

No. 624,311.

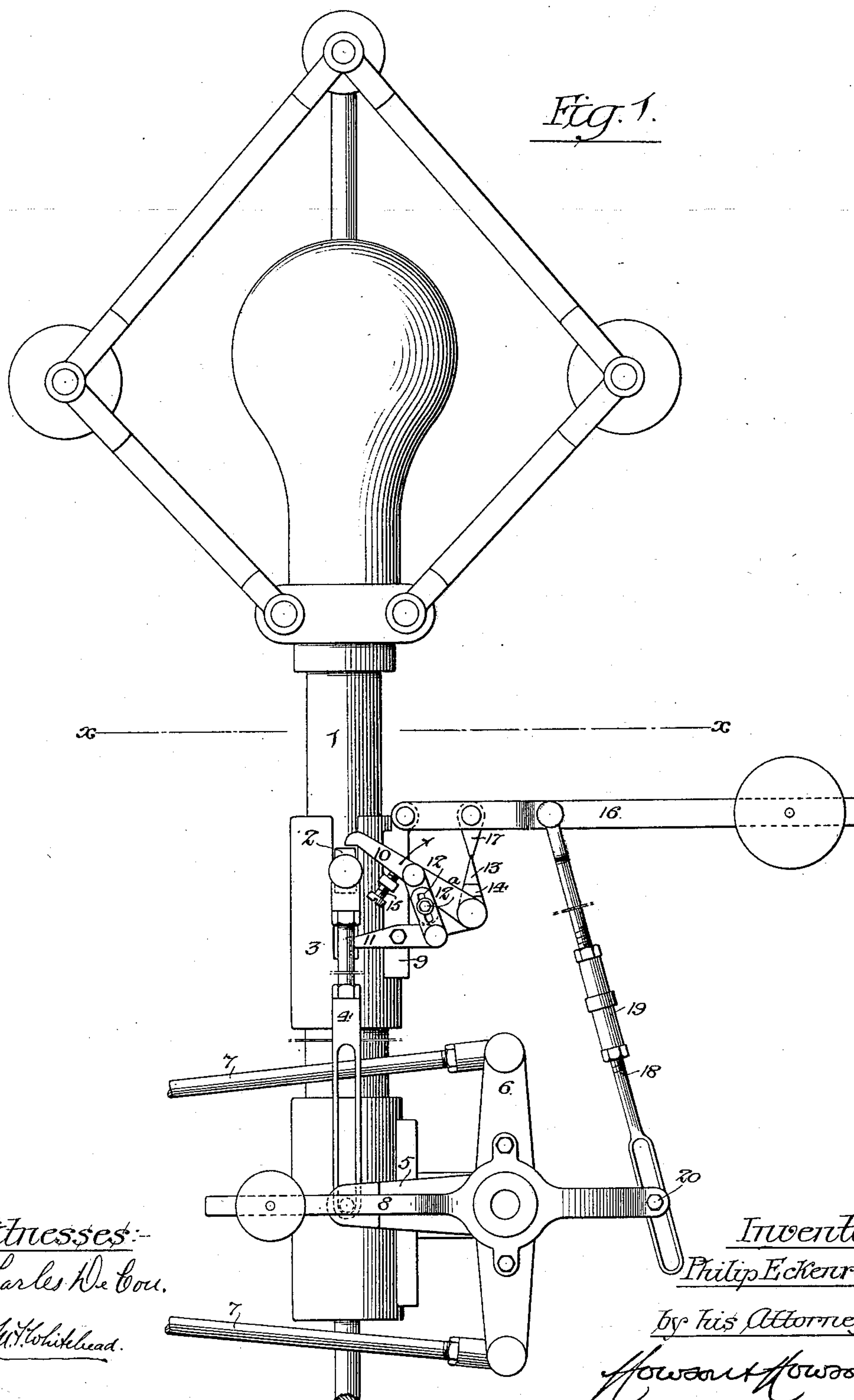
Patented May 2, 1899.

P. ECKENROTH.  
STOP MECHANISM FOR ENGINES.

(Application filed Jan. 18, 1899.)

(No Model.)

3 Sheets—Sheet 1.



No. 624,311.

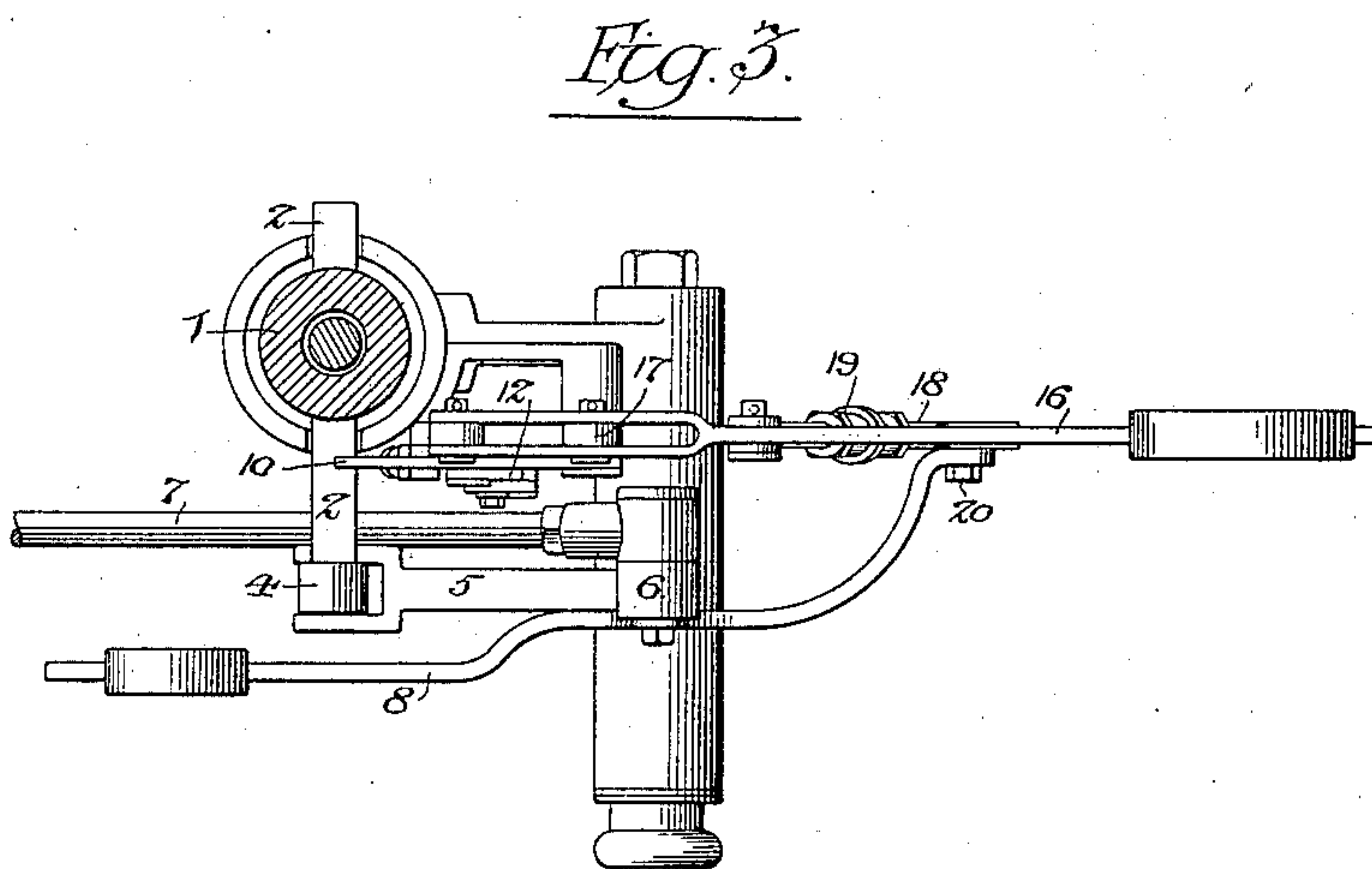
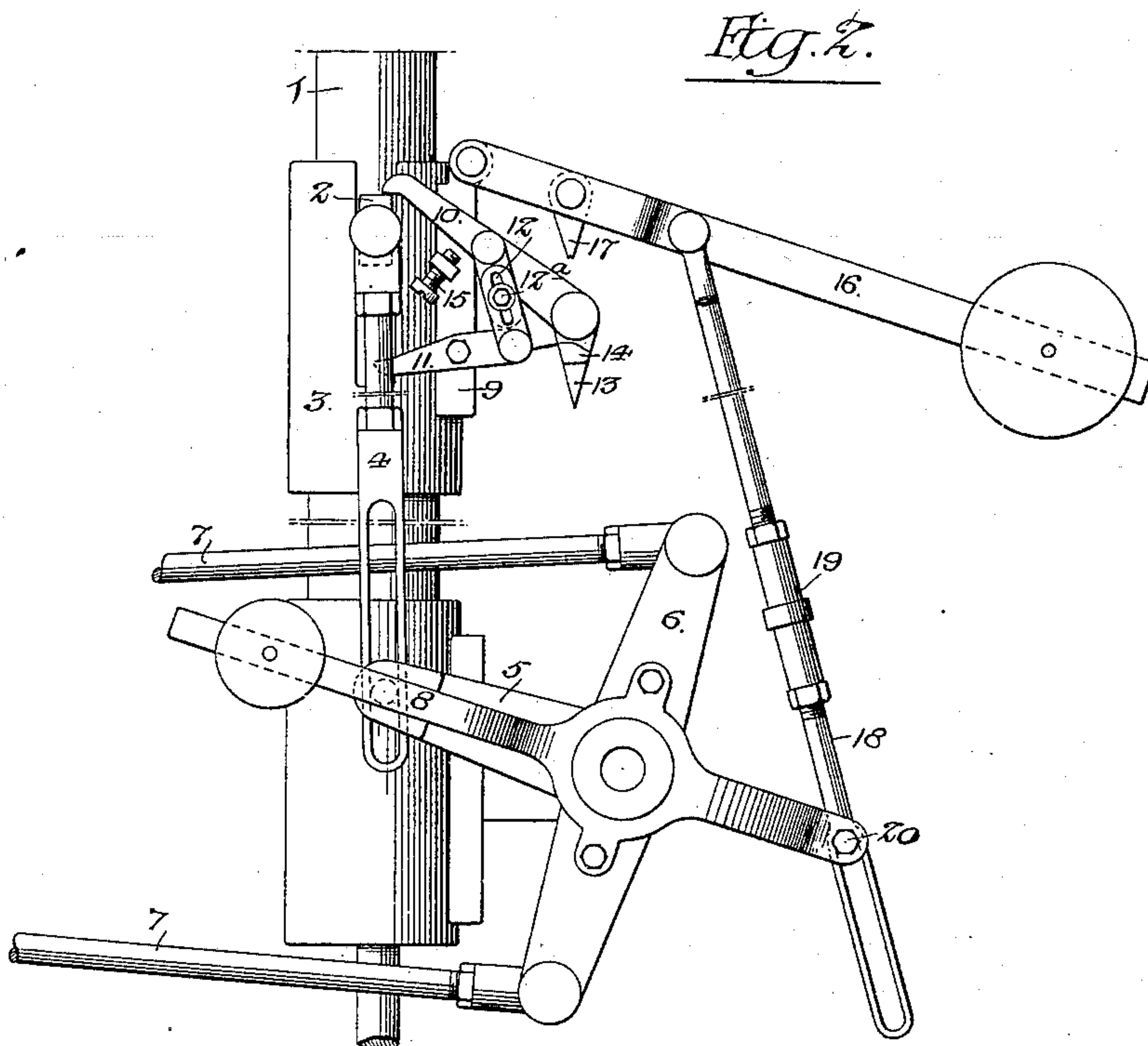
Patented May 2, 1899.

P. ECKENROTH.  
STOP MECHANISM FOR ENGINES.

(Application filed Jan. 16, 1899.)

(No Model.)

3 Sheets—Sheet 2.



Witnesses:-  
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Louis H. T. Whitehead.

Inventor:-  
Philip Eckenroth.  
by his Attorneys:-  
Howson & Howson

**No. 624,311.**

**Patented May 2, 1899.**

**P. ECKENROTH.**  
**STOP MECHANISM FOR ENGINES.**

(Application filed Jan. 16, 1899.)

(No Model.)

**3 Sheets—Sheet 3.**

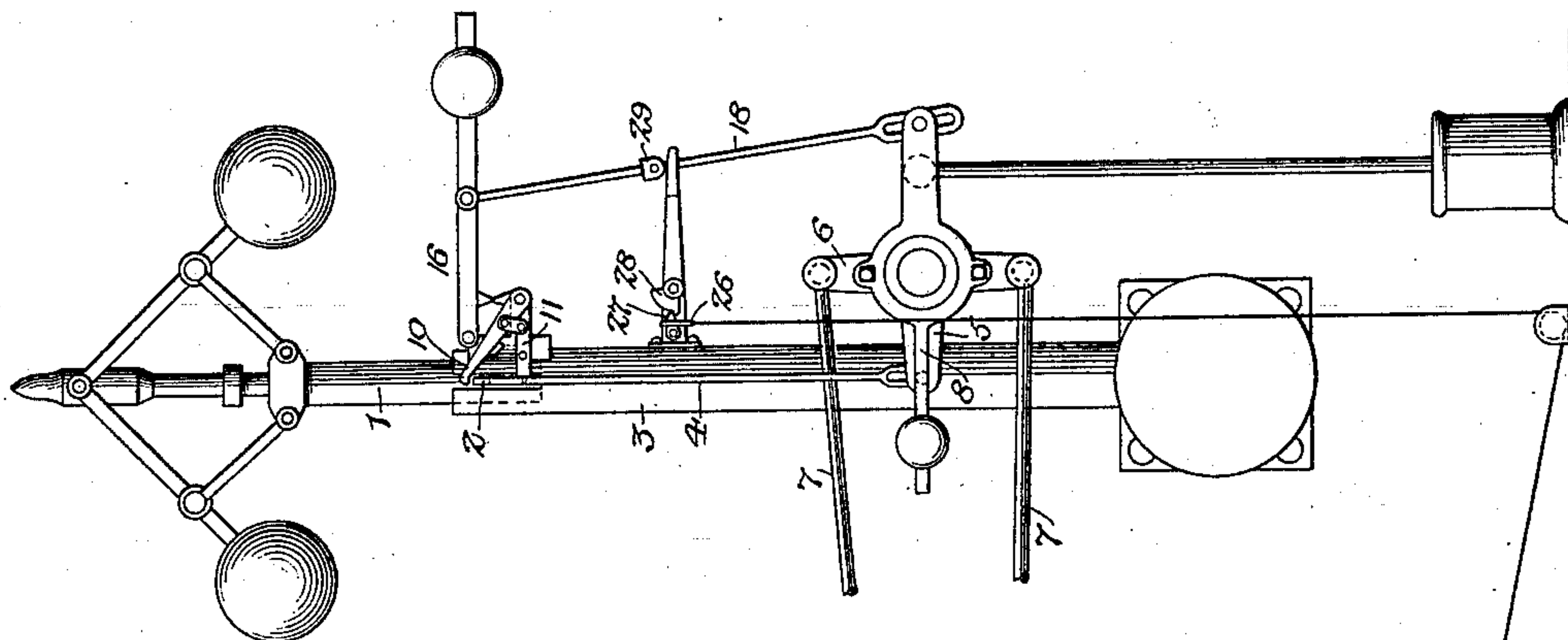


Fig. 4.

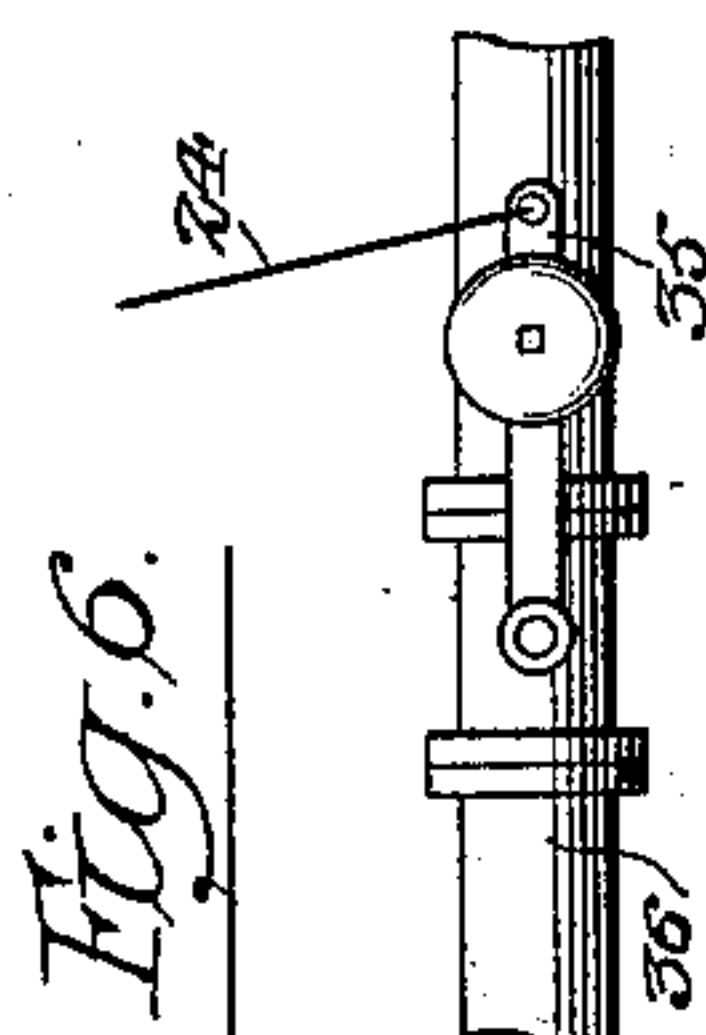


Fig. 6.

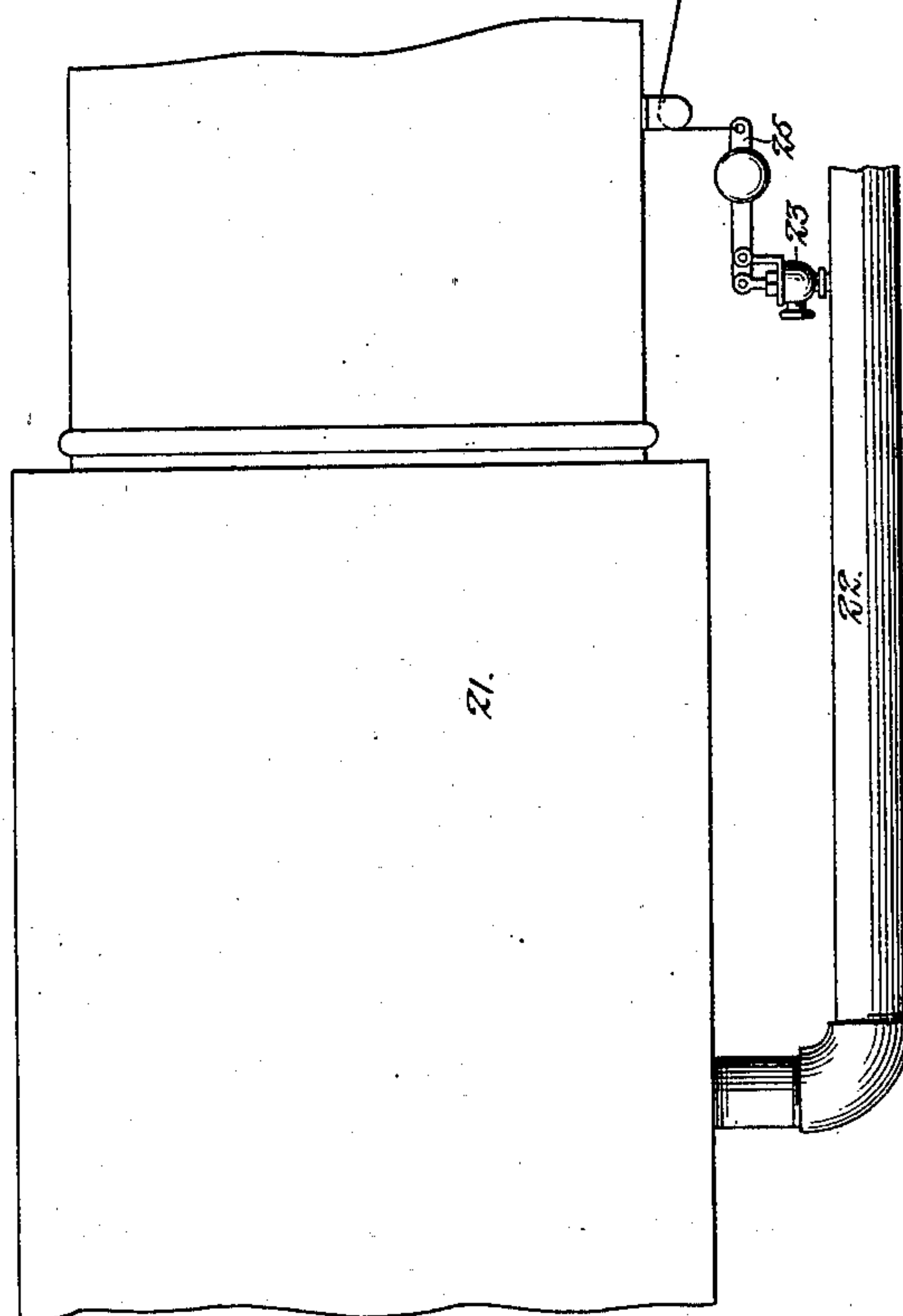
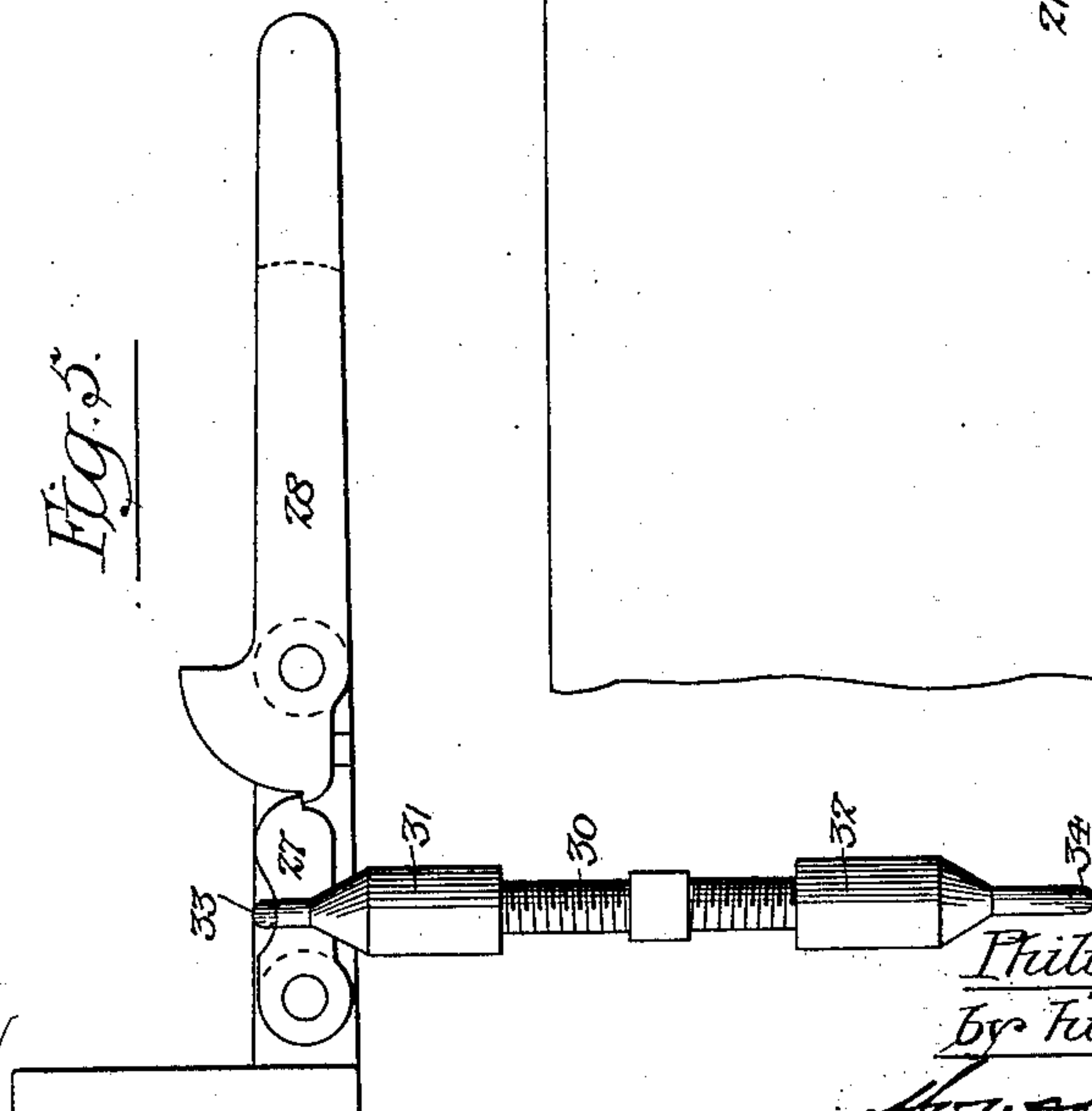


Fig. 2.



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# UNITED STATES PATENT OFFICE.

PHILIP ECKENROTH, OF PHILADELPHIA, PENNSYLVANIA.

## STOP MECHANISM FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 624,311, dated May 2, 1899.

Application filed January 16, 1899. Serial No. 702,314. (No model.)

*To all whom it may concern:*

Be it known that I, PHILIP ECKENROTH, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain  
5 Improvements in Automatic Stop Mechanism for Steam-Engines, of which the following is a specification.

One object of my invention is to provide simple and efficient means for effecting the  
10 automatic stopping of a steam-engine when the same exceeds a predetermined speed and also, if desired, when the speed falls below a predetermined limit.

A further object is to prevent the drawing  
15 of water into the cylinder of the engine from the condenser during the stroke or strokes made by the piston before the same comes to a stop after the steam is cut off and while the engine is consequently acting as a pump.  
20 These objects I attain in the manner herein-after set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a side view of controlling mechanism for steam-engines constructed in accordance with my invention, the parts being shown in the position which they occupy when the engine is running normally. Fig. 2 is a view of part of the mechanism, showing the same in the position occupied when the engine has been stopped after having exceeded its normal speed. Fig. 3 is a section on the line *x x*, Fig. 1. Fig. 4 is a view on a smaller scale than Fig. 1 and showing mechanism for preventing the drawing of water into the cylinder through the exhaust-pipe after steam  
35 has been cut off. Fig. 5 is an enlarged view of part of said mechanism, and Fig. 6 is a view of a modification of part of the same.

In carrying out my invention I may use a  
40 centrifugal governor of any desired character which imparts reciprocating motion to a shaft 1 as its speed varies, the governor shown in the drawings being of the well-known weighted-arm type, of which no specific description will  
45 be necessary. The shaft 1 has projecting lugs 2, guided in vertical slots in a bearing 3, one of these lugs being connected to a slotted rod 4, which engages with a pin on an arm 5, connected to or forming part of a rock-lever 6,  
50 which has rods 7 connected to the cut-off devices of the valve-motion of the engine, so

that as the rock-lever is moved in one direction by the rise of the rod 4 the cut-off will be actuated so as to admit steam to the cylinder for a lesser portion of the stroke, and as  
55 said rock-lever is actuated by a weighted lever 8, connected thereto, the cut-off mechanism will be operated so as to admit steam during a greater portion of the stroke. The governor and the valve-controlling device illustrated are, however, merely samples of well-known types and may be varied without departing from my invention, which can be used in connection with many of the valve-governing devices now in use.  
65

I will now describe the attachment forming the subject of my invention and intended to act in conjunction with the governor to effect the stoppage of the engine when the same exceeds or falls below a predetermined speed.  
70

To a bracket 9, secured to the side of the bearing 3, are hung two levers 10 and 11, the lever 10 projecting from above over one of the projecting lugs 2 of the governor-operated shaft 1 and the lever 11 projecting from  
75 below under said lug, so that the latter is free to travel between the overlapping ends of the two levers, undue rise of the lug causing it to strike the projecting end of the lever 10 and undue drop of the lug causing it  
80 to strike the lever 11. The lever 10 is connected to one arm of the lever 11 by means of overlapping links 12, slotted for the reception of a securing-bolt 12<sup>a</sup>, whereby the extent of overlap of the links may be varied  
85 and the distance between the projecting ends of the levers thus changed to accord with the desired play of the lug 2 between them.

Loosely mounted upon the same pin or stud whereby the lever 10 is hung to the  
90 bracket 9 is a trigger 13, having a projecting lug 14, which bears upon the back of the lever 10 when said trigger is in the vertical position, a set-screw 15, upon which the lever  
95 10 is supported, serving to adjust said lever so as to insure the vertical position of the trigger 13 when its lug 14 is resting on the lever.

Hung to the bracket 9 is a weighted arm 16, which has a pivoted depending toe 17,  
100 notched at the lower end for engagement with the point of the trigger 13, and said weighted



arm 16 is also connected by a rod 18 to the weighted lever 8 of the valve-operating device, said rod 18 having a central screw-turn-buckle 19, whereby the rod may be length-  
 5 ened or shortened, and the lower end of the rod being slotted for the reception of a pin 20 on the weighted lever 8, so that the ordinary movements of the latter under the normal action of the governor will not affect the  
 10 position of said rod or of the weighted arm 16. If, however, the lug 2, owing to excessive speed of the governor, rises so as to strike the overlapping end of the lever 10, the latter is caused to swing in the direction of the  
 15 arrow, Fig. 1, so as to move the trigger 13 from its normal vertical position. As soon as the points of engagement of the trigger 13 and toe 17 pass beyond a line drawn through the pivots of said trigger and toe the action  
 20 of the weighted arm 16 causes the trigger 13 to swing downward, and the support of said trigger is thereby removed from the toe 17 and the weighted arm 16 drops, so as to cause the rod 18 to act upon the weighted lever 8  
 25 and move the rock-lever 6 to the position shown in Fig. 2, this movement effecting such adjustment of the cut-off devices of the engine that no steam is permitted to enter the cylinder of the same, and hence the immediate  
 30 stoppage of the engine is effected. The same result will be attained upon an undue drop of the lug 2, caused by decreased speed of the engine, the lug 2 acting upon the lever 11, and hence through the medium of the  
 35 links 12 upon the lever 10, so as to effect the same result as though said lever 10 had been acted upon directly.

While my improved safety attachment is simple in construction and involves the use  
 40 of but few parts, it is, owing to the use of the trigger 13 and toe 17, extremely sensitive in its action, slight movement of the lever 10 serving to trip the trigger and render the weighted arm 16 operative.

While I have shown a weighted arm 16 and a weighted lever 8, it will be evident that a  
 45 spring-pressed arm or lever may be used instead without departing from my invention, the use of the weighted lever and arm being  
 50 preferred.

After the steam has been cut off from the engine the piston may make one or more strokes before the momentum of the fly-wheel has been overcome, and during such time the  
 55 engine acts as a pump, and in the case of a condensing-engine it will in the absence of any means to prevent it draw water from the condenser, the engine being more powerful than the pump usually employed to remove  
 60 the water from the condenser.

The admission of water to the cylinder of the engine is liable to cause serious damage to the cylinder or cylinder-heads by interposing an incompressible body between a cylinder-head and the piston before the latter has  
 65 reached the end of its stroke. In order to overcome this objection, I combine the auto-

matic stopping device with automatic means for preventing backflow of water into the cylinder, preferably by admitting air to the  
 70 exhaust-pipe, and thereby breaking or preventing the formation of a vacuum in the cylinder. Thus in Fig. 4, 21 represents part of the cylinder of the engine and 22 part of the exhaust-pipe, which has an air-inlet valve  
 75 23, normally held closed by the pull of a cord, wire, or chain 24 upon a weighted lever 25, but opening automatically by the action of said weighted lever as soon as the pull upon the cord is relaxed. The cord 24 passes over  
 80 suitable guide-pulleys and is connected to a link 26, which is supported by a trip-lever 27, hung to a bracket on the bearing 3 and normally engaged and retained by a trigger-lever  
 85 28, which is forked for the passage of the rod 18 of the stop-motion device, said rod having a lug or collar 29, which on the drop of the rod strikes the trigger-lever 28, withdraws the same from beneath the trip-lever 27, and permits the latter to drop, so as to release the  
 90 link 26 and relieve the cord 24 from strain, thereby permitting the weighted lever 25 to drop and open the air-inlet valve 23 of the exhaust-pipe.

The link 26 is preferably composed of a  
 95 right-and-left screw 30 and right and left threaded nuts 31 and 32, with loops or hooks 33 and 34, as shown in Fig. 5, so as to provide for imparting any desired degree of tension to the cord 24 after the loop of the nut 31 has  
 100 been applied to the trip-lever 27.

Instead of controlling an air-valve in the exhaust-pipe of the engine, so as to break or prevent the formation of a vacuum in the  
 105 cylinder, the trip-cord 24 may control the weighted arm 35 of a valve in the discharge-pipe 36 of the condenser, as shown in Fig. 6, so that when the tension on the cord is relaxed the valve will close and backflow through the pipe will be prevented.

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

1. The combination of the centrifugal governor and valve-controlling device of a steam-  
 115 engine, with a safety attachment comprising an arm having a slotted connection with the valve-controlling device, a lever actuated by the governor on excessive movement of the latter, and a trip connection between said  
 120 lever and the arm, whereby the latter is normally held inoperative, but is released on the movement of the lever, substantially as specified.

2. The combination of the centrifugal governor and valve-controlling device of a steam-  
 125 engine, with an arm having a slotted connection with said valve-controlling device, a lever actuated by the governor on undue movement of the latter, a trigger bearing upon  
 130 said lever but free to swing independently of the same, and a toe carried by the arm and engaging with said trigger, substantially as specified.



3. The combination of the centrifugal governor and valve-controlling device of a steam-engine, with a safety attachment comprising an arm having a slotted connection with said valve-controlling device, a lever operated by the governor on undue movement of the latter, a set-screw providing an adjustable stop or support for said lever, and a trip connection between the lever and the arm whereby the latter is normally held out of action but is released on the movement of the lever, substantially as specified.

4. The combination of the centrifugal governor and valve-controlling device of a steam-engine, with a safety attachment consisting of an arm having a slotted connection with said valve-controlling device, a pair of connected levers adapted to be operated by the governor on undue movement of the same in either direction, and a trip connection between one of said levers and the arm whereby the latter is normally held out of action but is released by the movement of either lever, substantially as specified.

5. The combination of the centrifugal governor and valve-controlling device of a steam-engine, with a safety attachment consisting of an arm having a slotted connection with said valve-controlling device, a pair of levers having an adjustable link connection adapted to be operated by the governor on undue movement of the same in either direction, and a trip connection between one of said levers and the arm whereby the latter is normally held out of action but is released by the movement of either lever, substantially as specified.

6. The combination of the valve-controlling device of a steam-engine, with a governor having a slotted connection with said valve-controlling device, and a safety attachment adapted to be operated by undue movement of the governor, and likewise having a slotted connection with said valve-controlling device, whereby the governor can operate the valve-controlling device without affecting the safety attachment, and the operation of the latter is

not restricted by the governor connection, substantially as specified.

7. The combination of automatic mechanism for cutting off the supply of steam to an engine, means for preventing the inflow of water to the cylinder, and a connection between the two, substantially as specified.

8. The combination of automatic mechanism for cutting off the supply of steam to an engine, a valve for admitting air to the cylinder to break or prevent the formation of a vacuum therein, and a connection between said valve and the automatic stop mechanism, substantially as specified.

9. The combination of automatic mechanism for cutting off the supply of steam to an engine, means for preventing the inflow of water to the cylinder, and a flexible connection between the two having means for adjusting its length, substantially as specified.

10. The combination of automatic mechanism for cutting off the supply of steam to an engine, means for preventing the inflow of water to the cylinder, and a connection between the two, comprising a cord or chain, a trip-lever engaging therewith, a trigger-lever engaging and supporting said trip-lever, and means whereby said trigger-lever is operated by one of the elements of the automatic stop mechanism, substantially as specified.

11. The combination of automatic mechanism for cutting off the supply of steam to an engine, a pipe having a valve weighted so that its normal tendency is to assume the operative position intended, and a trip connection between said weighted valve, and the automatic stop mechanism whereby the valve will be released by the action of the latter, substantially as specified.

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

PHILIP ECKENROTH.

Witnesses:

CHAS. H. BANNARD,  
F. E. BECHTOLD.