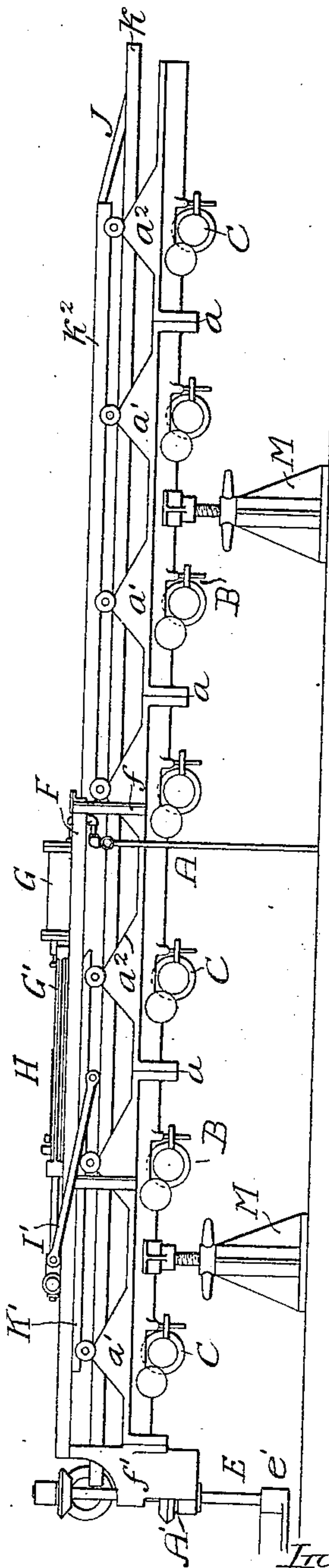


J. S. WORTH.
TUBE TROUGH FOR TUBE MILLS.
APPLICATION FILED MAY 5, 1906.

5 SHEETS—SHEET 1.

Fig. 1.

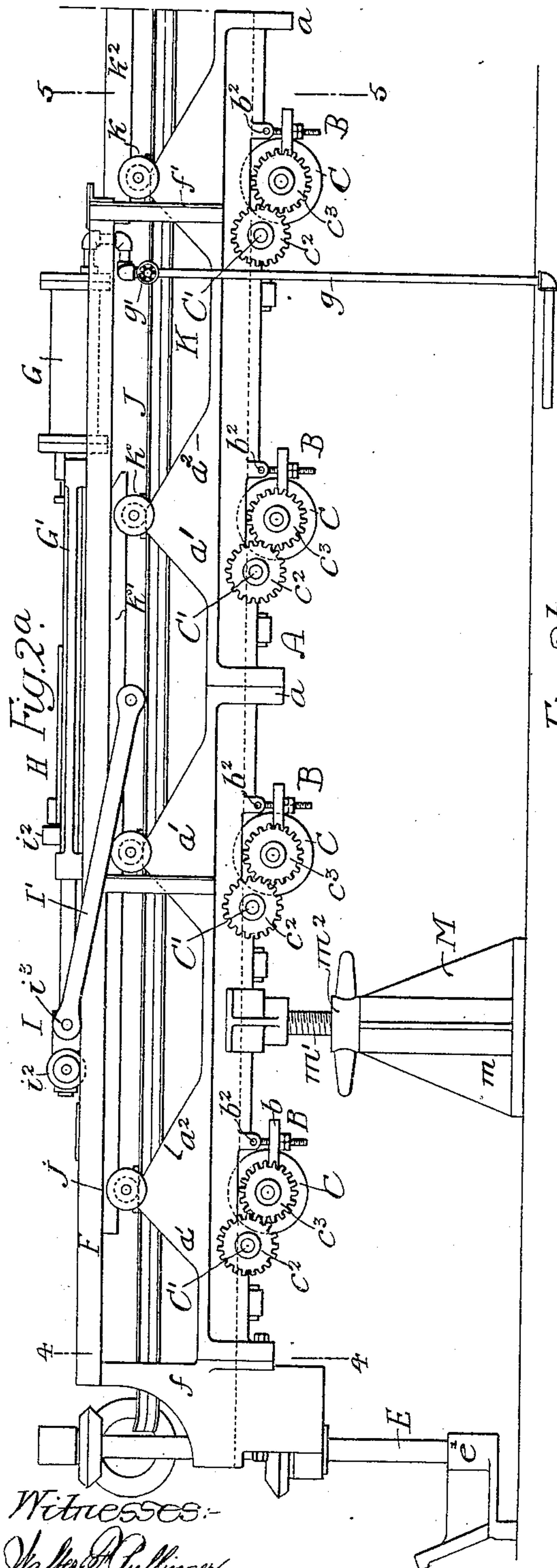


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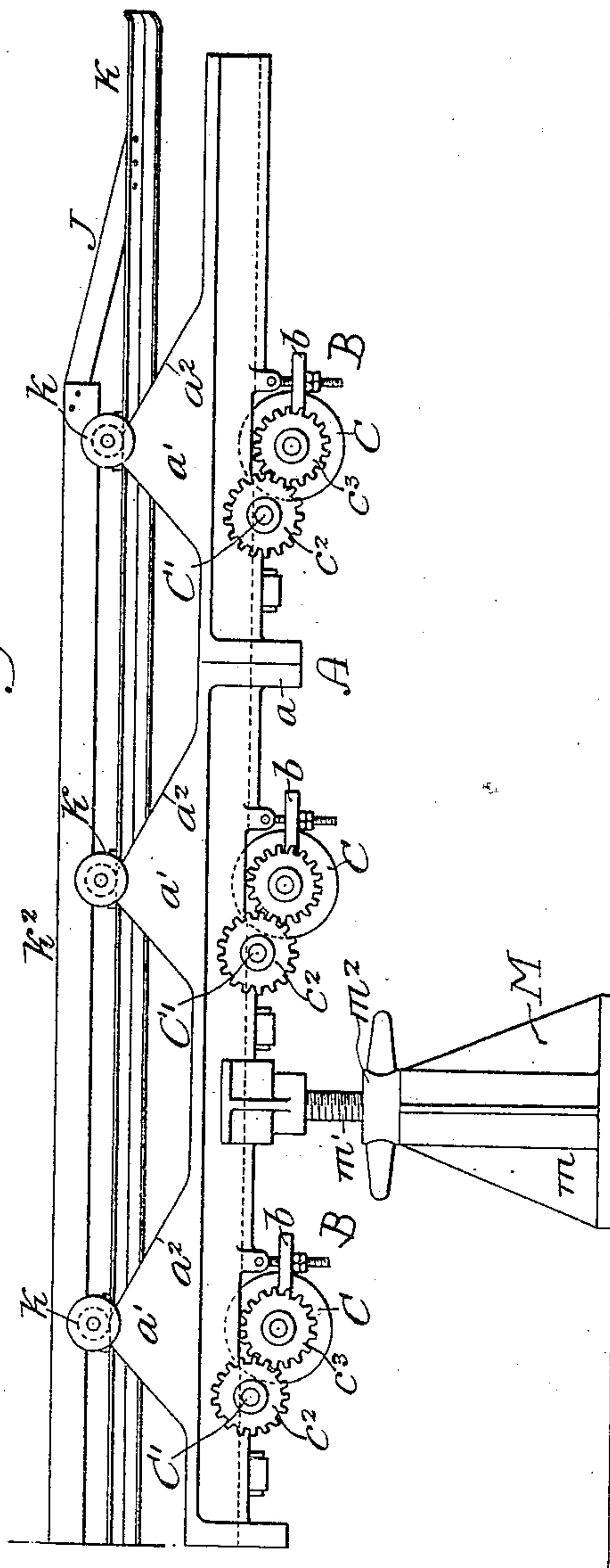
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Patented Aug. 17, 1909.
5 SHEETS—SHEET 2.



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Fig. 2b.



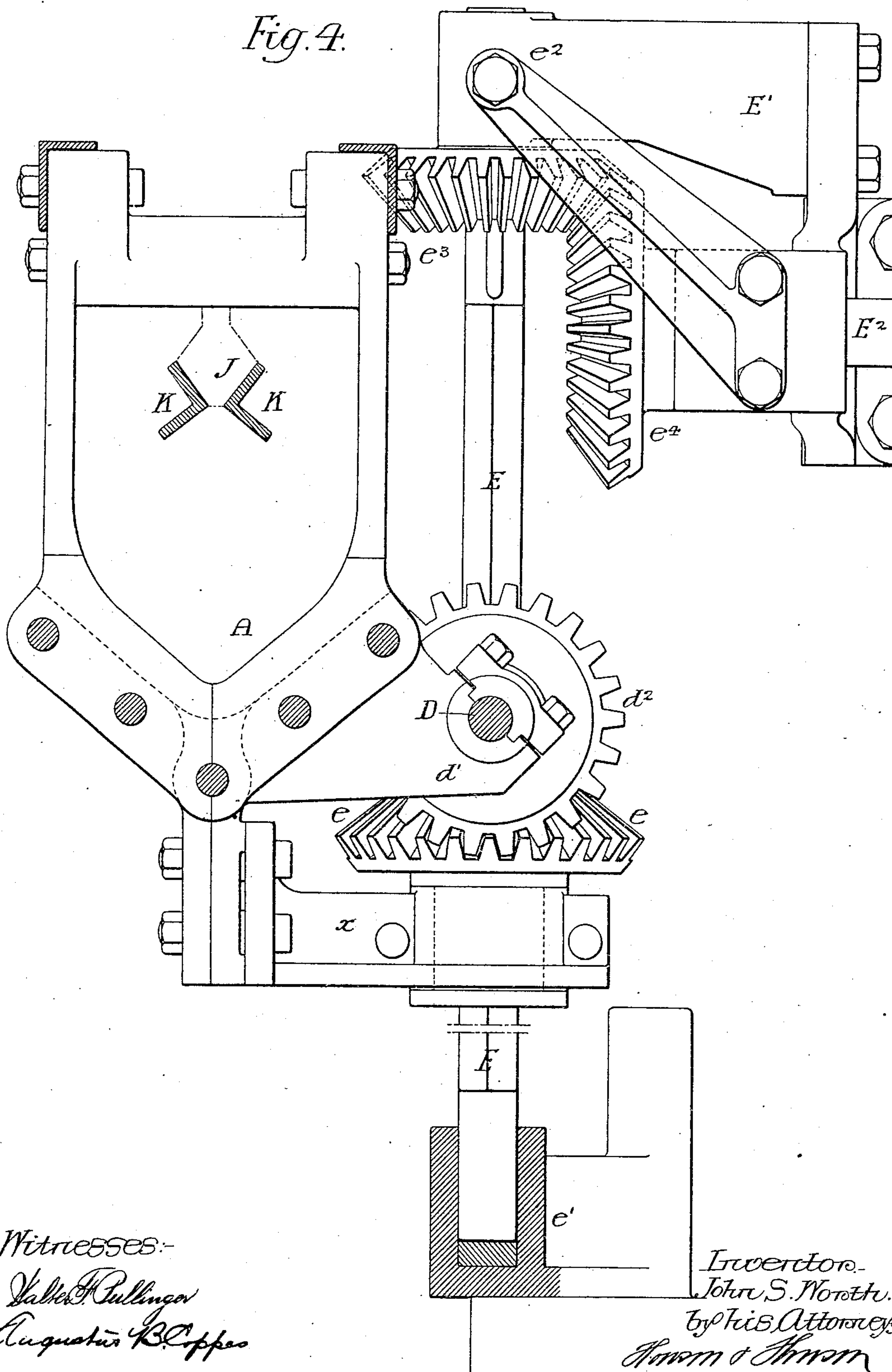
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Fig. 4.



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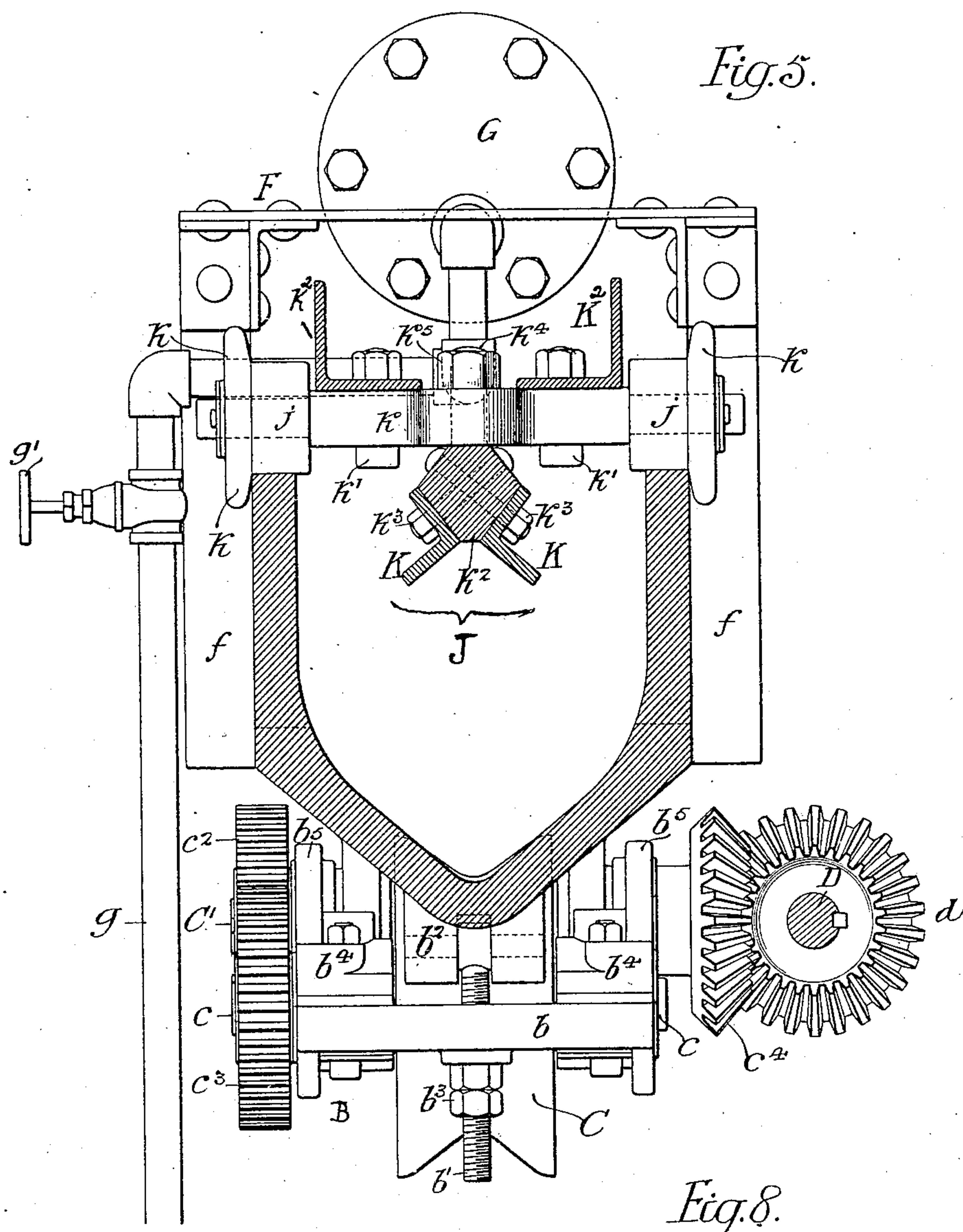
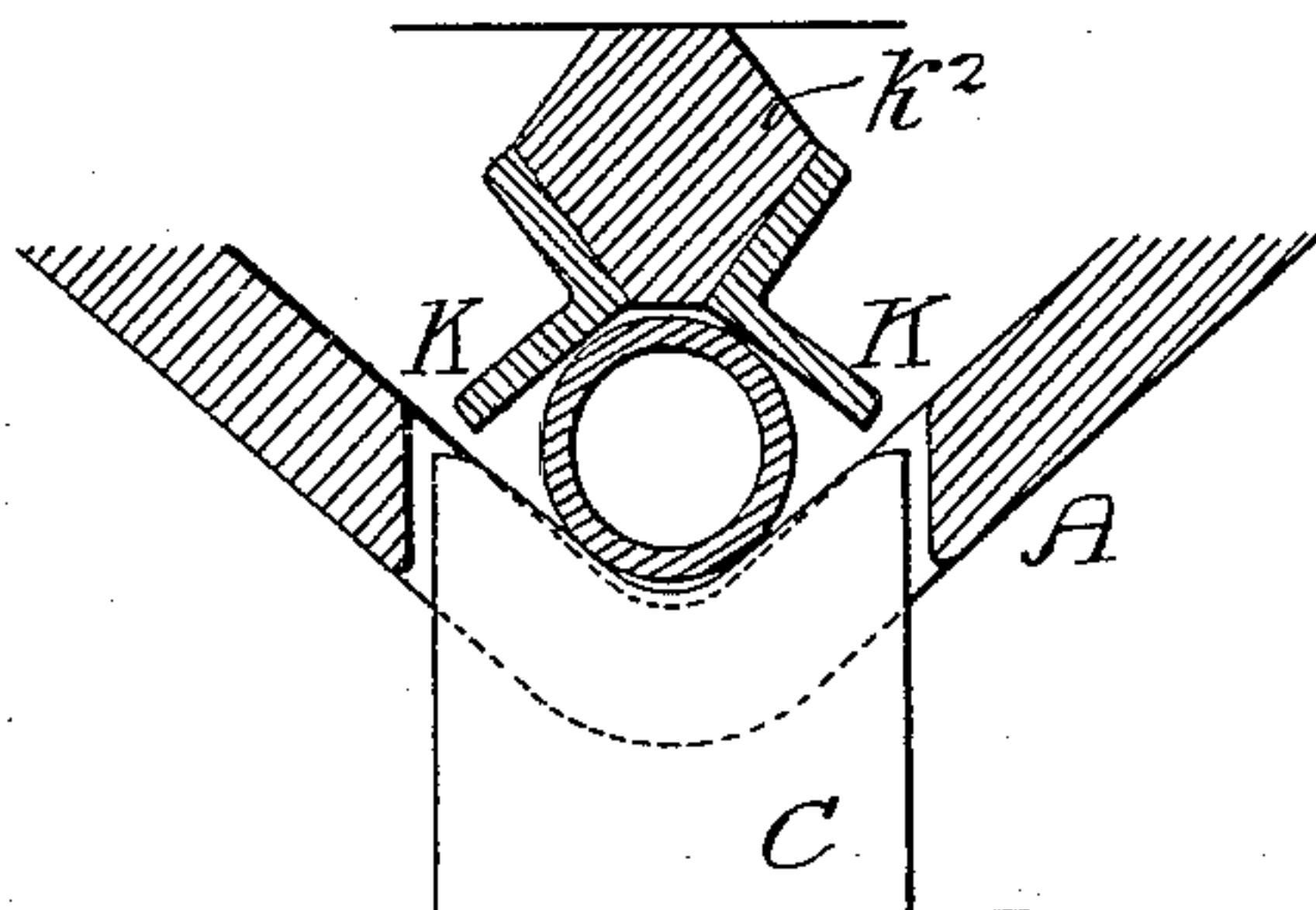


Fig. 8.



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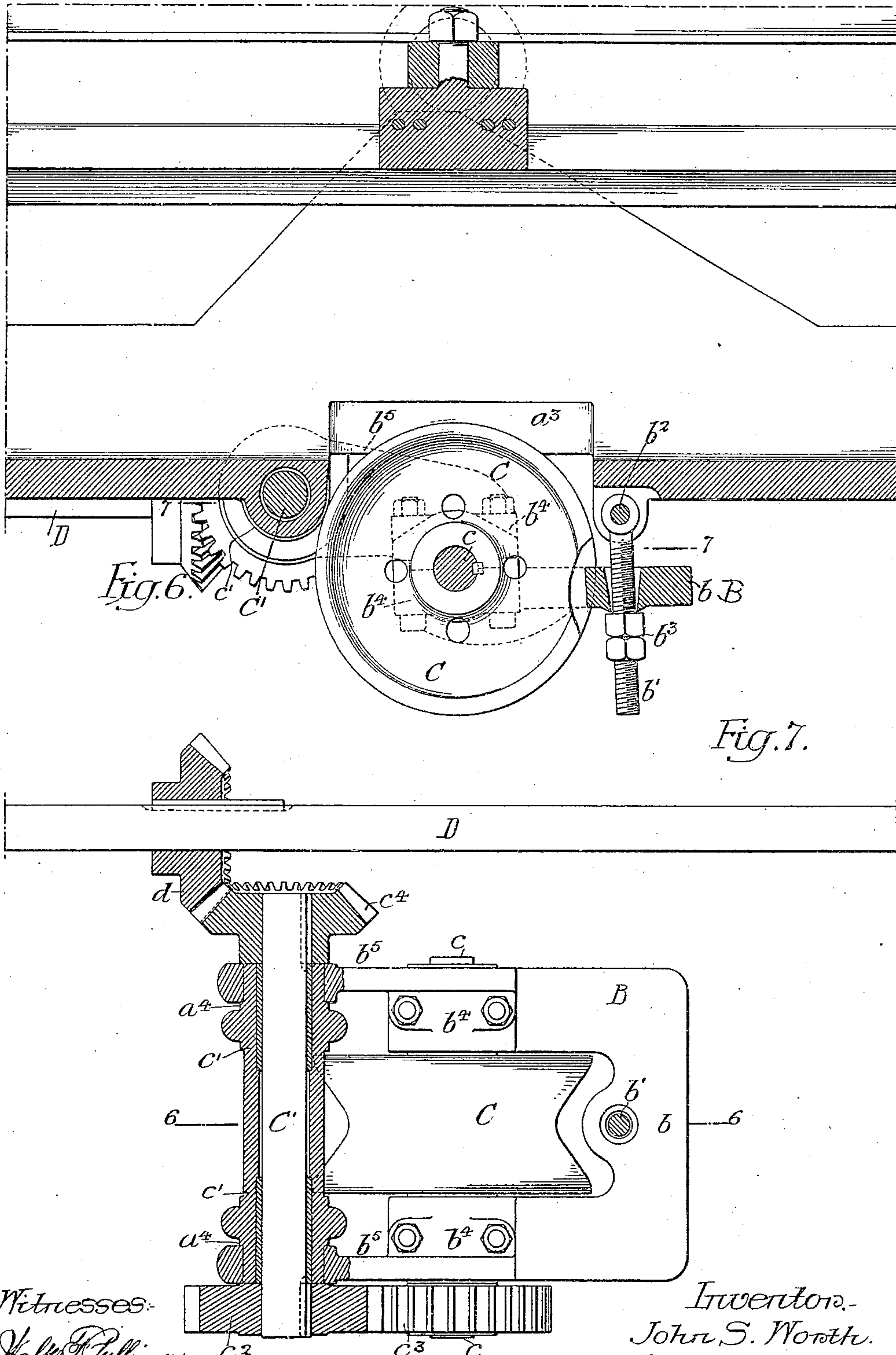
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Patented Aug. 17, 1909.

5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

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TUBE-TROUGH FOR TUBE-MILLS.

No. 931,544.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed May 5, 1906. Serial No. 315,320.

To all whom it may concern:

Be it known that I, JOHN S. WORTH, a citizen of the United States, residing at Coatesville, Pennsylvania, have invented certain Improvements in Tube-Troughs for Tube-Mills, of which the following is a specification.

My invention relates to certain improvements in troughs for conveying tubes, during the process of manufacture, from one machine to another of a tube mill.

One object of my invention is to provide means for driving the tube through the trough.

A further object of the invention is to provide an adjustable guard extending over the trough so as to retain the tubes in the trough should they twist or buckle either in passing from one roll or passing into the other.

In the accompanying drawings:—Figure 1, is a side view of my improved tube trough; Fig. 2^a and Fig. 2^b are enlarged side views similar to Fig. 1, but more clearly illustrating my invention; Fig. 3, is a plan view of Fig. 2^a; Fig. 4, is a transverse sectional view on the line 4—4, Fig. 2^a; Fig. 5, is a transverse sectional view on the line 5—5, Fig. 2^a; Fig. 6, is a longitudinal sectional view on the line 6—6, Fig. 7; Fig. 7, is a sectional plan view on the line 7—7, Fig. 6; and Fig. 8, is a sectional view of the trough showing the guard lowered in position to guide a tube.

My present invention is particularly designed to convey a partly finished tube from the sizing rolls of a tube mill to the straightening rolls, and I have found that it is desirable to provide means for propelling the tube while in the trough, so that it will properly enter the straightening rolls, and the guard which rests above the trough, retains the tube in the trough. This guard is vertically adjustable so as to accommodate different sized tubes, at the same time it can be quickly raised in the case of an accident so that an imperfect tube, for instance, can be quickly removed from the trough before it enters the straightening rolls; and while my improved trough is especially designed for the purpose indicated above it will be understood that it can be used at any point in the mill where it is desirable to convey a tube, or can be used in mills manufacturing rods or

other shapes without departing from my invention.

A is the trough, made of a series of sections bolted together at *a* and of any length desired.

A' is an end section which is shaped to fit closely to the roll structure through which the tube must pass into the trough.

The trough is V-shaped, as shown in Figs. 4 and 5, and projecting vertically from each edge of the trough is a series of cams *a'* having inclined surfaces *a''* on which are supported the bearings for the adjustable guard which is situated directly over the trough.

There is a series of openings *a'''* in the bottom of the trough as clearly shown in Fig. 6, and mounted in the hangers B is a spindle *c* of a roller C, this roller extends through the opening *a'''* in the bottom of the trough and it can be adjusted so that the roller will bear upon the tube and propel it through the trough. There is a series of these rollers placed a given distance apart and they are raised just sufficiently above the trough to prevent bending of the tube and to reduce the friction on the trough itself. The rollers are each vertically adjustable so as to take up for any wear and in the present instance they are hung from a portion *a''''* of the fixed bearing formed integral with a section of the trough in the present instance, and this bearing is perforated for the passage of a shaft C'. Bushings *c'* are provided in which the shaft is mounted. On one end of the shaft is a gear wheel *c''* which meshes with a gear wheel *c'''* on the shaft *c* carrying the wheel C, and on the other end of the shaft is a bevel wheel *c''''* which meshes with a bevel wheel *d* keyed to a longitudinal shaft D extending along one side of the trough. Any means may be provided for driving this shaft D, although I have shown in Fig. 4 special means which will be described hereafter.

The hanger B has an extension *b* through which passes a screw threaded bolt *b'* which is hung at *b''* to the trough and has nuts *b'''* on turning which the hanger may be raised or lowered. In the present instance the hanger is made in two parts, the portion *b* forms the lower part of the boxes *b''''* for the shaft *c* while the arms *b''''''* swing on the projecting portions *a''''* of the fixed bearing.

The longitudinal shaft D is mounted in

bearings d' projecting at intervals from the trough and secured to one end of said shaft is a bevel wheel d^2 which meshes with a bevel wheel e on a square or splined vertical shaft E, Fig. 4. This bevel wheel is supported by a bracket x on the trough so that the wheel will be raised and lowered with the trough, and this shaft is mounted in a step bearing e' at the lower end and in a bearing e^2 carried by a bracket E' secured to any fixed portion of the mechanism. The shaft E has at its upper end a bevel wheel e^3 which meshes with a bevel wheel e^4 on the horizontal shaft E^2 driven by the driving mechanism of the sizing rolls or the straightening rolls, as desired. It will be understood, however, that this mechanism may be changed without departing from my invention, as an independent means may be used for driving the shaft D if desired.

F is a frame mounted on standards f, f' projecting from the sides of the trough A and mounted on this frame in the present instance is a cylinder G. In front of the cylinder are guides G' for the slide H and carried by the slide is a piston rod h having a piston h' mounted in the cylinder G.

I is a carriage arranged to travel on the bar F and secured to the carriage is a rod i having a screw threaded portion i' which passes through a nut i^2 mounted in the slide H, so that in turning this nut the distance between the slide H and the carriage I may be increased or decreased as desired. The carriage I in the present instance has flanged wheels i^2 which rest on the frame F, and also has projecting portions i^3 .

The guard in the present instance is made up of a frame J consisting of two longitudinal angle bars K extending the full length of the trough and preferably turned up at each end, and angle bars made in two sets K', K^2 , as clearly shown in Figs. 2^a and 2^b. The angle bars K', K^2 are secured at intervals to axles l and are arranged as shown in Fig. 5, being secured to the axles by bolts l' .

The angle bars K, K are secured to blocks l^2 by bolts l^3 and each block has a stem l^4 which extends through an axle l and is secured thereto by a nut l^5 .

It will be noticed that the guard proper formed by the bars K, K is in the form of an inverted V, so that when the guard is lowered as in Fig. 8, it forms, with the trough, a way for the tube so that the tube cannot be deflected out of its course. On the trunnions of the axles l are flanged wheels j which travel on the inclined ways a^2 of the projections a' of the trough. The position of these rollers on the inclined ways is regulated by the nut i^2 of the slide H, by turning the nut the carriage I is moved toward or from the said slide and the position of the wheels j on the inclined trough

a^2 defines or fixes the position of the guard J in respect to the trough. The parts are so arranged, however that when it is desired to quickly elevate the guard in the case of an accident, or it is desired to remove a tube, the hydraulic or steam valve g' in the supply pipe g can be turned so as to force the plunger forward and this forward movement will cause the rollers to travel up the incline and thus raise the guard sufficiently so that access can be had to the trough. In Figs. 2^a and 2^b the parts are shown with the guard raised to its full height. The details of construction of the guard may be modified without departing from my invention. In the present instance the trough is mounted on a standard M consisting of a base m and a screw threaded portion m' , and mounted on the screw threaded portion is a nut m^2 so that on turning the nut the trough can be vertically adjusted. Any other support may be used without departing from my invention.

The operation of the mechanism is as follows: If a given size of tube is to be made the nut i^2 is adjusted so as to bring the guard to such a position in the trough that the tube will pass freely through the trough without touching the guard, the hangers B are so adjusted as to lift the rollers that they will support the tube in the trough, then the mechanism is set in motion, all the rollers being preferably driven from the same source of power, namely the longitudinal shaft D, and as the tubes come from the rolls they pass into the trough and are fed forward at a given speed by the rollers to the straightening rolls or other machine.

If it is desired to remove any one of the tubes while in the trough, the guard J can be quickly elevated by simply turning the valve g' of the supply pipe to the cylinder G so as to admit fluid to the cylinder when the slide and carriage will be moved forward and the rollers supporting the guard will travel up the several inclined planes. Thus raising the guard to such a height that access may be had to the trough and the tube can be removed from either end of the trough.

It will be understood that any power may be used to operate the guard either fluid under pressure, electricity or other prime mover.

I claim:

1. The combination of a trough used in the manufacture of tubes, etc., guards for said trough, and means for supporting said guards, the same including cams, and a device for adjusting the guards on the cams to vary their position relatively to the trough.
2. The combination of a trough used in the manufacture of tubes, etc., a series of hangers, rolls mounted thereon and projecting through the bottom of the trough, means

for adjusting the hangers to vary the amount of projection of said rolls into the trough and means for driving the rolls while permitting said adjustment, the same including
 5 a plurality of elements of which one is adjustable with each roller and remains in connection with the source of power irrespective of the position of its hanger.

3. The combination of a V-shaped trough
 10 having openings in the bottom, a series of rolls projecting through said openings, hangers pivoted to the trough and supporting the rolls, means for adjusting the hangers, and means for driving the rolls including an element passing through the pivotal support for the hangers.

4. The combination of a trough, rolls projecting through openings in the bottom of the trough, hangers pivoted to the trough
 20 each hanger supporting a roll, a bolt passing through the free end of the hanger, nuts on the bolt whereby the said hanger can be adjusted to raise or lower the rolls, and means for driving the rolls, substantially as described.

5. The combination of a trough, a bearing, a shaft extending through the bearing, means for driving the said shaft, a hanger pivoted to the bearing, means for adjusting the
 30 hanger, a shaft mounted in the hanger, a roll carried by the shaft and extending through an opening in the trough, and gearing between the driving shaft and the roll shaft, substantially as described.

35 6. The combination of a trough, a guard mounted above the trough, means for moving the guard longitudinally, and means for causing the guard to be raised simultaneously with its longitudinal movement,
 40 substantially as described.

7. The combination of a trough, a series of inclined ways on the trough, a guard supported by the inclined ways above the trough, and means for moving the guard
 45 longitudinally, substantially as described.

8. The combination of a trough having a series of inclined ways, a guard mounted above the trough having wheels arranged to travel on the inclined ways, a frame, a carriage thereon, a connection between the carriage and the guard, and means for operating the carriage so as to raise and lower the guard, substantially as described.

55 9. The combination of a trough, a frame mounted above the trough, fixed inclined

ways, a carriage arranged to travel on the frame, a guard mounted above the trough and supported by the inclined ways, a connection between the carriage and the guard, and means for operating the carriage, substantially as described. 60

10. The combination of a trough, a frame mounted above the trough, fixed inclined ways, a guard having rollers mounted on the ways, a carriage mounted on the frame and connected to the guard, a slide, means for operating the slide, and an adjustable connection between the slide and the carriage, substantially as described. 65

11. The combination of a trough, a frame mounted above the trough, fixed inclined ways, a cylinder mounted on the frame, a slide arranged to move on the frame in advance of the cylinder and having a piston, a piston rod connected to the slide, a carriage mounted in advance of the slide, a screw rod projecting from the carriage, a nut carried by the slide through which the screw rod extends, a guard mounted above the trough in the fixed inclined ways, and means connecting the guard to the carriage, substantially as described. 70 75 80

12. The combination in a guard for a tube trough, of two longitudinally extending angle bars, blocks supporting said bars in position with certain of their faces forming the guard proper, transverse members supporting said angle bars, and longitudinally extending members carrying the transverse members. 85 90

13. The combination in a guard for a tube trough, of two series of cams, axles extending between said two series and having rollers co-acting therewith, and a guard proper carried by said axles so as to have its position in the trough varied when the rollers are moved on the cams. 95

14. The combination in a guard for a tube trough, of a supporting structure, beveled blocks depending from said structure, and angle bars secured to the blocks so that certain of their faces form an inverted V-groove. 100

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses. 105

JOHN S. WORTH.

Witnesses:

WILLIAM S.-G. COOK,
 S. G. COOK.