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J. SOLER, Dec'd.

P. B. TURPIN, Administrator.

SELF RECORDING PLANOGRAPH.

No. 481,432. Patented Aug. 23, 1892.

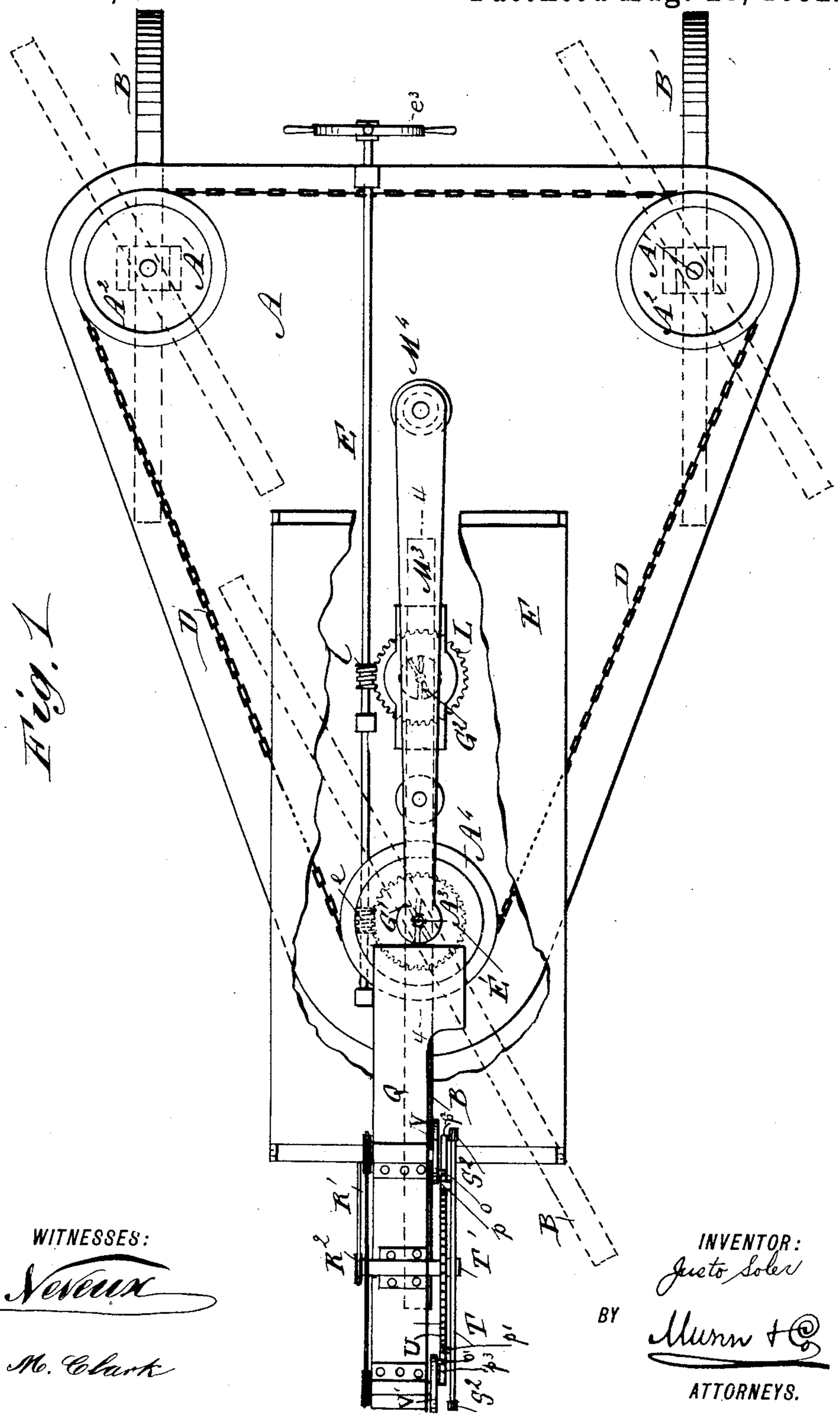

Fig. 1.

WITNESSES:

C. Neveux

E. M. Clark

INVENTOR:

Jacto Soler

BY Munn & Co

ATTORNEYS.

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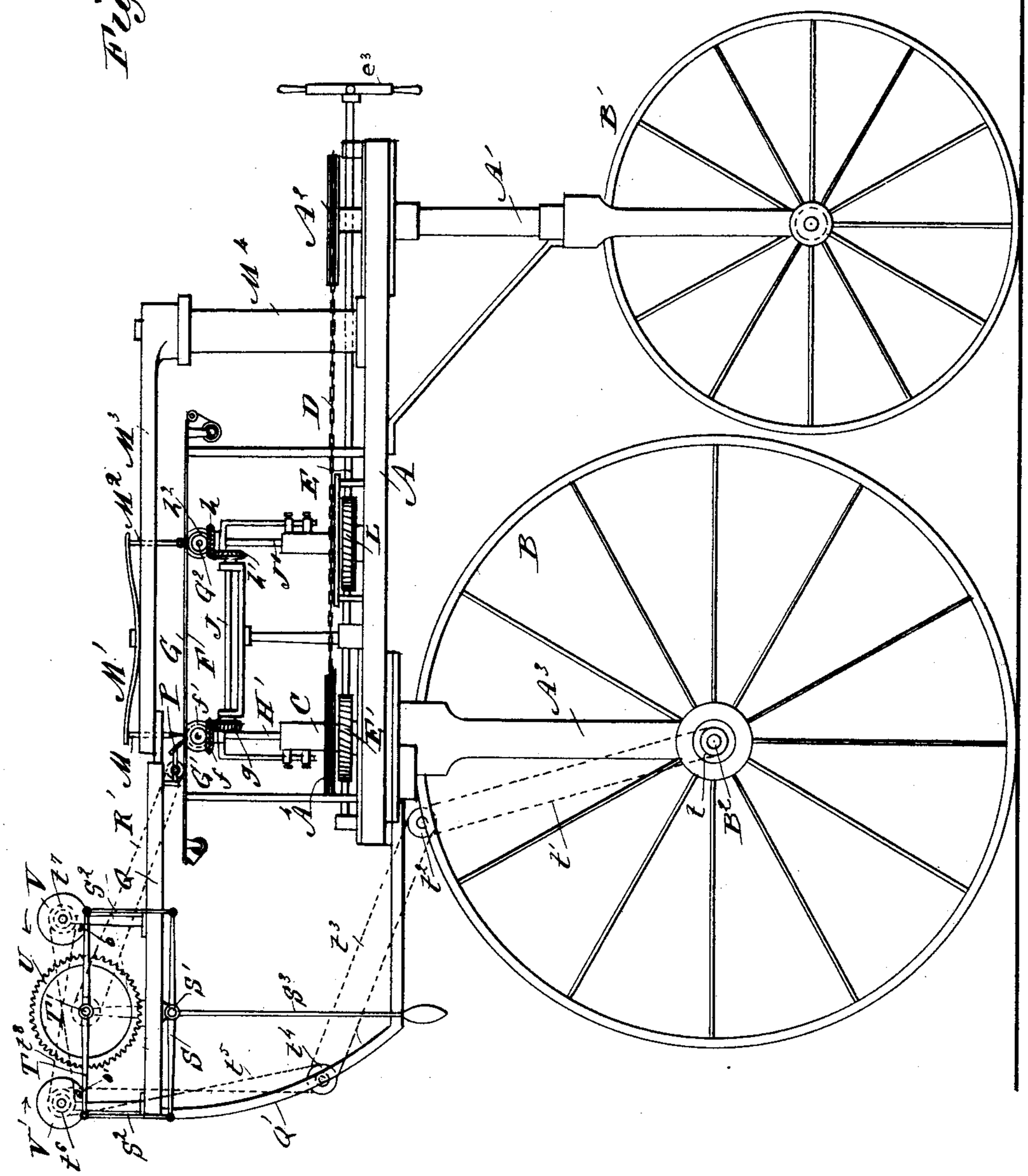
P. B. TURPIN, Administrator.

SELF RECORDING PLANOGRAPH.

No. 481,432. Patented Aug. 23, 1892.

Fig. 2.



WITNESSES:

C. Neveux

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INVENTOR:

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J. SOLER, Dec'd.

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SELF RECORDING PLANOGRAPH.

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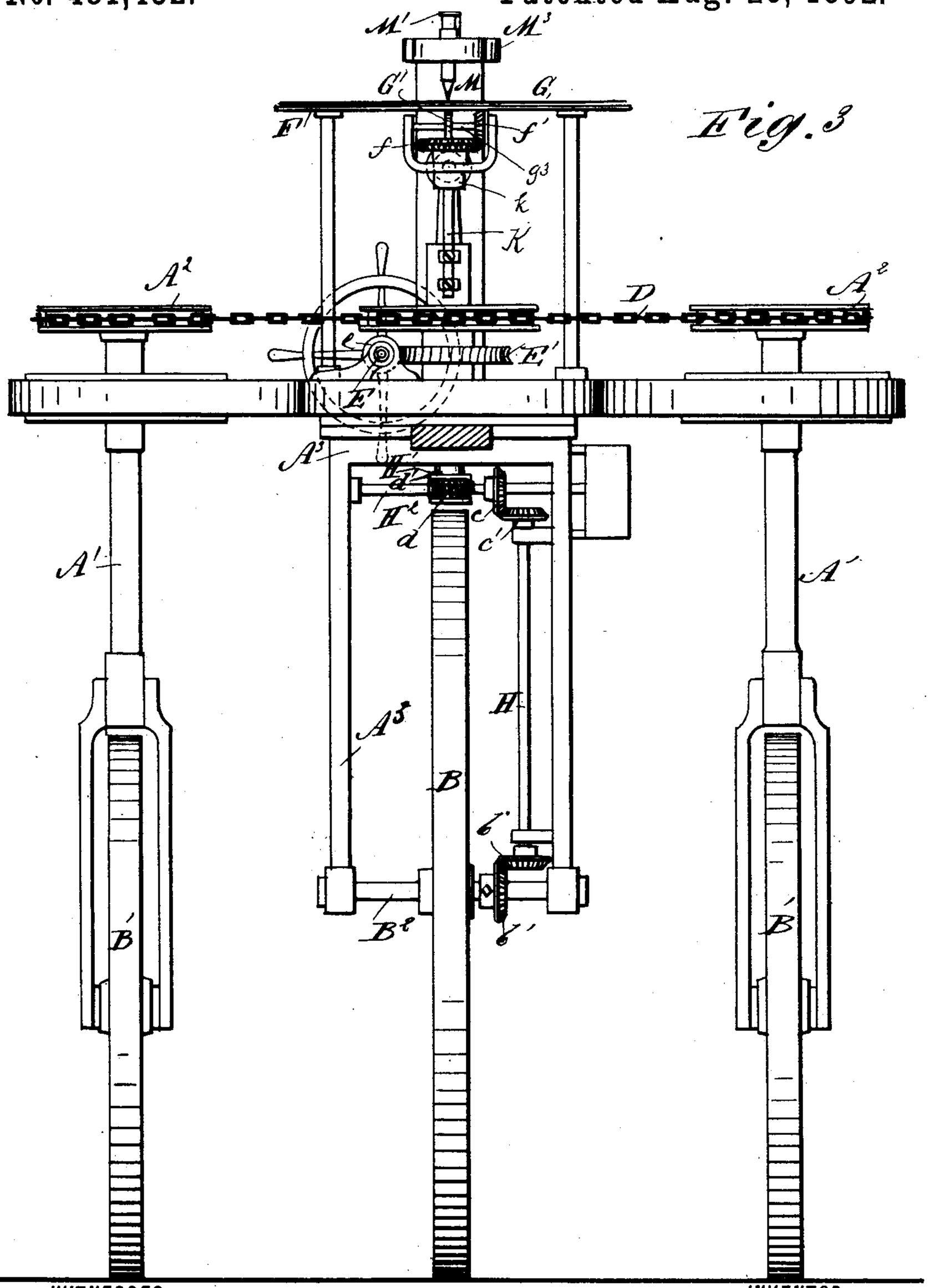

Fig. 3

WITNESSES:

C. Neveux

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SELF RECORDING PLANOGRAPH.

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Fig. 4

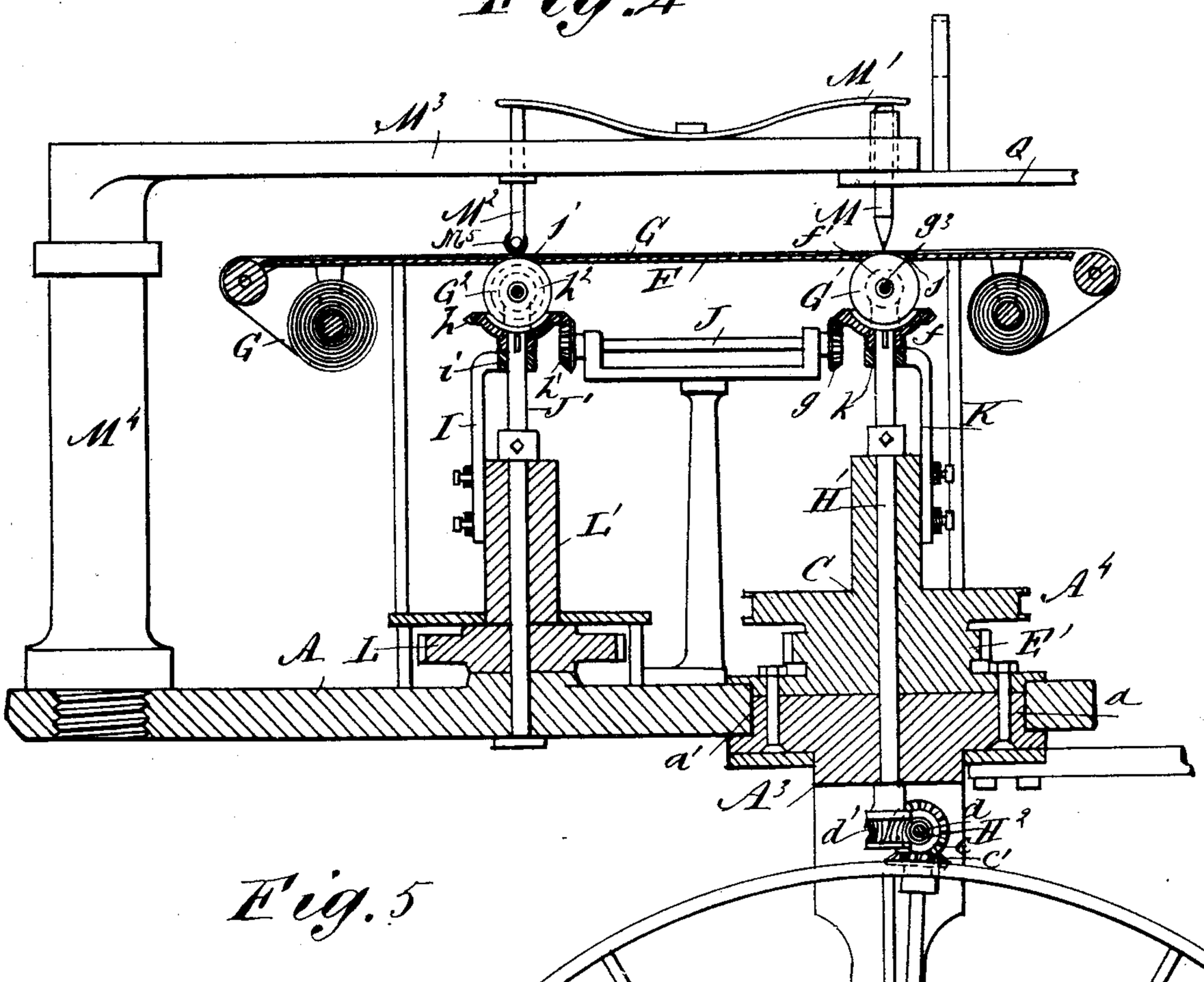
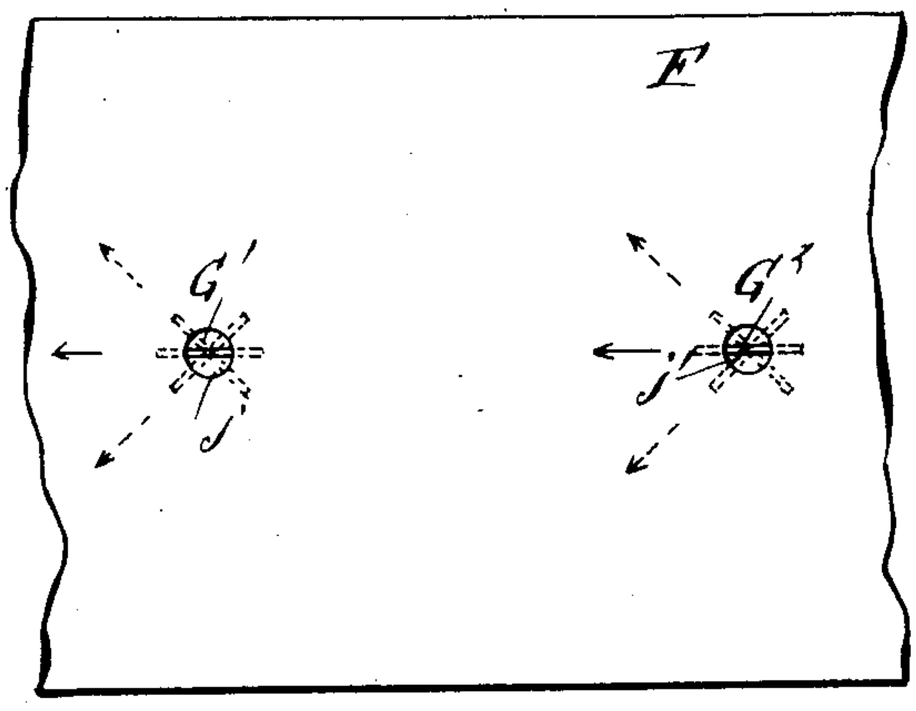


Fig. 5



WITNESSES:

C. Neveux

E. M. Clark

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(No Model.) 6 Sheets—Sheet 5.

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SELF RECORDING PLANOGRAPH.

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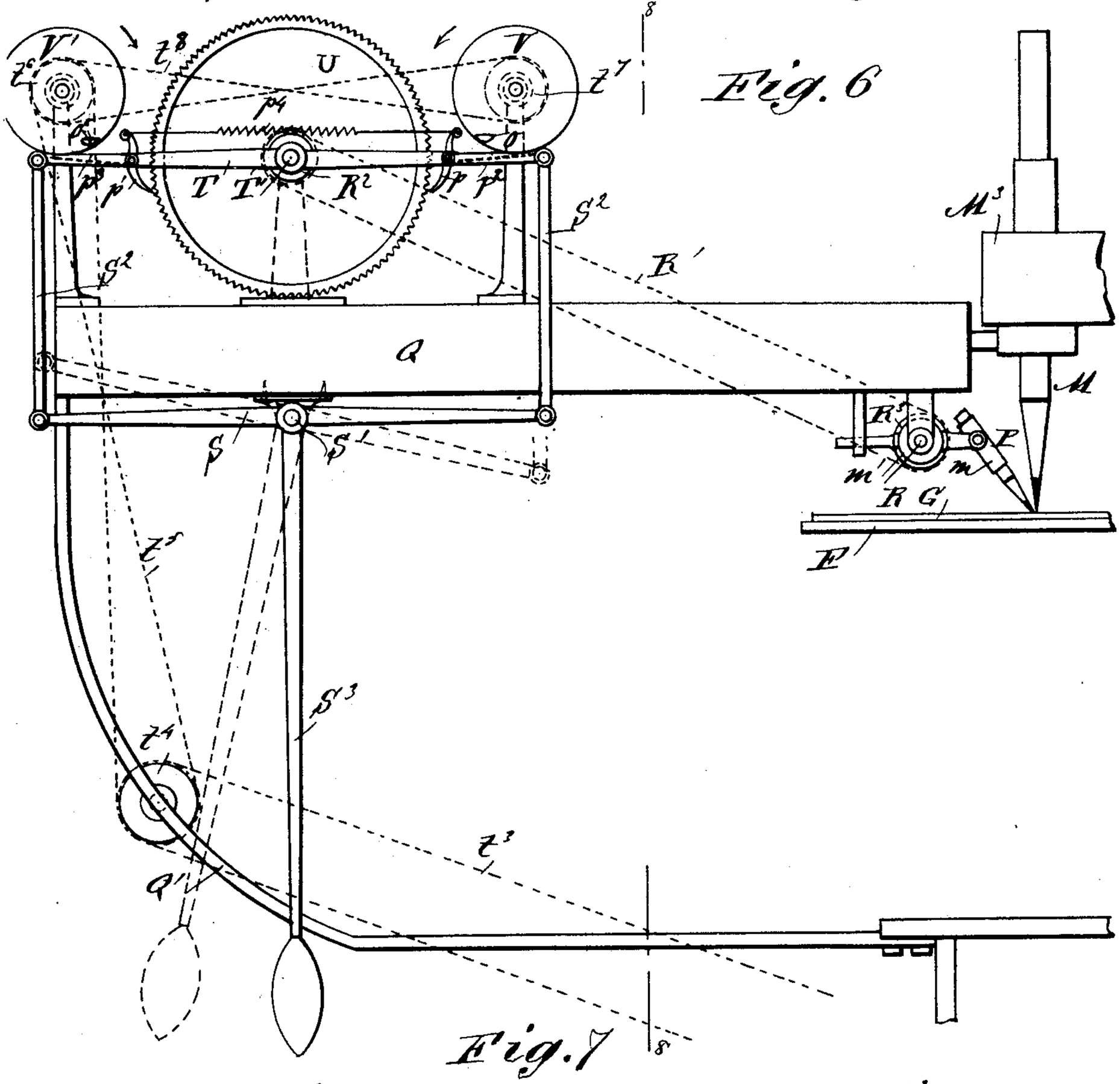

Fig. 6

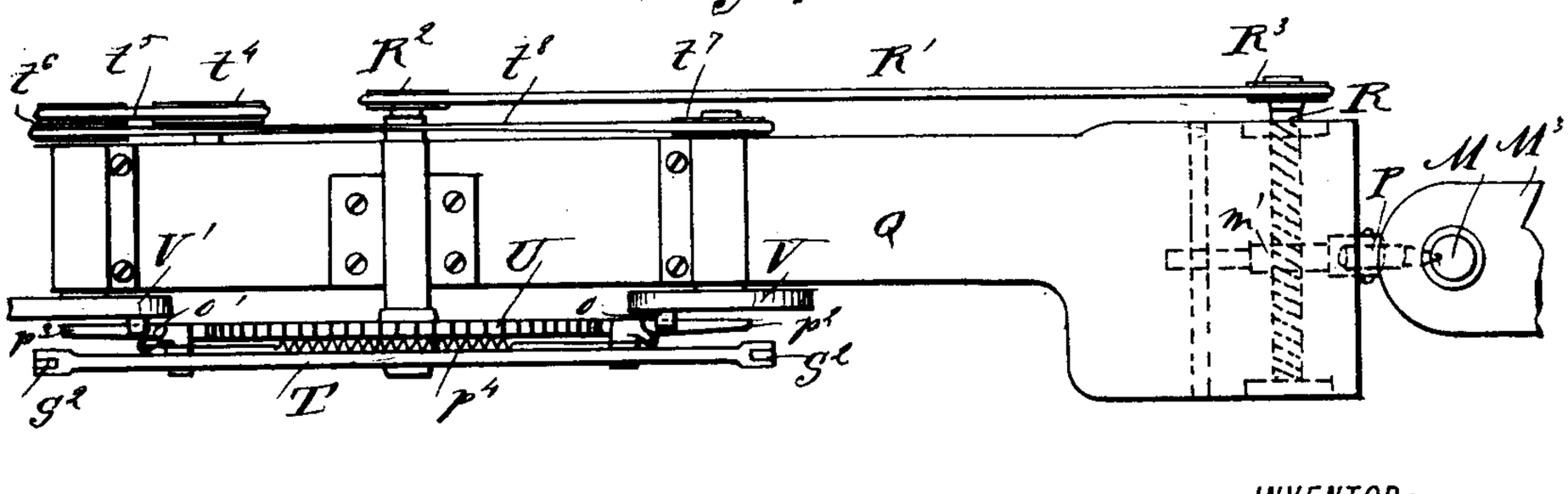

Fig. 7

WITNESSES:

C. Neveux

E. M. Clarke

INVENTOR:

Justo Soler.

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Fig. 8

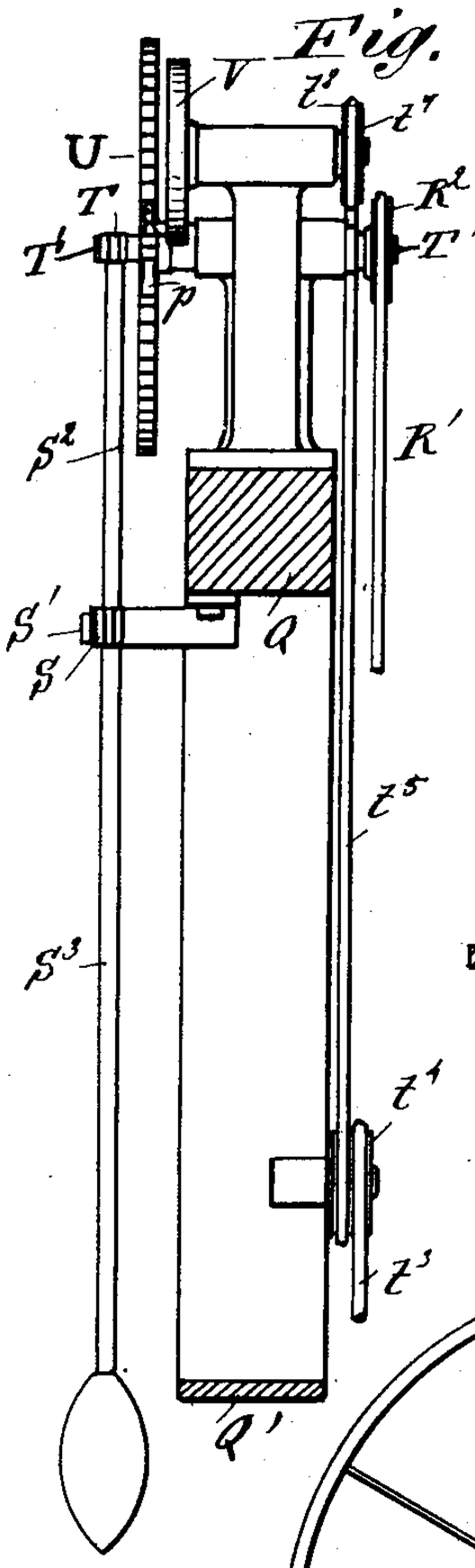


Fig. 9

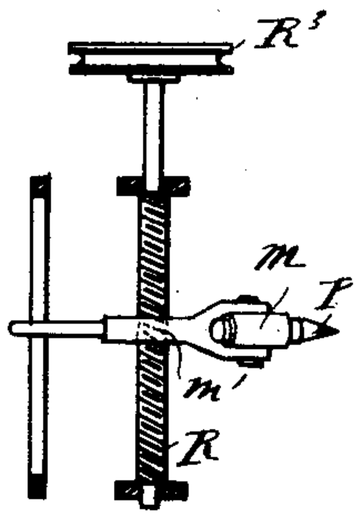


Fig. 10

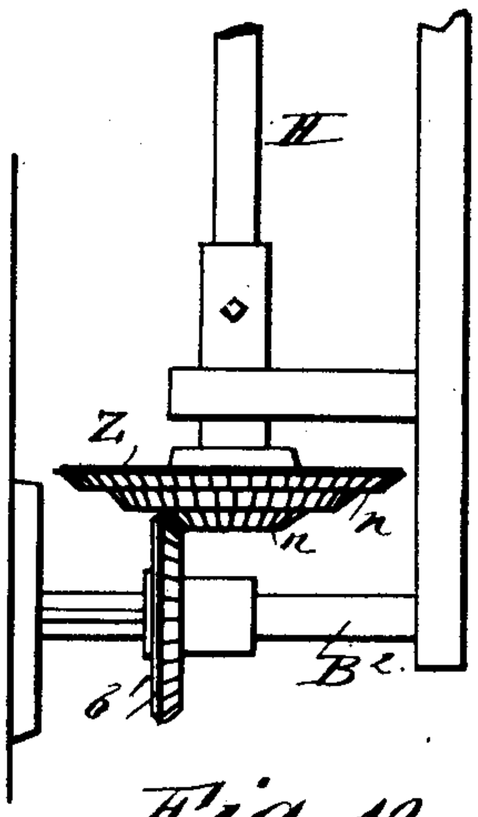


Fig. 11

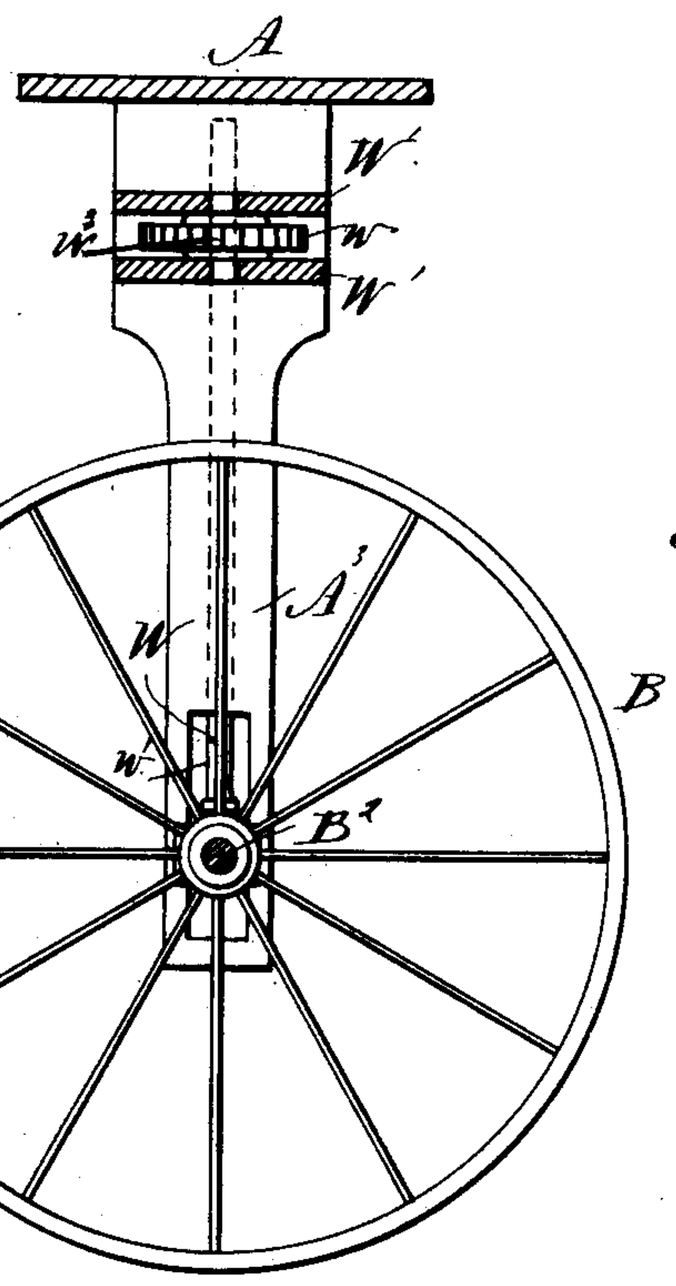
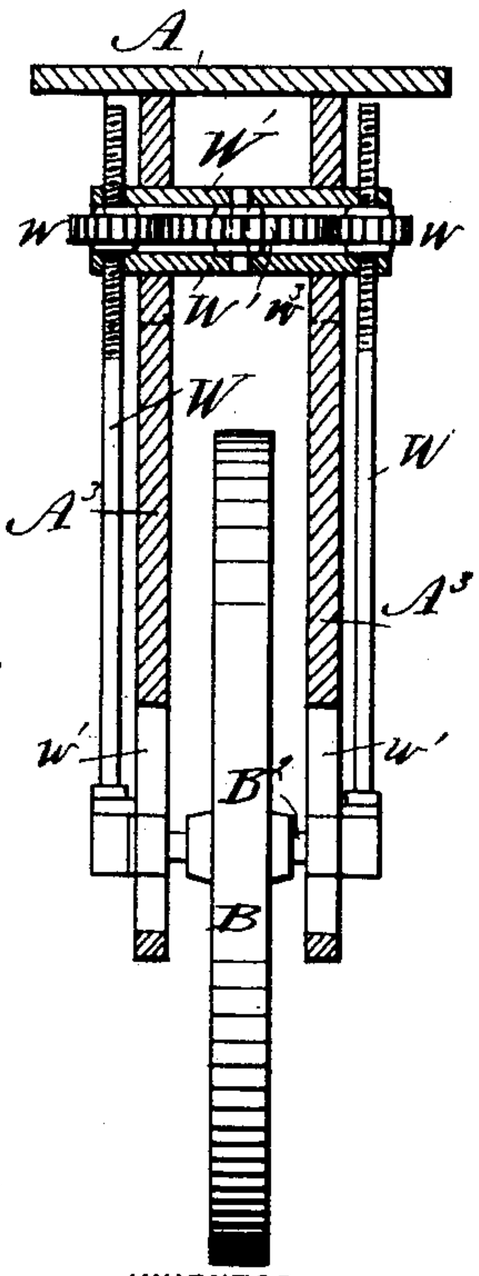


Fig. 12



WITNESSES:

C. Neveux

E. M. Clarke

INVENTOR:

Juste Soler.

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JUSTO SOLER, OF YANCO, PORTO RICO, WEST INDIES; PERRY B. TURPIN ADMINISTRATOR OF SAID JUSTO SOLER, DECEASED.

SELF-RECORDING PLANOGRAPH.

SPECIFICATION forming part of Letters Patent No. 481,432, dated August 23, 1892.

Application filed June 25, 1891. Serial No. 397,475. (No model.)

To all whom it may concern:

Be it known that I, JUSTO SOLER, of Yanco, Porto Rico, West Indies, have invented a new and Improved Self-Recording Planograph, of which the following is a full, clear, and exact description.

To form a geometrical or topographical plane is to form a figure on paper similar to the ground measured—that is, to determine the value of the sides and angles with the homologous points, which, owing to their situation, it may be convenient to know in order to complete the figure of the zone measured. Hence a machine that will record automatically on paper the angles of the ground and the proportional sides gone over according to a scale would greatly lessen the work of engineers and surveyors. To construct such a machine is therefore the object of my invention. This machine is mounted in this instance upon three wheels and is adapted to be moved over the ground by hand, a strip or ribbon of paper and a pencil being used to make horizontal angles, lines, or curves, and another pencil being used to mark elevations and depressions. The paper is caused to travel under the pencils at a speed bearing a known relation to the diameter at least of one of the main wheels, which furnishes a scale for reading the scroll made by the pencils.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a broken plan view of my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a front elevation. Fig. 4 is a detail sectional view taken on line 4 4 of Fig. 1. Fig. 5 is a diagram indicating the different directions in which the paper may be moved. Fig. 6 is a detail side elevation showing the means for recording the elevations and depressions. Fig. 7 is a plan view of the same. Fig. 8 is a sectional elevation on the line 8 8 of Fig. 6. Fig. 9 is a plan view of the pencil for recording elevations and depressions, showing the screw for moving the same laterally. Fig. 10 is a detail view of the means for changing the progressive speed of the paper. Fig. 11 is a sectional view showing a differently-constructed front-wheel frame A^3, having means for leveling the top frame of the machine; and Fig. 12 is a sectional front view of the same.

A represents a triangular platform supported by the front wheel B and two rear wheels B′ B′. The rear supporting-standards A′ A′ reach up through the platform A and are each provided at the upper end with a horizontal pulley A^2. The front supporting-frame A^3, which rests on the axle B^2 of the front wheel B, has bolted to it the casting C, (see Fig. 4,) which is flanged and which, together with a circular portion *a* of the frame A^3, constitutes a horizontal wheel which fits in a circular aperture *a′* in the platform A, so that the front wheel B may be readily turned to any angle. The casting C is formed with a horizontal pulley A^4, to correspond with the horizontal pulleys A^2 A^2 on the standards A′ of the rear wheels, and around the three said horizontal pulleys is placed an endless chain D, which serves to turn all of the wheels B B′ B′ in unison and to keep them always tracking parallel with each other, as indicated in dotted lines in Fig. 1. The wheels are turned by a shaft E and worm *e* thereon, which meshes with the worm-wheel E′, formed on the above-mentioned casting C. (See Fig. 4.) By turning the shaft E through the medium of hand-wheel e^3 the front wheel B may be kept parallel with the center line of the platform to go ahead in a straight line, or it may be turned to change the course, which turning will turn the pulley A^4 and also the pulleys A^2 A^2, and thus turn the rear wheels to parallel planes with the front wheel.

F represents a table or support, over which the strip or ribbon G of paper is caused to move slowly by the friction of feed-wheels G′ G^2 and a pencil and presser-foot, hereinafter described, (see Fig. 4,) as the machine is moved along the ground. This movement is communicated to the paper G and to the said friction-wheels G′ G^2 from the axle B^2 of the front wheel B. In this instance motion is communicated to wheel G′ by the two vertical shafts H H′, (see Figs. 3 and 4,) horizontal shaft H^2, gear-wheels *b b′* and *c c′*, worms *d d′*, and upper beveled gear-wheels *f f′*. (See Figs. 2 and 3.) Motion is communicated to friction-wheel G^2 by the horizontal shaft J, (see Figs. 2 and 4,)

beveled gear-wheels *f g*, vertical shaft J′, and beveled gear-wheels *h*, *h′*, and *h*². The short shaft H³, (see Figs. 3 and 4,) upon which the friction-wheel G′ turns, is supported in lugs reaching up from the cross-piece *k* of bracket K, attached to the casting C, so that when said casting is turned to turn the front wheel B the said friction-wheel G′ will also be turned and kept constantly parallel with the wheel B, as will be understood from dotted lines in Fig. 1. The friction-wheel G² is kept parallel with friction-wheel G′ by the worm-wheel L on shaft J′ and the worm *l* on the steering-shaft E, which meshes with the said worm-wheel L, as shown in Fig. 1. The shaft of the said friction-wheel G² is supported in bearings rising from the cross-piece *i* of the bracket I, attached to the pillar L′, made a part of the worm-wheel L, as shown in Fig. 4, so that when the steering-shaft E is turned not only all of the main ground-wheels of the machine are turned, but also the friction-wheels G′ G², so that all of said wheels are constantly kept parallel.

The peripheries of the friction-wheels G′ G² reach through small round apertures *j j* in the table F to the upper surface of said table, (see Figs. 2 and 4,) to run in contact with the under surface of the paper, and upon the paper, immediately over the center of the wheel G′, is placed the pencil M, which leaves a mark upon the paper G as the paper is drawn along under the pencil. The said pencil is kept in contact with the paper by a spring M′, and the opposite end of this spring also holds the presser foot or rod M² in contact with the paper, pressing it firmly upon the friction-roller G², so that the paper will partake of the motion of the said friction or feed wheel with precision and certainty. The presser-foot or rod M² is provided with an anti-friction roller M⁵. The pencil M and presser-foot M² are held on the arm M³, supported by the post M⁴, rising from the platform A, as is clearly shown in Fig. 4.

The action as thus far described is simply that as the machine is moved along the ground the paper is moved slowly along under the pencil M. If the machine be moved in a straight line, the mark left by the pencil will be straight and the length of the line will bear a certain relation to the distance covered by the machine. If the machine be turned in its course, the feed-wheels G′ G² will turn and move the paper somewhat laterally to the pencil, thus forming a lateral line. Each turn of the machine to either side and each straight course pursued will thus be accurately delineated upon the strip of paper, which not only accurately records the directions, but the distance covered at each change of course. In addition to this, I employ an attachment to mark upon the paper the elevations and depressions in the ground passed over by the machine. This consists of a laterally-moving pencil P, which answers to the movement of a pendulum device supported upon the arm Q, which arm is held at its outer end by the bow Q′ and pivoted at its inner end to the arm M³, as is clearly shown in Fig. 6.

The pencil P is held in an inclined sleeve or tube *m*, held by an apertured and screw-threaded arm *m′*, placed upon the horizontal screw-shaft R, the point of the pencil resting on the paper G near the point of the pencil M, as is shown clearly in Fig. 6. When the machine ascends elevations or descends, the pencil P is moved to the right or left by the turning of the screw-shaft R, so that irregularities of the ground are indicated by a zigzag line formed upon the paper G. The said screw-shaft R is turned by the pendulum mechanism above mentioned. This comprises the bar S, centrally pivoted on the shaft S′, and the upper bar T, centrally pivoted upon the shaft T′. The ends of the two bars S T are united by the pivoted rods S² S². Rigidly connected to the shaft S′ or to the bar S is the pendulum S³. On the shaft T′ is placed the ratchet-wheel U, which, when turned, communicates motion to the screw-shaft R for laterally moving the pencil P. This motion is communicated, in this instance, by the belt R′, passing over pulleys R² R³, secured, respectively, to the shafts T′ and R. To the bar T are pivoted the two opposite pawls *p p′*, formed with extending horizontal arms *p*² *p*³. (See Figs. 1 and 6.) The pawls are held normally out of contact with the ratchet-wheel U by the spring *p*⁴, attached at its ends to the upper ends of the pawls, as shown in Fig. 6. Contiguous to the arms *p*² *p*³ of the pawls are the wheels V V′, formed with projections *o o′*. The said wheels V V′ are revolved constantly while the machine is in motion from the main axle B², pulley *t* thereon, belt *t′*, pulley *t*², belt *t*³, double pulley *t*⁴, belt *t*⁵, double pulley *t*⁶, and pulley *t*⁷ on the shafts of the said wheels, and the belt *t*⁸, all shown in Figs. 2, 6, and 3. When the machine is running on level ground, the arms S T will be held in horizontal position by the pendulum S³, the pencil P will be in line with the pencil M, the pawls *p p′* will be out of contact with the ratchet-wheel U, and the projections *o o′* will in their revolution clear the arms *p*² *p*³ of the pawls for the reason that said arms are normally in a lower plane than is reached by said projections. In going downgrade the pendulum S³ will swing forward and elevate the front ends of the bars S T, as indicated in dotted lines in Fig. 6. This brings the arm *p*³ of the pawl *p′* up into range of the projection *o′* of the wheel V′. The revolution of this wheel will act to turn the ratchet-wheel U intermittently—that is, when the stud *o′* strikes arm *p*³ it will turn the pawl on its pivot and engage it with the teeth of the wheel and then depress the pawl, carrying the wheel until the stud *o′* passes the arm *p*³ of the pawl. This movement of the wheel turns the screw-shaft R and shifts the pencil P, causing a lateral mark to be

formed upon the paper G, indicating descent. If the descent be considerable, the movement of the pendulum will be considerable and also the movement of the wheel U and pencil P, so that the mark made by the pencil P will indicate the grade. If the machine is running upgrade, the pendulum will swing back from the position shown in Figs. 2 and 6 and the rear ends of the bars S T will be elevated, bringing the arm p^2 of pawl p into range with the stud o of the wheel V, which stud in the revolution of the wheel will strike the said arm of the said pawl, engage the pawl with the ratchet-wheel U, and turn said wheel back, giving a reverse motion to the screw-shaft R and pencil P, which indicates on the paper G rising ground.

In case it be found necessary to level the platform A this may be done by means of the nuts w, (see Figs. 11 and 12,) placed on the screw-threaded rods W W. The upper ends of these rods are held in cross-pieces W′, and the axle B^2 is journaled in the lower ends of these rods, and the lower ends of the vertical members of frame A^3 are slotted, as shown at w', to permit the said uprights to move vertically. Between the cross-pieces W′ W′ is placed a cog-wheel w^3, which meshes with the nuts w w, so that by turning the cog-wheel w^3 both nuts w may be turned to raise and lower the platform.

On the lower end of the vertical shaft H, in place of the plain beveled gear b, may be placed the gear Z. (Shown in Fig. 10.) This gear is formed with several beveled gear-sections $b^\times$ $b^\times$ of different diameters, so that by adjusting the gear-wheel b' to mesh in one or the other of these sections the speed of the shaft H, and through it the speed of movement of the paper G, may be varied, increased or diminished, as required.

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

1. In a planograph, the combination, with the platform or frame having front and rear wheels geared together and tracking in unison and a steering-shaft forming part of said gearing, of the feed-wheels for the paper continuously rotated from the main axle and the pencil or marker supported in the path of the paper, substantially as set forth.

2. The standards A′ A′ and frame A^3, having wheels B B′ journaled therein, in combination with the platform A, pulleys A^2 A^4, endless chain D, worm-wheel E′, attached to the frame A^3, and the steering-shaft E, having worm e to engage with the worm-wheel E′, substantially as deseribed.

3. The combination, with the steering-shaft E and the standards for the wheels, the pulleys A^2 A^4, endless chain D, gear E′, and worm e, of the worm-gear L, shafts H′ J′, feed-wheels G′ G^2, and the gearing and shafts for revolving the said feed-wheels from the main axle B^2, substantially as described.

4. The combination, with the platform or frame having front and rear wheels and a steering-shaft geared to the said wheels and tracking them in unison, of the paper-feed wheels rotated from the main axle and having horizontally-turning bearings geared together and to said steering-shaft to track the feed-wheels in unison with platform-supporting wheels, substantially as set forth.

5. The combination, with the wheeled platform or frame and the paper-table, of feed-wheels driven from the main axle and projecting at their upper sides flush with the upper surface of the table, a pencil and a presser-foot or rod over the respective feed-wheels, and a spring pressing the pencil and presser-foot down to hold the paper to the feed-wheels, substantially as set forth.

6. The combination, with the wheeled platform or frame, the longitudinally-aligned feed-wheels rotated from the main shaft, and the vertical spring-pressed pencil and presser-foot or rod to hold the paper down upon the respective feed-wheels, of a transverse screw-shaft supported adjacent to the pencil and a nut traveling on said screw-shaft and also carrying a pencil and a pendulum mechanism and gearing for traversing said nut, substantially as set forth.

7. The combination, with the wheeled frame, the paper-feeding mechanism, and stationary pencil, of the transverse screw-shaft having a pencil-carrying nut, a shaft provided with a ratchet-wheel and geared to the screw-shaft, a horizontal bar T, pivoted between its ends on the ratchet-wheel shaft, pawls pivoted to the said bar at opposite sides of the ratchet-wheel and provided with oppositely-extending arms p^2 p^3, a spring throwing the pawls out of engagement with the ratchet-wheel, wheels V V′ above said pawls and having projections o o' to engage the respective arms p^2 p^3 when the bar T is rocked, a lower bar S, pivoted between its ends, links S^2, pivotally connecting the ends of the bars S T, a pendulum S^3 for rocking the bar S, and gearing connecting the wheels V V′ with the main axle, substantially as set forth.

JUSTO SOLER.

Witnesses:
H. A. WEST,
EDGAR TATE.