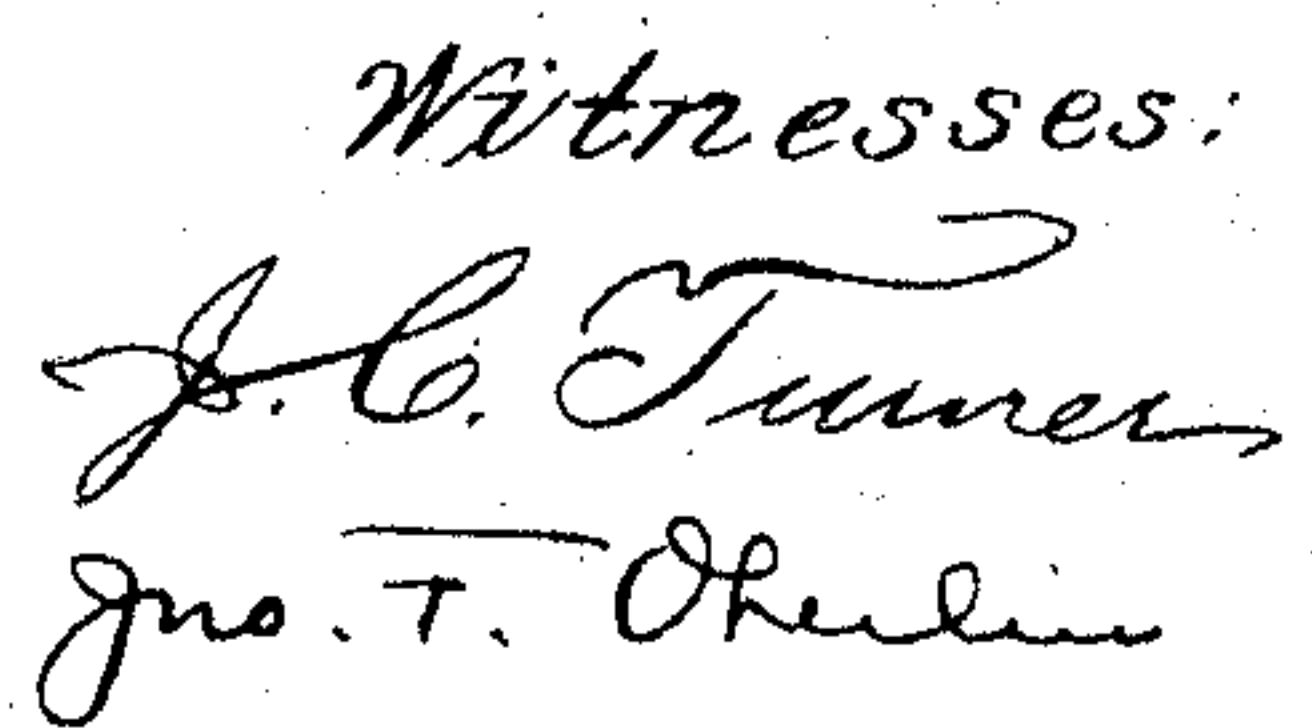


976,017.

2 SHEETS--SHEET 1.



Inventor:
Eud. H. Waterman
by J. B. Fay
Attorney

F. W. WATERMAN.
SPEED LIMITING APPARATUS.
APPLICATION FILED MAR. 31, 1909.

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Patented Nov. 15, 1910.

2 SHEETS—SHEET 2.

Fig. 4

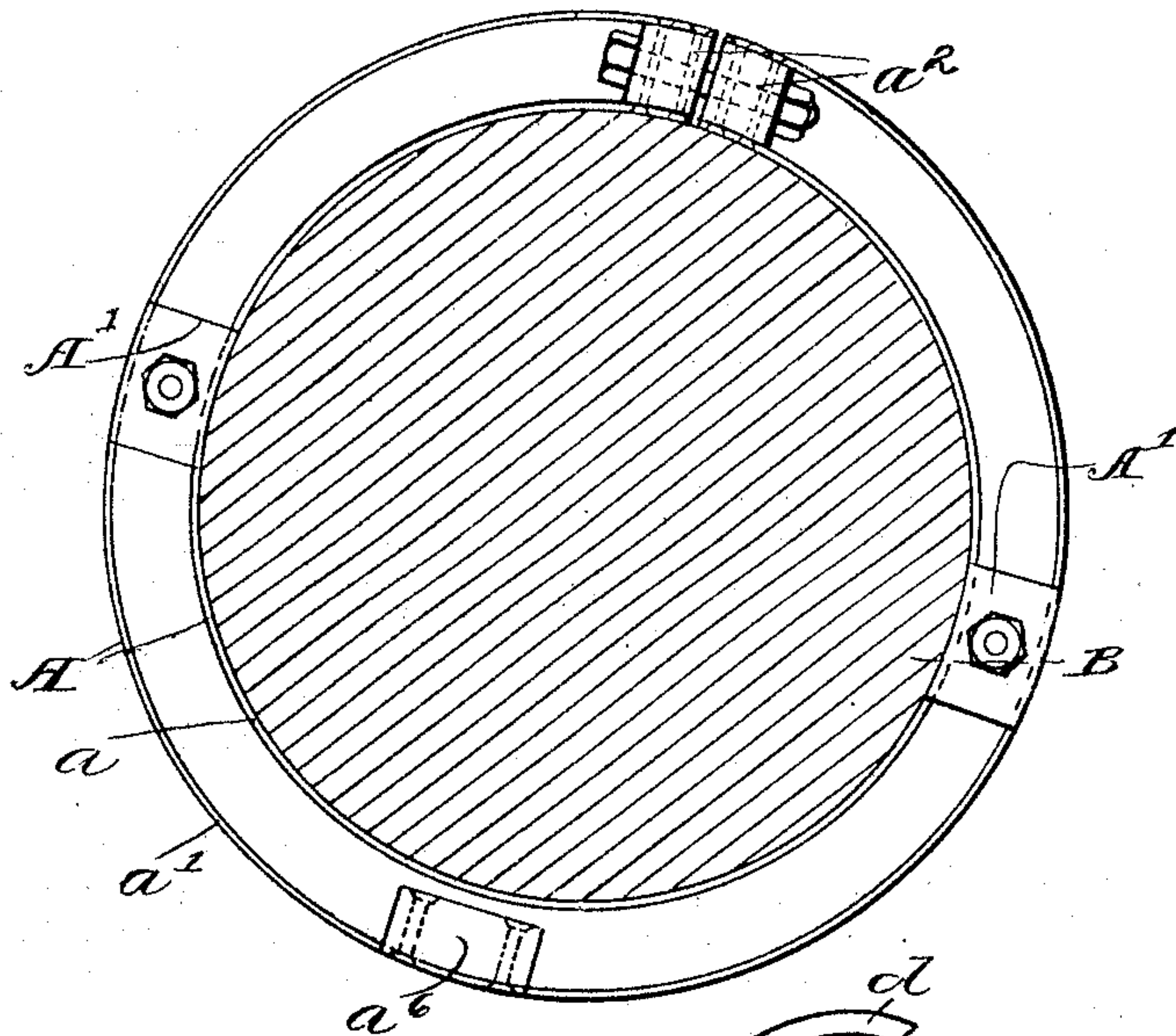
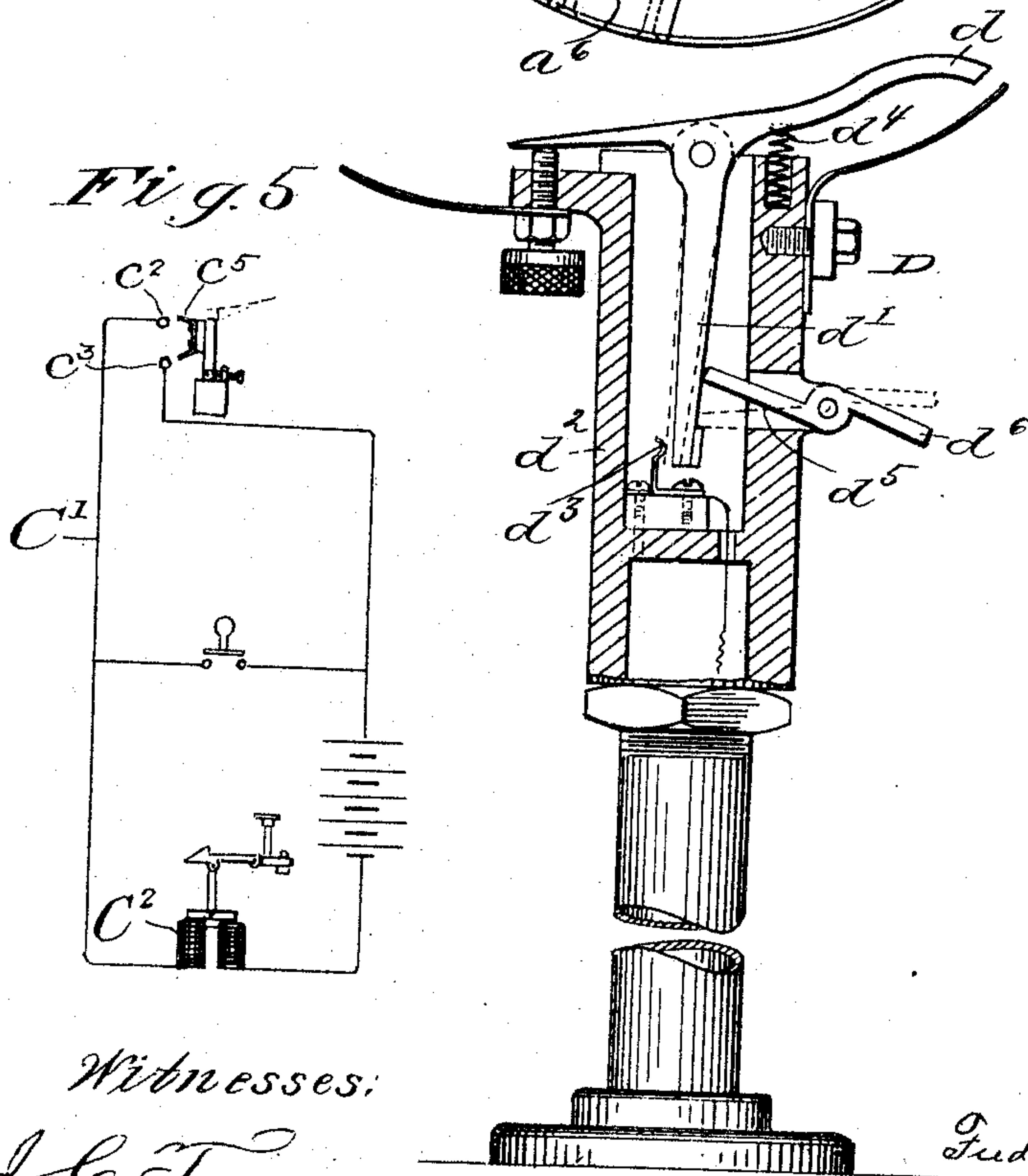


Fig. 5



Witnesses:

J. C. Turner

Jno. H. Ouelin

Inventor:
F. W. Waterman

by J. B. Fay

Attorney.

UNITED STATES PATENT OFFICE.

FRED W. WATERMAN, OF ELYRIA, OHIO.

SPEED-LIMITING APPARATUS.

976,017.

Specification of Letters Patent.

Patented Nov. 15, 1910.

Application filed March 31, 1909. Serial No. 486,996.

To all whom it may concern:

Be it known that I, FRED W. WATERMAN, a citizen of the United States, and a resident of Elyria, county of Lorain, and State of Ohio, have invented a new and useful Improvement in Speed-Limiting Apparatus, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The present invention relating as indicated to speed limiting apparatus, has regard more particularly to a circuit closing device adapted to be actuated by a motor or other moving part whenever an undue speed is attained by the latter. The circuit including such circuit closing device, it will be understood, energizes a suitable actuating device whereby a valve or other mechanism may be operated as, for example, to cut off the supply of steam to an engine where the motor in question utilizes steam power.

The object of the invention, is the provision of simple and effective apparatus for the purpose in question, and to the accomplishment of this and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but several of the various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—Figure 1 is a front elevational view of apparatus embodying my present improvements shown as operatively associated with a section of a shaft; Fig. 2 is an end elevation of the same; Fig. 3 is a cross section of a detail of the apparatus; Fig. 4 shows a modified form of construction; and Fig. 5 is a diagram indicating the electrical connections of a circuit including the apparatus of Figs. 1 and 2.

As stated, the apparatus, in the form in which it appears in the several figures of the drawing, is shown as associated with a shaft, as for example, an engine shaft and one detail of the apparatus is constructed with particular reference to its attachment to a moving part of this character. It is not intended, however, thereby to imply that

other means than such detail may not be employed to actuate the rest of the apparatus, such detail constituting specifically as will appear, the governing device, that is, the element of the apparatus that is directly affected by change in the rate of movement of the part to which it is attached.

In the illustrated construction, then, of such governing device A the latter will be seen to consist of simply two flexible bands a a' concentric with, and adapted to substantially inclose, the shaft B, or equivalent part, blocks a^2 being inserted between the free ends of the inner and outer bands, to separate the same and also provide means for drawing such ends thus assembled, together, in order to secure them to the shaft. Other separators A' , curved to conform with the shaft, are slidably held between the two bands a a' , such blocks having a dovetailed connection with the bands in order to enable the same to be thus retained without danger of their being dislodged. Such slidable separators, moreover, comprise two parts a^3 a^4 as shown in Fig. 3, that are adapted to be drawn together by a bolt a^5 passing through the same, and lying transversely of the bands. By reason of this construction, such separating blocks may obviously be secured at any desired points about the circumference of the shaft, so as to leave free between them, in other words, a section of the outer band a' of varying extent. Thus, when moved to the positions indicated in dotted outline, said blocks reduce the extent of the free portion of the band considerably from that left by them when occupying the positions shown in full lines. Such intermediate portion of the outer band bears, preferably directly opposite the point where the free ends of the bands are brought together, a governor weight a^6 that will be thrown outwardly by the centrifugal force developed by the rotation of the shaft a greater or less distance, dependent in the first instance, upon the rate of such rotation, and secondly upon the location of the separator blocks. In other words, by adjustment of the latter, movement of such governor can be controlled, so as to cause it to assume a position at a given radial distance from the axis of the shaft under any pre-determined speed of rotation. Upon the outer face of the band adjacent to governor weight, a^6 is secured a lug or catch member a^7 designed to effect

operation of the circuit closing device whenever such pre-determined position of the governor weight is reached, as will be readily understood.

5 The circuit closing device itself comprises simply a suitable stand C upon the upper end of which is mounted a head or cap c carrying on a fixed arm c' two contacts c^2 c^3 by the bridging of which the circuit is closed
 10 (see Fig. 5). Pivotaly attached to the top of the cap is a switch member in the form of an arm c^4 that carries on the face disposed toward said fixed arm, a spring contact piece or bridge member c^5 . The latter is adapted, when pivotal arm c^4 is
 15 thrown over toward the fixed arm c' to close the circuit in the manner indicated, but normally such switch arm is held in a substantially vertical position with its center of
 20 gravity a trifle on the opposite side, the amount of overbalance being determined by an adjusting screw c^6 mounted in a lug on the upper face of the cap. Two tension
 25 springs c^7 assist both in maintaining the switch arm in this position and in its circuit-closing position. The position of the stand C with respect to the rotating gov-
 30 ernor device A, is such as to oppose such switch arm c^4 to the direction of rotation of the governor device. As result, it will be seen that whenever the governor weight
 35 a^6 is thrown outwardly an undue amount, by reason of excessive speed of the shaft to which it is attached, the lug a^7 on the outer side of the band a' will engage said arm and
 40 throw it over into its circuit-closing position, where the springs c^7 will securely hold it until it is manually returned to its normal or set position. In this it is likewise
 45 safely held despite the fact that only a very slight blow of the lug borne by the governor device is necessary to actuate it.

The general arrangement of electric circuit, in connection with which my improved
 45 speed limiting apparatus is designed to operate, is diagrammatically shown in Fig. 5, and, it may be further explained, is substantially the same as that illustrated in Patent
 50 No. 836,794, issued to Oscar Winter and myself November 27, 1906, upon an automatic device for operating valves and other mechanisms. In such Fig. 5, then, the device designed to be actuated by the current sent
 55 through the circuit C' is inclusively designated by reference letter C², and it obviously does not require to be described in detail for an understanding of the present apparatus.

In the alternative construction illustrated in Fig. 4, the governor device proper is sub-
 60 stantially the same as in the apparatus just described, save for the omission of the lug on the outer side of the flexible band adjacent to the governor weight a^6 . The circuit closing device D, however, while utiliz-
 65 ing the same principle of unstable equilib-

rium in its operation differs in details of construction from that of the other device. The pivotal switch member here comprises two arms d d' , of which one d extends upwardly into position to be struck by the
 70 outer band of the governor device, whenever the governor weight throws the latter out too far, while the other arm d' extends downwardly within the hollow cap d^2 wherein the member is mounted. In the
 75 depressed position of the upper switch arm such downwardly extending arm d' is adapted to be swung over against a spring d^3 forming a fixed contact member that constitutes one terminal of the circuit con-
 80 trolled, such switch arm d' constituting the other terminal, so that when the arm is in the position just described, the circuit will be closed. Obviously, however, only a momentary contact would be secured by the de-
 85 vice so far described, since the upper arm d is normally returned to its upper position as soon as the governor device releases the same, by a compression spring d^4 . I accordingly provide locking means for retain-
 90 ing arm d' in contacting position, such means consisting of a pivoted member d^5 loosely contacting with the depending arm of the switch as shown in full lines; upon
 95 such arm, however, being swung over against the fixed contact member d^3 in the fashion just described, such pivoted member drops under the influence of gravity into the position shown in dotted outline in
 100 which position its outer end lies below the line of its axis, and so serves to lock the switch arm in such contacting position. To release the apparatus it is merely necessary to depress the outer end of said member, for
 105 which purpose the latter is formed as a thumb piece d^6 . Spring d^5 will thereupon restore the switch to its normal inoperative position, in which the upper arm is again
 110 adapted to be struck by the governor weight, should the latter rotate at an excessive speed.

From the foregoing description of my invention, presented in two typical forms of construction, it will be seen that I avoid the difficulty heretofore encountered, where a
 115 simple momentary contact has been relied on to effect operation of the operating device controlled by the circuit; it frequently occurs in connection with apparatus of this last type, that such momentary contact does
 120 not allow a sufficient current to pass through the circuit to effect the desired result. At the same time by closing the circuit directly by the operation of the governor weight, I eliminate all complicated trip mechanism
 125 which is apt to get out of order and so demands constant attention to insure the apparatus being in operative condition.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as
 130

regards the mechanism herein disclosed, provided the means stated by any one of the following claims or the equivalent of such stated means be employed.

5 I therefore particularly point out and distinctly claim as my invention:—

10 1. In apparatus of the class described, a governor comprising a flexible band adapted to be secured to a rotating part at two circumferentially separated points lying in a plane transverse to the axis of said part, the portion of said band between such points being free to move outwardly under the influence of centrifugal force.

15 2. In apparatus of the class described, a governor comprising a flexible band adapted to be secured to a rotating part at two circumferentially separated points lying in a plane transverse to the axis of said part, located an adjustable distance apart, the portion of said band between such points being free to move outwardly under the influence of centrifugal force.

25 3. In apparatus of the class described, a governor comprising two discontinuous circular bands, one within the other, means for drawing the free ends of said bands together to secure the same to a shaft or like rotating part, and blocks adjustably secured between said bands whereby a variable portion of the outer band may be left free to move outwardly under the influence of centrifugal force.

35 4. In apparatus of the class described, a governor comprising two discontinuous circular bands, one within the other, means for drawing the free ends of said bands together to secure the same to a shaft or like rotating part, blocks slidably mounted between said bands, means for securing said blocks to said bands to leave a variable por-

tion of the outer band free to move outwardly under the influence of centrifugal force, and a weight attached to such portion of said outer band.

45 5. In apparatus of the class described, a governor comprising two discontinuous circular bands, one within the other, means for drawing the free ends of said bands together to secure the same to a shaft or like rotating part, blocks slidably mounted between said bands, means for securing said blocks to said bands to leave a variable portion of the outer band free to move outwardly under the influence of centrifugal force, a weight attached to the inner face of such outer band portion, and a lug attached to the outer face of such portion adjacent to said weight.

60 6. In apparatus of the class described, a governor comprising two discontinuous circular bands, one within the other, means for drawing the free ends of said bands together to secure the same to a shaft or like rotating part, blocks between said bands, each of said blocks including two parts respectively having dove-tailed connection with the sides of said bands, whereby they are slidable therealong, bolts adapted to draw said block parts together and thereby secure the same to said bands to leave any desired portion of the outer band free to be moved outwardly under the influence of centrifugal force, a weight attached to the inner face of such outer band portion, and a lug attached to the outer face of such portion adjacent to said weight.

Signed by me this 27 day of March, 1909.

FRED W. WATERMAN.

Attested by:

W. J. COUTOW,
DELLA M. REESE.