocking head 29. This rocking head 29 is considerably longer and hangs immediately below the T-head 25, and the springs 28 are so placed that they will press firmly on the upper surface of the rocking head 29 near its ends. The set-screws 27 are placed to adjust and limit the amount of rocking motion of the head 29. The under surface of the head 29 is in the form of an arc of a circle described from the center of the shaft 20, and the surface may be made of any material or covered with any substance desired for either grinding or polishing the article on which it is to operate.

The mechanism used to hold and feed upward the article to be polished or ground is situated centrally below the head 29 and is described as follows: Extending from the



web between the posts 2 and 3 is a horizontal bracket 30. This bracket is slotted in its upper part its entire length. On the top of this bracket 30 is a carriage 31, having depending dovetailed sides to engage the sides of the bracket and retain the carriage thereon. (See Figs. 4 and 5.) Mounted centrally in the carriage 31 is an upright externally-screw-threaded post 32. Through the center of this post is a vertical revoluble shaft 33, bearing at its lower end a beveled gear 34, placed to mesh with a similar gear 35, mounted on a shaft 36, extending across the machine and supported at one end in a boss 37 in the web between the posts 2 and 3 and at the other end by a bracket 38, attached to the web between the posts 4 and 5. At the end of the shaft 36 adjacent to the bracket 38 is a beveled gear 39, meshing in a similar gear 40 on the shaft 17. The hub of the gear 35 is splined on the shaft 36, by which it receives motion and is slid lengthwise on this shaft by having its hub inclosed by a depending bracket 41 from the carriage 31, which compels its transit therewith. Thus it will be seen that as the carriage 31 is moved along on the bracket 30 the bevel-gears 34 and 35 will be kept in mesh by the depending bracket 41, passing downward through the slot in the bracket 30, compelling the sliding of the gear 35 on the shaft 36 with the carriage 31. The bevel-gear 34 is splined on the vertical shaft 33, so that a slight upward motion is permitted the shaft 33 without removing the gear 34 from engagement with the gear 35. On the upper end of the shaft 33 is screwed a head 42, having upwardly cone-shaped sides, on which cone-shaped sides is hung a pan 43 for a purpose to be stated. Fastened tight in the upper face of the head 42 is a holder 44 with upturned edges and in which is placed the article 45 on which the grinding operation is to be employed. This article 45, which for the purpose of this application may be called a "lens," is retained in the holder by means of plaster-of-paris or in any desired or preferred manner.

It will be seen from the foregoing that the revolution of the shaft 33 will rotate the head 42 and the holder 44 and the lens 45. It is not essential that the pan 43, which is used for the purpose of catching particles of matter ground from the face of the lens, should revolve therewith; but it may be anchored in any suitable or desired manner. In order to raise the head upward from off its normal resting place on the upper end of the threaded post 32, a nut 46 is screwed on the threads on this post 32 and extends slightly above it and has its top immediately below a shoulder on the head 42, so that by revolving the nut 46 the head 42 is raised. The outer surface of a portion of the nut 46 is formed with gear-teeth for the purpose of revolving said nut. The revolution of the nut is secured in the following manner:

Vertically mounted in the carriage 31 and

to one side of the center thereof is a shaft 47, bearing at its upper end a pinion 48, meshing in the gear-teeth on the nut 46. The portion of the bracket 31 immediately surrounding the shaft 47 on either side extending longitudinally a considerable distance is slotted to afford a chance for the shaft 47, traveling with the carriage 41, to move without encountering resistance. On the lower end of the shaft 47 is a bevel-gear 49, meshing into a gear 50 on a horizontal shaft 51, whose outer end passes beyond the bracket 31 and terminates in a hand-wheel 52, by which the shaft 51, bevel-gears 50 and 49, shaft 47, and pinion 48 are revolved, as desired. The shaft 51 is a plain shaft, and near its outer end adjacent to the hand-wheel 52 is provided with a collar 53, having a set-screw 54 for the purposes of tightening it on the shaft 51. This collar 53 bears a substantially radial lug 55. Between the collar 53 and the end of the bracket 31 is a collar 58 of the same diameter as the collar 53, from which extends a radial arm 56, bearing a weight 57. This collar 58 also has a horizontal lug projecting from its outer periphery, so placed as to encounter the lug 55 on the collar 53. On the post 3 is a slotted curved arm 59, to which and vertically adjustable thereon is a cross-arm 60 of such a length as to lie in the path of and interrupt the revolution of the arm 56 of the collar 58. The operation of these parts will be described later.

The movement of the carriage 31 on the bracket 30 is controlled by a horizontal shaft 61, the threads of which mesh into a boss 62 on the outer end of the bracket 31, and the revolution of this shaft is controlled by a hand-wheel 63. This shaft 61 passes centrally under the slot in the bracket 30, and at its inner end passes through a depending bracket 64 on the carriage 31 and is provided on both sides of the bracket 64 with tight collars, so that by revolving the hand-wheel 63 the shaft 61 is caused to travel inward or outward, as desired, bearing the carriage 31 with it.

The operation of the machine is as follows: Previous to starting the operative mechanism the article—as, for instance, a lens on which the convex surface is sought to be ground or polished—is placed in the holder 44, and a suitable surface or substance is placed on the under face of the grinder 29. If it is desired to grind the article with a convex surface, grinding substance—such as emery, sand, or like material—is fed onto the surface of the glass during the operation, and if the desired amount of convexity has been already imparted to the glass and a polishing of that surface is desired buffing-cloth into which some fine grit powder has been placed is attached to the under surface of the grinder 29. In order to place the glass or lens in position, the hand-wheel 52 is revolved, which by means of the shaft 51, bevel-gears 50 and 49, with the



shaft 47, pinion 48, and nut 46, the head 42 bearing the holder and glass are lowered until the desired object is placed in the holder. The hand-wheel 52 is then rotated in an opposite direction, and by means of the previously-described machinery the glass in the holder is raised until it encounters the under central surface of the polisher 29. The weight 57 and lever 56 are then raised until nearly vertical, but with a slight inclination toward the right in Fig. 2. The collar 53 is then swung around until the lug 55 is immediately under the lug on the collar 58. The set-screw 54 on the collar 53 is tightened against the shaft 51, so that the influence of the weight will be to revolve by means of this mechanism the shaft 51, revolving the pinion 48 and nut 46, thereby raising and constantly pressing upward the glass against the grinding-surface of the rocking head 29. Thus as the grinding is effected and accomplished the weight in its gradual descent will force upward the glass into frictional engagement with the rocking head 29. Power is then supplied to the machine by the belt 10, which revolves the shaft 8 and cranks 12, causing a reciprocating motion to be imparted to the connecting-rod 19 through the connecting-rod 14, which will in turn oscillate the two arms 22 and in turn the head 25, which being immovable on the arms 22 will press, by means of the springs 27, upon the outer ends of the rocking head or grinder 29. This oscillating motion of the head 29 carries the under working surface of the head across the upper face of the glass held in the holder 44, and the glass is constantly revolved at high speed by means of the pulley 15, operating the belt 18 to drive the pulley 16, shaft 17, bevel-gears 40 and 39, shaft 36, bevel-gears 35 and 34, and the vertical shaft 33. The holder 44 is permitted to rise, as hereinbefore noticed, by means of the fact that the bevel-gear 34 is splined onto the shaft 33. Should it be desired that more conveyity be imparted to the glass than is capable of being imparted by reason of the fact that the grinder 29 has its under surface made in substantially an arc of a circle described from the center of the shaft 20, two methods are provided whereby this may be accomplished, one being by means of the adjusting set-screws 27 in the T-head 25, which press downward one side of the rocking grinder 29 more than the other, causing it to do substantially all its work on one side, and the other method is to rotate the hand-wheel 63, which in turn rotates the shaft 61, drawing the carriage 31 and its attached parts, including the glass to be ground, to one side of the axial line of the machine, thus causing the grinder to cut deeper on that particular side, at the same time permitting the regular operation of the machine. Should it be necessary at any time to get at the working parts easily, it may be done by lowering the glass from contact with the head 29 and by means of the hand-wheel 63 drawing the carriage 31

and its connected mechanism to one side and easily within reach.

Having thus described my invention, what I claim is—

1. The combination in a machine for grinding convex surfaces consisting of an oscillating grinding-head, springs to bear upon the upper surface of said grinding-head, means to adjust the inclination of said grinding-head, means to hold the article to be ground, and means to revolve said holder, means to oscillate said grinding-head, and means to convey said article to be ground against said grinding-head, substantially as shown and described.

2. The combination in a machine for grinding convex surfaces consisting of a grinding-head, means to vary the vertical inclination of either end of said grinding-head, a pair of arms to sustain said grinding-head, horizontal guides to guide said grinding-head, means to hold the article to be ground, a lever to oscillate the arms bearing said grinding-head, a second lever and a power-driven crank to operate the hereinbefore-described mechanism.

3. The combination in a machine for grinding convex surfaces consisting of an oscillating grinding-head capable of vertical inclination on either side, means to adjust this inclination, a grinding-head to hold the article to be ground, a pan surrounding said holder to receive particles ground from the surface of said article, a transversely-moving carriage to sustain said holder and pan, and means to move said carriage on its support transversely, substantially as shown and described.

4. The combination in a machine of the class designated of an oscillating grinding-head, means to vary the vertical inclination of said grinding-head, and means to retain said grinding-head in a desired position, a holder to sustain the article to be ground, a carriage to sustain said holder, transverse ways to sustain said carriage, means to slide said carriage on said ways, and means to raise said holder on said carriage, substantially as shown and described.

5. The combination in a machine for grinding convex surfaces of an oscillating grinding-head, means to vary the vertical inclination of said head, a holder to sustain the article to be ground, a carriage to sustain said holder, a threaded nut on said carriage to raise said holder, and means to rotate said nut and raise said holder vertically, substantially as shown and described.

6. The combination in a machine for grinding convex surfaces of an oscillating head, means to cause said head to oscillate, means to revolve said article, means capable of lateral adjustment to bring said article in alignment with said grinding-head, substantially as shown and described.

7. The combination in a machine for grinding convex surfaces of an adjustable oscillating head, means to cause such oscillation,



means to revolve the article to be ground,  
means to automatically force said article  
against said grinding-head, and independent  
means for the lateral adjustment of said arti-  
5 cle, substantially as shown and described.

8. The combination in a machine for grind-  
ing convex surfaces consisting of a grinding-  
head, means to retain said head at a desired  
vertical inclination, a holder to sustain the  
10 article to be ground, a carriage to sustain said  
holder, means to revolve said holder, means

to raise said holder vertically on said car-  
riage, and independent means to adjust the  
lateral position of said carriage in said ma-  
chine, substantially as shown and described. 15

In testimony that I claim the above I here-  
unto set my hand in the presence of two sub-  
scribing witnesses.

WILLIAM LAHODNY.

In presence of—

C. E. HUMPHREY,  
WM. C. ROMPE.