

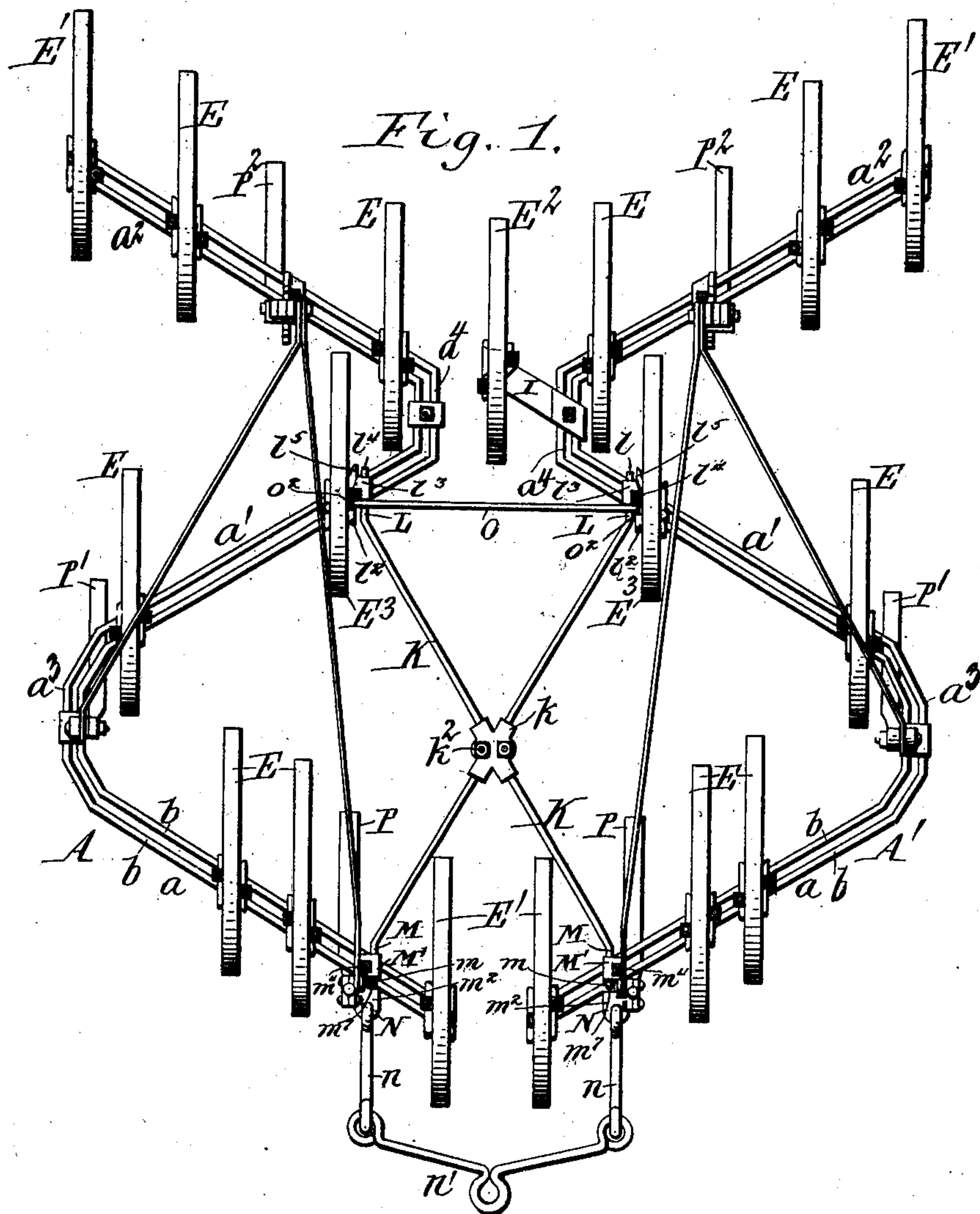
No. 829,445.

PATENTED AUG. 28, 1906.

O. TOWER.  
HARROW.

APPLICATION FILED OCT. 8, 1906.

3 SHEETS—SHEET 1.



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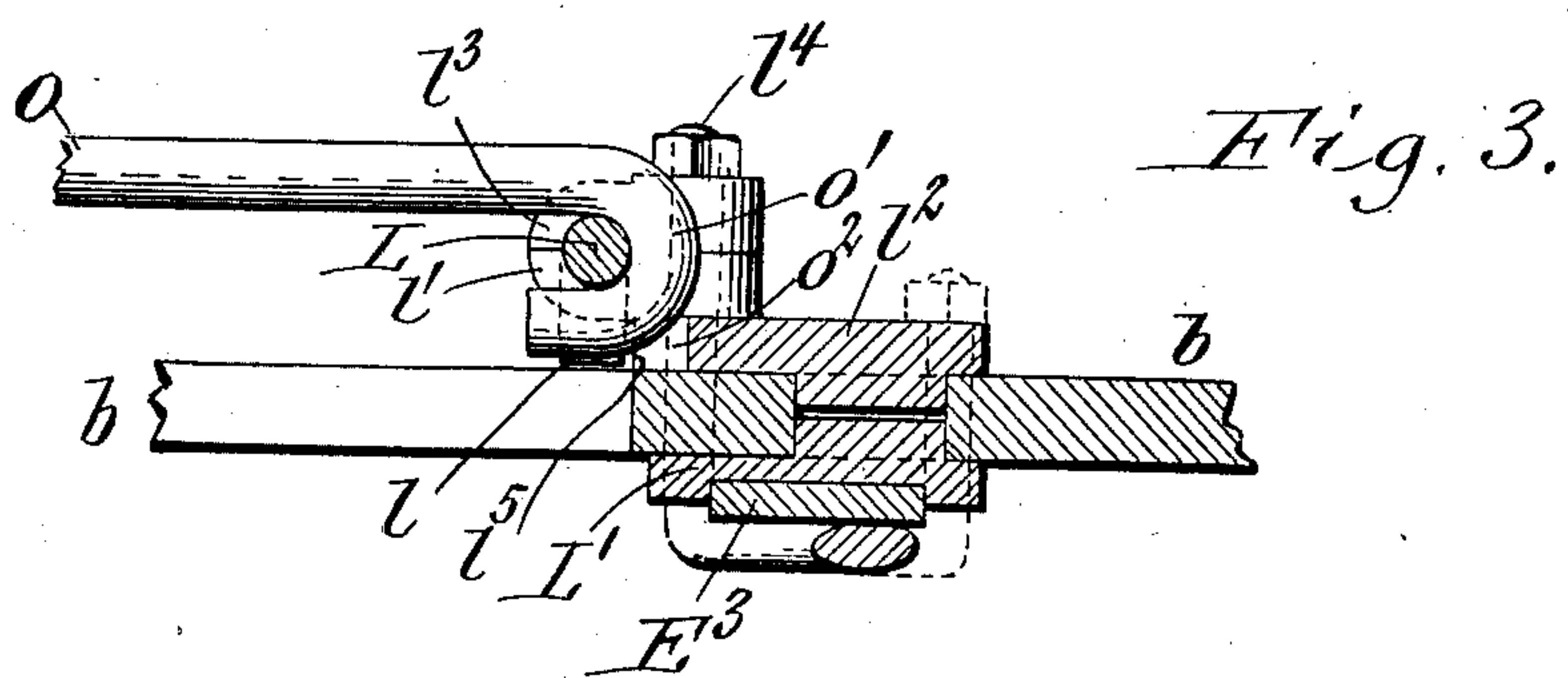
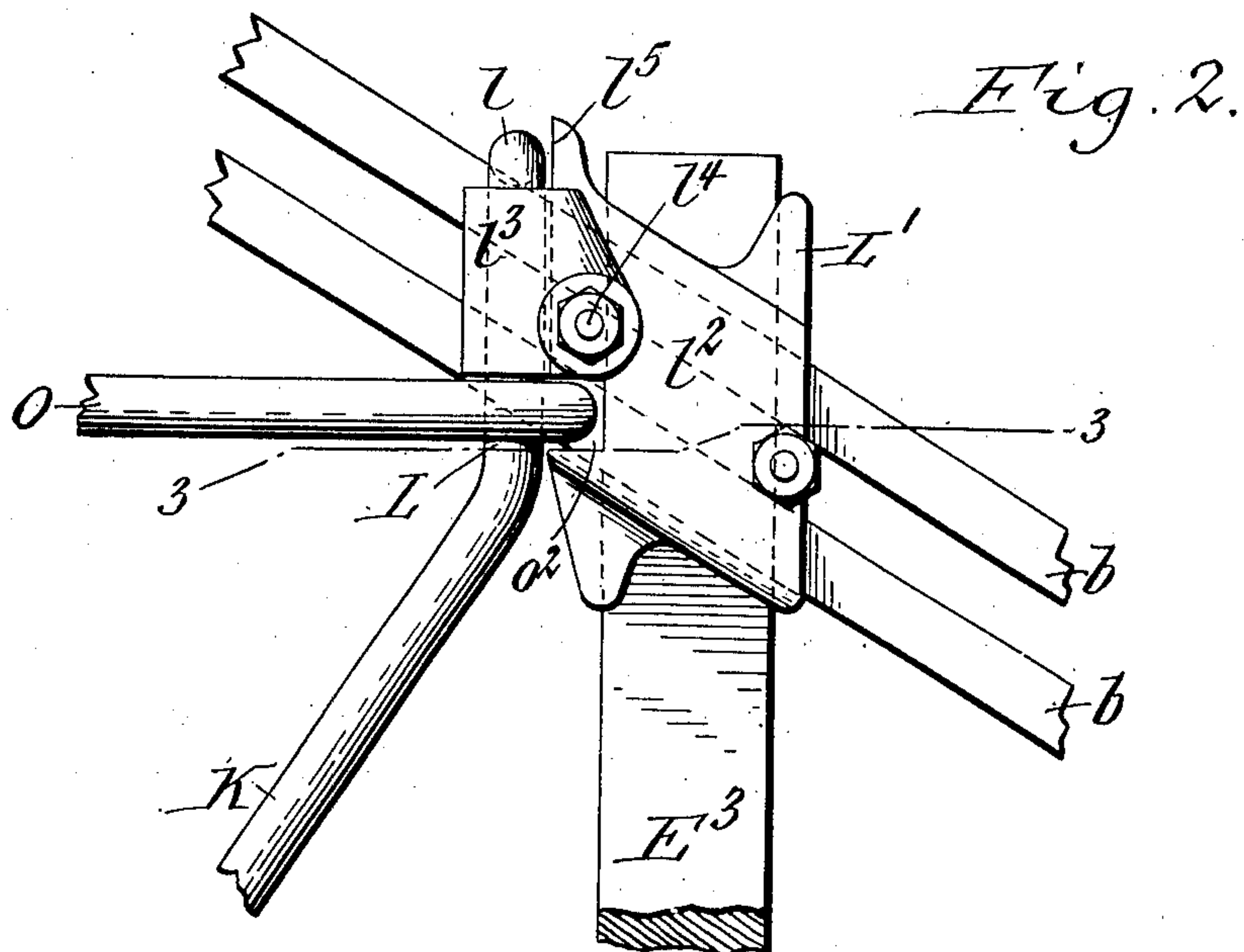
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 4.

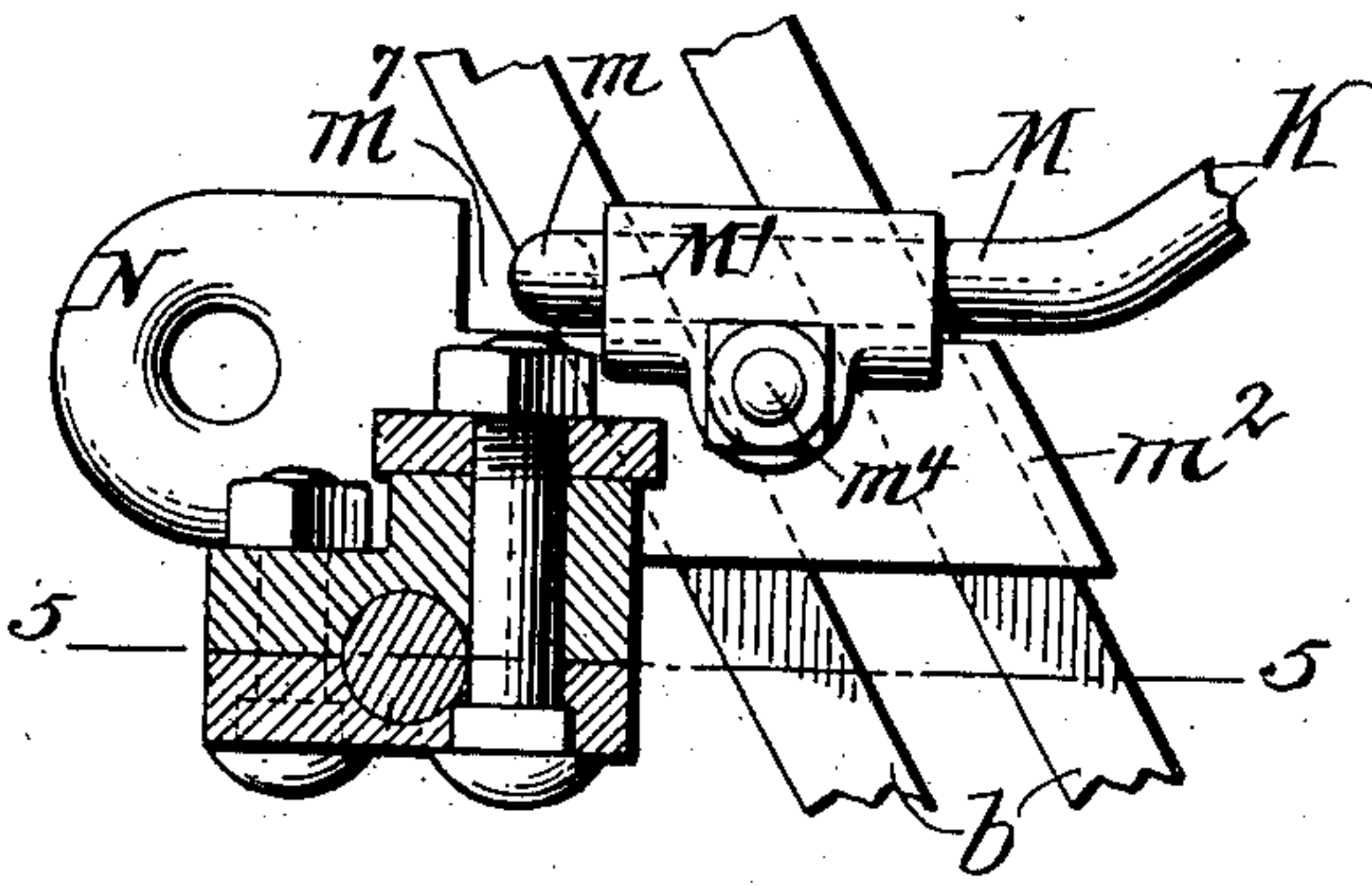


Fig. 7.

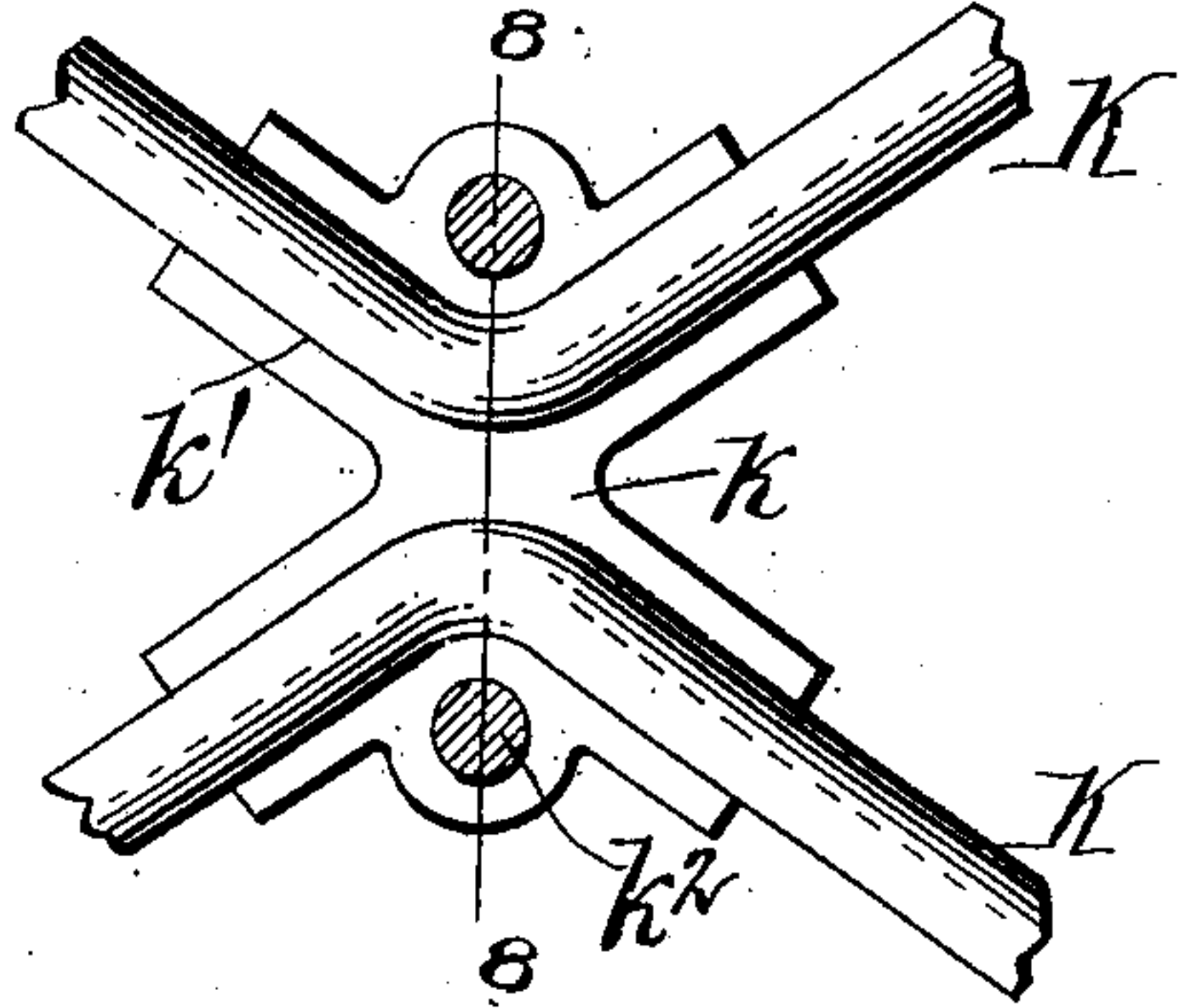


Fig. 8.

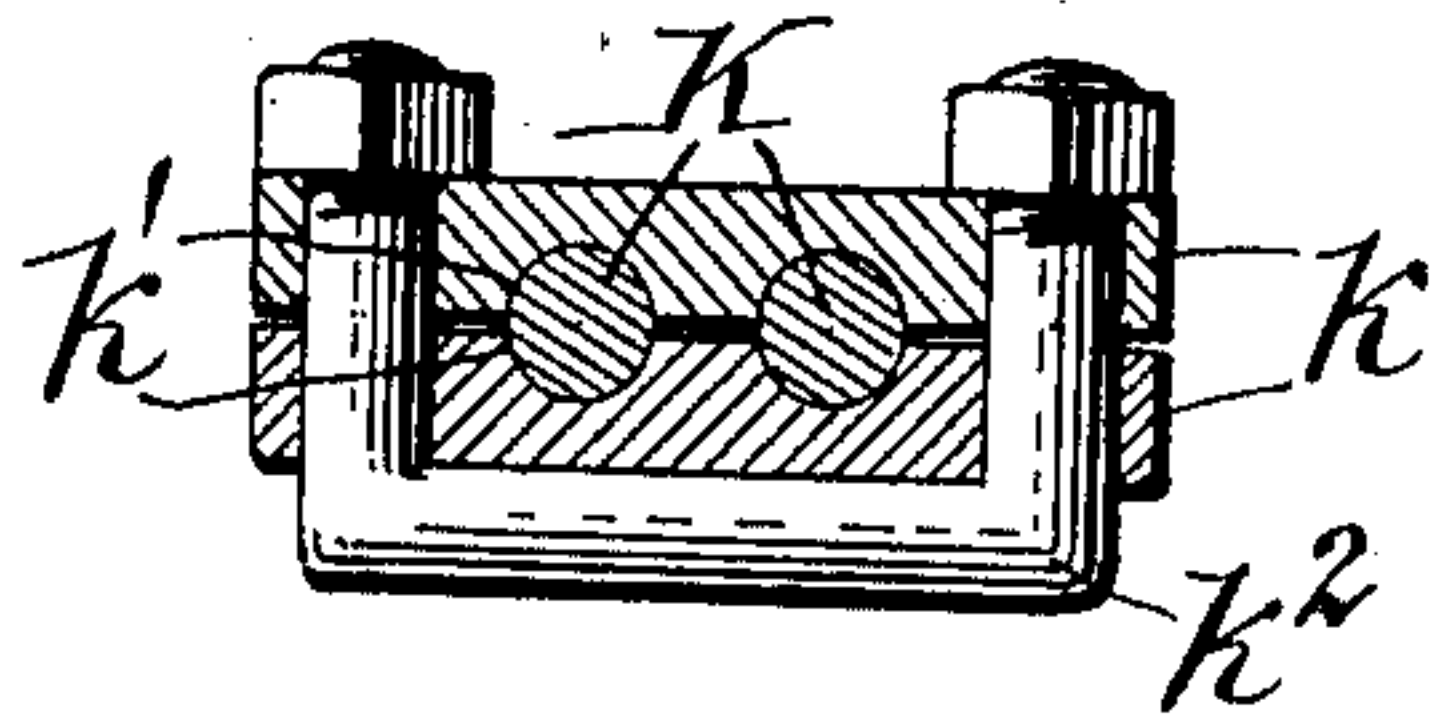


Fig. 5.

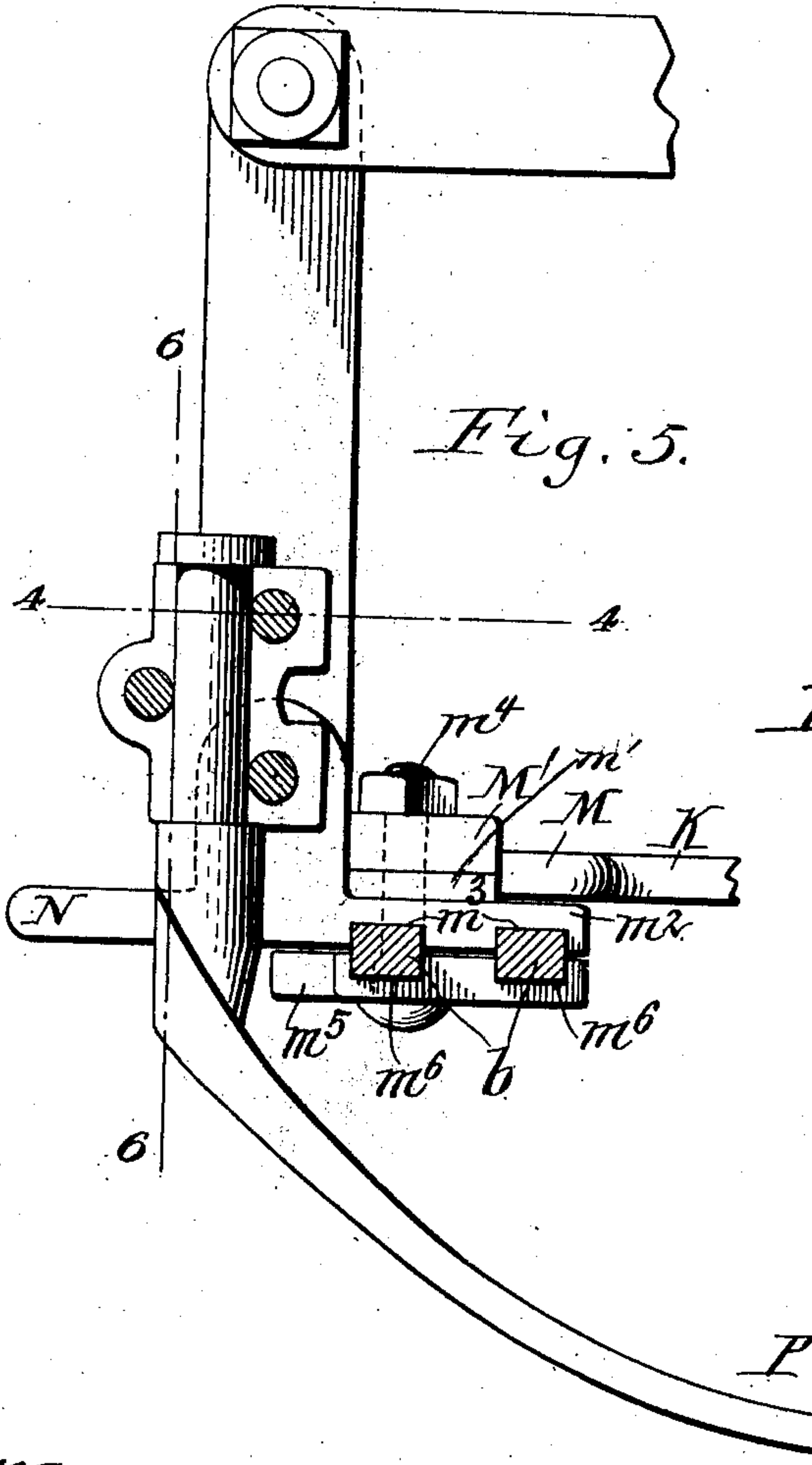
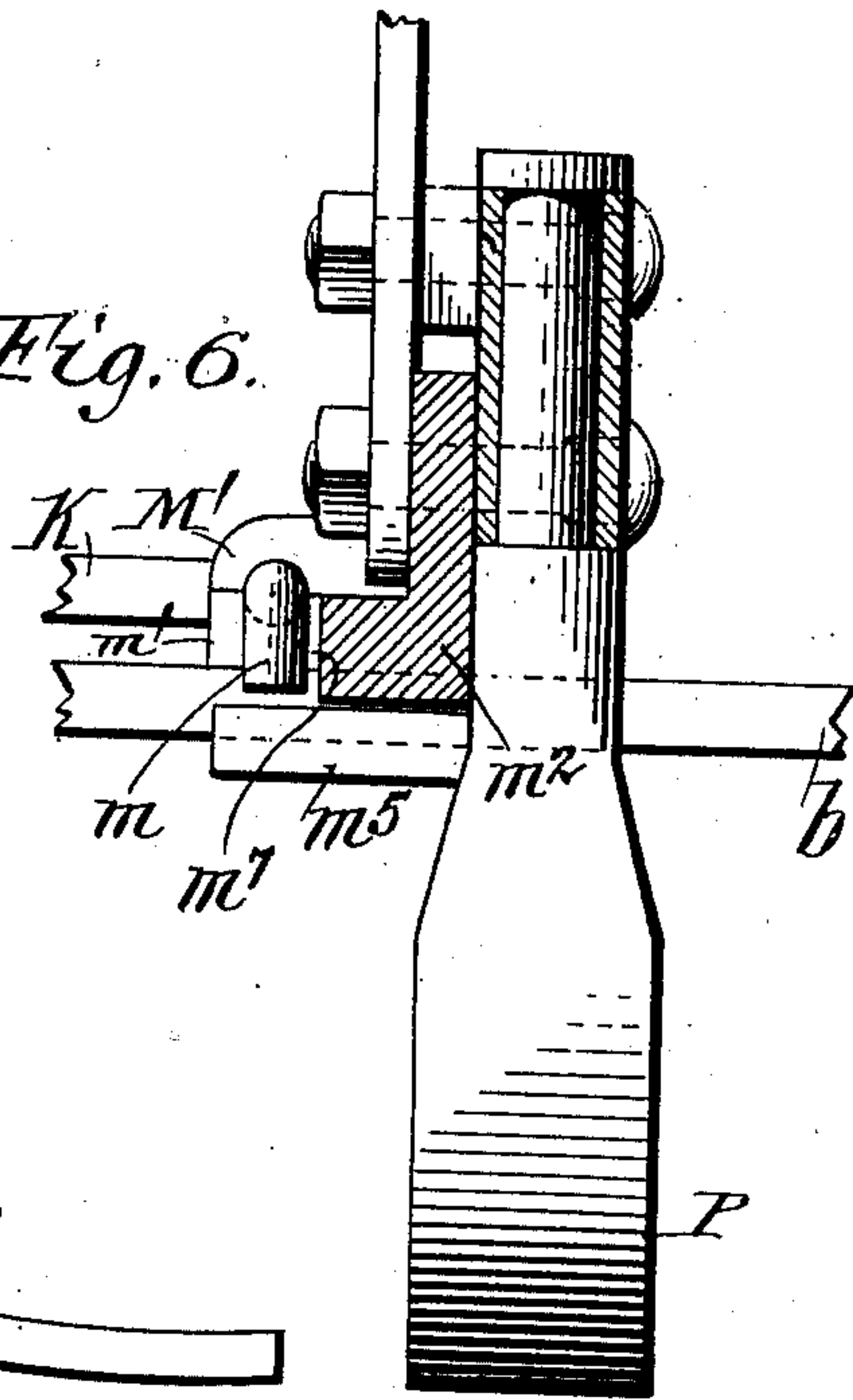


Fig. 6.



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# UNITED STATES PATENT OFFICE.

OSCAR TOWER, OF BUFFALO, NEW YORK.

HARROW.

No. 829,445.

Specification of Letters Patent.

Patented Aug. 28, 1906.

Application filed October 6, 1905. Serial No. 281,607.

*To all whom it may concern:*

Be it known that I, OSCAR TOWER, 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 Harrows, of which the following is a specification.

This invention relates to harrows.

The object of this invention is to improve the means whereby the sections of the frame are connected so as to permit the sections to move freely independent of each other in adapting themselves to the irregularities of the ground and also to permit the sections to be readily folded compactly for transportation or storage.

In the accompanying drawings, consisting of three sheets, Figure 1 is a top plan view of a spring-tooth harrow embodying my improvements. Fig. 2 is a fragmentary top plan view, on an enlarged scale, showing combined means for attaching a spring-tooth, a coupling-bar, and a brace to one section of the frame. Fig. 3 is a vertical section in line 3 3, Fig. 2. Fig. 4 is a fragmentary horizontal section taken in line 4 4, Fig. 5, and showing the means for connecting the front part of one of the frame-sections with one of the front shoes, the adjacent part of the coupling device, and the draft device. Fig. 5 is a vertical longitudinal section of the same, taken in line 5 5, Fig. 4. Fig. 6 is a vertical transverse section taken in line 6 6, Fig. 5. Fig. 7 is a fragmentary horizontal section showing the means for connecting the coupling-rods. Fig. 8 is a vertical cross-section thereof in line 8 8, Fig. 7.

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

The main frame of the harrow consists of two sections A A', each of which has substantially the shape of the letter S, and comprises an oblique front part  $a$ , which extends from its front end outwardly and rearwardly relatively to the longitudinal center of the harrow, an intermediate part  $a'$ , extending from its front end inwardly and rearwardly, a rear part  $a^2$ , extending from its front end outwardly and rearwardly, an outer turn part  $a^3$ , which connects the outer ends of the front and intermediate parts, and an inner turn part  $a^4$ , which connects the inner ends of the intermediate and rear parts. These sections are arranged side by side and have their front ends projecting inwardly, while their rear ends project outwardly, so that the frame as a whole has an

outwardly-bulging front portion and a fan-tail rear portion, the same as that shown in Patent No. 787,011, granted to myself April 11, 1905. Each of these frame-sections is composed of two S-shaped rods or bars  $b b$ , which are parallel, or substantially so, from one end of the section to the other. These rods or bars are preferably square in cross-section and arranged with two of their flat sides in a horizontal position; but the cross-section of these bars and the arrangement thereof may be varied. At different points throughout the length of each frame-section these bars are connected by clamping devices, nearly all of which are constructed so that they perform the additional function of supporting spring-teeth E, an adjusting-shoe, or other part to be mounted on the frame. The fixtures which connect the frame-bars at the ends thereof also support teeth E', as shown in Fig. 1. The central tooth E<sup>2</sup> of the harrow is preferably attached to the inner turn  $a^4$  of the section A' of the frame by an oblique bracket I.

K K represent two V-shaped coupling rods or bars which comprise part of the means for flexibly connecting the two sections of the harrow-frame. These coupling-bars have their central parts connected and their ends diverging forwardly and rearwardly, so as to give the same substantially the form of the letter X. The preferred means of connecting the central parts of the coupling-rods consists of two clamping-plates  $k k$ , each of which is provided on its inner side with a pair of V-shaped recesses or grooves  $k'$ , which receive the angular central parts of the two coupling-rods on one side thereof. The two clamping-plates are clamped against opposite sides of the rods by means of a clip  $k^2$ , arranged outside of the rods, or by any other suitable means. The coupling-rods are preferably constructed of round iron, whereby these rods while forming a substantial connection between the sections of the harrow-frame possess enough elasticity to permit the required amount of independent movement relative to each other when subjected to torsional strains. At its rear end each of the coupling-rods is pivotally connected with a harrow-frame section, so as to permit the same to turn in a vertical plane for adapting it to any irregularities of the ground independent of the other section and also permit the sections to be folded over each other transversely for compactness in shipping or



transportation. These pivotal connections are preferably combined with the holders of the teeth  $E^3$  on the intermediate frame parts  $a'$  near the inner turns  $a^4$ , the same being best shown in Figs. 1, 2, and 3 and constructed as follows:

$L$  represents a longitudinal wrist, formed on the rear end of each coupling-bar and having a depending arm or lug  $l$  at its rear end. This wrist is journaled in a divided box or bearing, the lower part  $l'$  of which is formed on the top clamping-plate  $l^2$  of the adjacent tooth-holder, while the upper part  $l^3$  is held in place relatively to the lower part by means of one arm of the clip  $l^4$ , which fastens said top plate and the companion lower plate  $L'$  against opposite sides of the frame-bars and the corresponding tooth against the seat on the under side of the lower plate  $L'$ . Adjacent to the outer side of the lug or arm  $l$  the top plate  $l^2$  is provided with a stop  $l^5$ , which is adapted to cooperate with said arm and limit the downward movement of the respective section relatively to the coupling-rods and the other frame-section.

The pivotal connections between the front ends of the coupling-rods and the front parts of the frame-sections are shown in Figs. 1, 4, 5, and 6 and are each constructed as follows:  $M$  represents a longitudinal wrist formed on the front of each coupling-rod and provided on its front end with a depending lug or arm  $m$ . This wrist is journaled in a divided box or bearing, the lower part  $m'$  of which is formed on an upper or top clamping-plate  $m^2$ , which is grooved on its under side, as shown at  $m^3$ , and fitted over the adjacent frame-bars, while its upper part  $M'$  is secured to the lower part  $m'$  by a bolt  $m^4$ , passing through the upper part, the top clamping-plate  $m^2$ , and the lower clamping-plate  $m^5$ , having grooves  $m^6$  in its upper side, which are held in engagement with the under side of the frame-bars. In front of the bearing  $m' M'$  the top plate  $m^2$  is provided with a laterally-opening recess  $m^7$ , into which the arm  $m$  projects. The front and rear sides of this recess limit the longitudinal movement of the wrist in its bearing by engagement of the arm  $m$  with its sides, while the bottom or back of this recess serves as a stop which cooperates with said arm for limiting the vertical rocking movement of the frame-section relatively to the coupling-rods. The front ends of the top plates  $m^2$  terminate in eyes  $N$ , which are connected by links  $n$  with a cross-piece  $n'$  of the rigging, whereby the harrow is attached to the draft-animals.

For the purpose of aiding the coupling-bars in keeping the frame-sections the proper distance apart a brace-bar, tie-rod, or stay  $O$  is provided which is pivotally connected at opposite ends with the central parts of the frame-sections. The pivotal connection between the brace and the frame-sections is

preferably effected by forming hooks  $o'$  at the ends of the brace and engaging the same with the wrists  $L L$  of the coupling-rods in front of the rear bearings  $l' l^3$ , as shown in Figs. 1, 2, and 3. Adjacent to the backs of the hooks  $o'$  the top plates  $l^2$  are provided with recesses  $o^2$ , into which these hooks project. Each of these recesses is so constructed that the sides thereof confine the respective hook against longitudinal movement on the wrist, while the back thereof serves as a stop to limit the lateral movement of the hook and wrist, thereby preventing these parts from becoming detached.

For the purpose of varying the depth which the teeth are permitted to enter the ground each of the frame-sections is supported at its front, rear, and intermediate portions by shoes  $P P' P^2$ , which are adjustably connected with the frame for producing this effect.

I claim as my invention—

1. A harrow comprising two frame-sections, and a flexible connection between said sections consisting of two V-shaped rods which are connected at their central parts and have their ends diverging and connected with the frame-sections, substantially as set forth.

2. A harrow comprising two frame-sections, and a flexible connection between said sections consisting of two V-shaped rods which have their central parts opposing each other while their ends diverge and are connected with said frame-sections, and clamping-plates secured to opposite sides of the central parts of said rods, substantially as set forth.

3. A harrow comprising two frame-sections, and a flexible connection between said sections consisting of two V-shaped rods having their central parts opposing each other while their corresponding ends diverge and are connected with said frame-sections, cooperating clamping-plates provided in their opposing sides with V-shaped grooves which receive the central parts of said rods, and bolts connecting said plates, substantially as set forth.

4. A harrow comprising two frame-sections, a flexible connection between said sections comprising coupling-rods having wrists, and bearings on said frame-sections in which said wrists are journaled, substantially as set forth.

5. A harrow comprising two frame-sections, a flexible connection between said sections comprising coupling-rods having wrists, bearings on said frame-sections in which said wrists are journaled and means for limiting the turning movement of said rods and frame-sections relatively to each other, substantially as set forth.

6. A harrow comprising two frame-sections, a flexible connection between said sec



tions comprising coupling-rods having wrists, bearings on said frame-sections in which said wrists are journaled and means for limiting the turning movement of said rods and frame-sections relatively to each other comprising arms arranged on said wrists and stops arranged on said frames and adapted to engage with said arms, substantially as set forth.

7. A harrow comprising two frame-sections, a flexible connection between said sections comprising coupling-rods having wrists, bearings on said frame-sections in which said wrists are journaled, stop-arms arranged on said wrists, and supporting-plates for said bearings mounted on said frame-sections and provided with stops with which said arms engage, substantially as set forth.

8. A harrow comprising two frame-sections, a flexible connection between said frames, and a transverse brace between said sections, substantially as set forth.

9. A harrow comprising two frame-sections,

a flexible connection between said sections comprising coupling-rods having wrists, bearings on said frame-sections in which said wrists are journaled and a transverse brace having hooks at its ends which engage with the wrists of said rods, substantially as set forth.

10. A harrow comprising two frame-sections, coupling-rods having wrists, bearings in which said wrists are journaled, supporting-plates for said bearings mounted on said frame-sections and provided with recesses adjacent to said bearings, and a transverse brace having hooks at its ends which are arranged in said recesses and engage with said wrists, substantially as set forth.

Witness my hand this 28th day of September, 1905.

OSCAR TOWER.

Witnesses:

THEO. L. POPP,  
MAY E. McARTHUR.