

A. W. ARNOLD.
 AUTOMATIC FIRE GOVERNOR.
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970,599.

Patented Sept. 20, 1910.

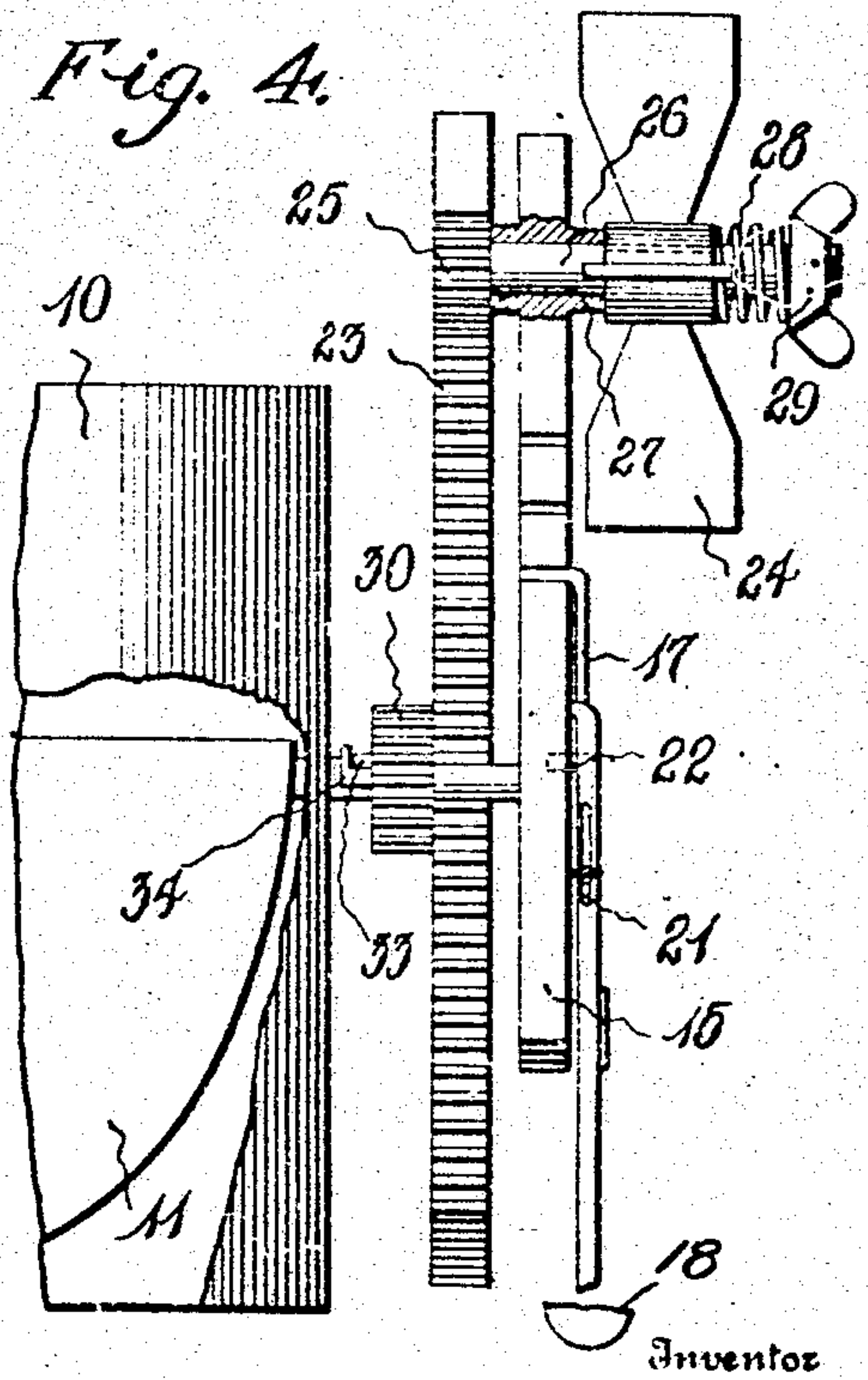
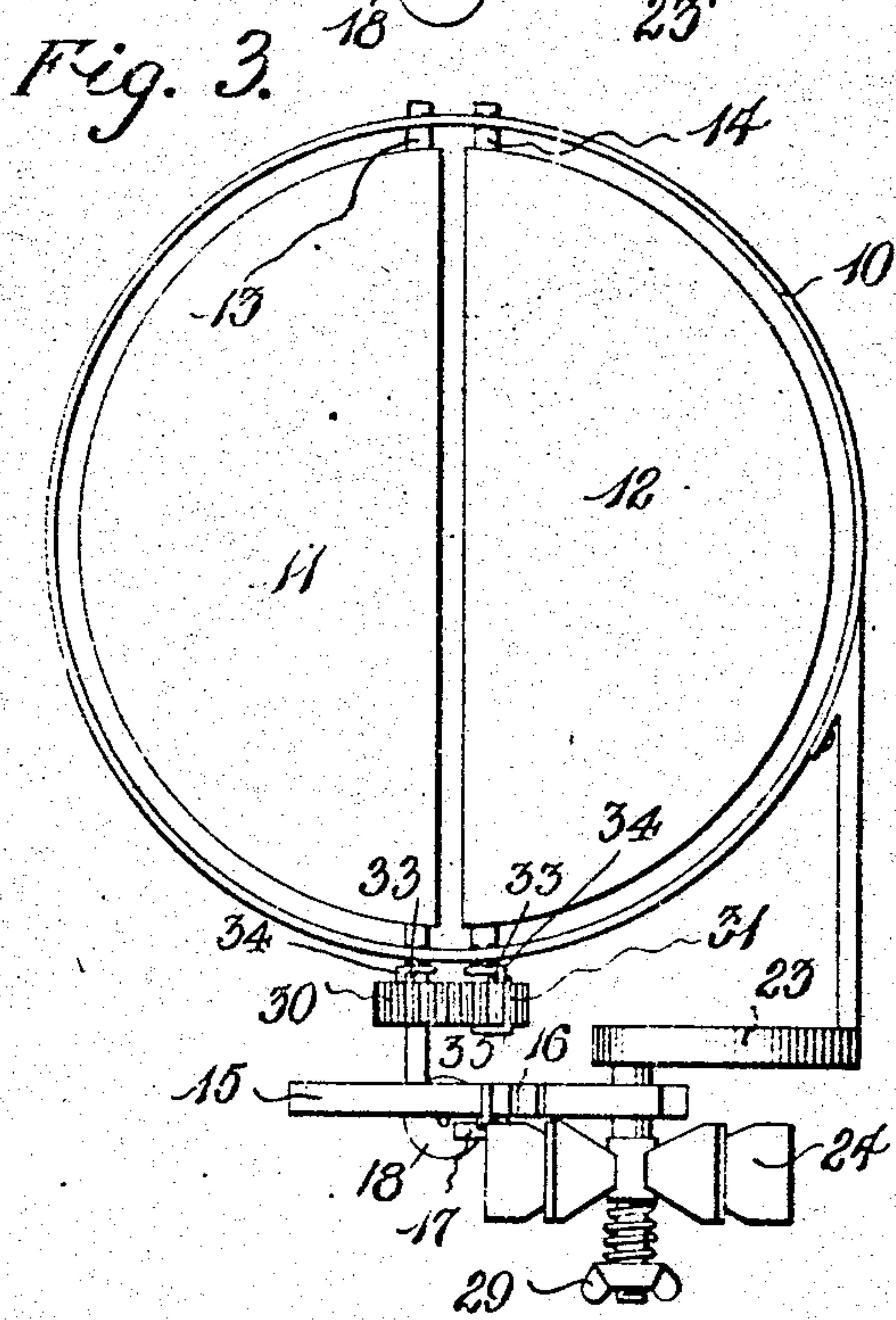
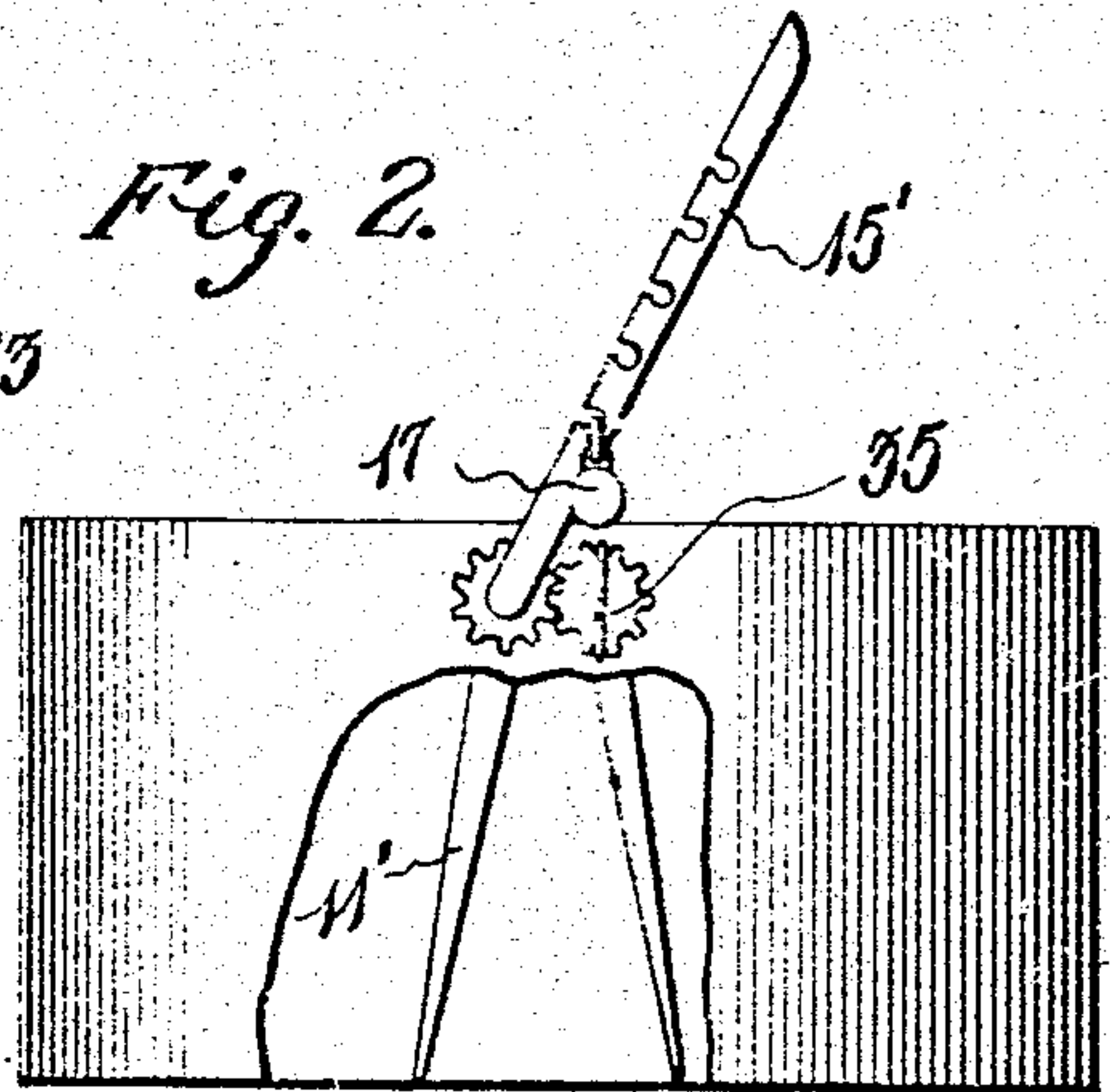
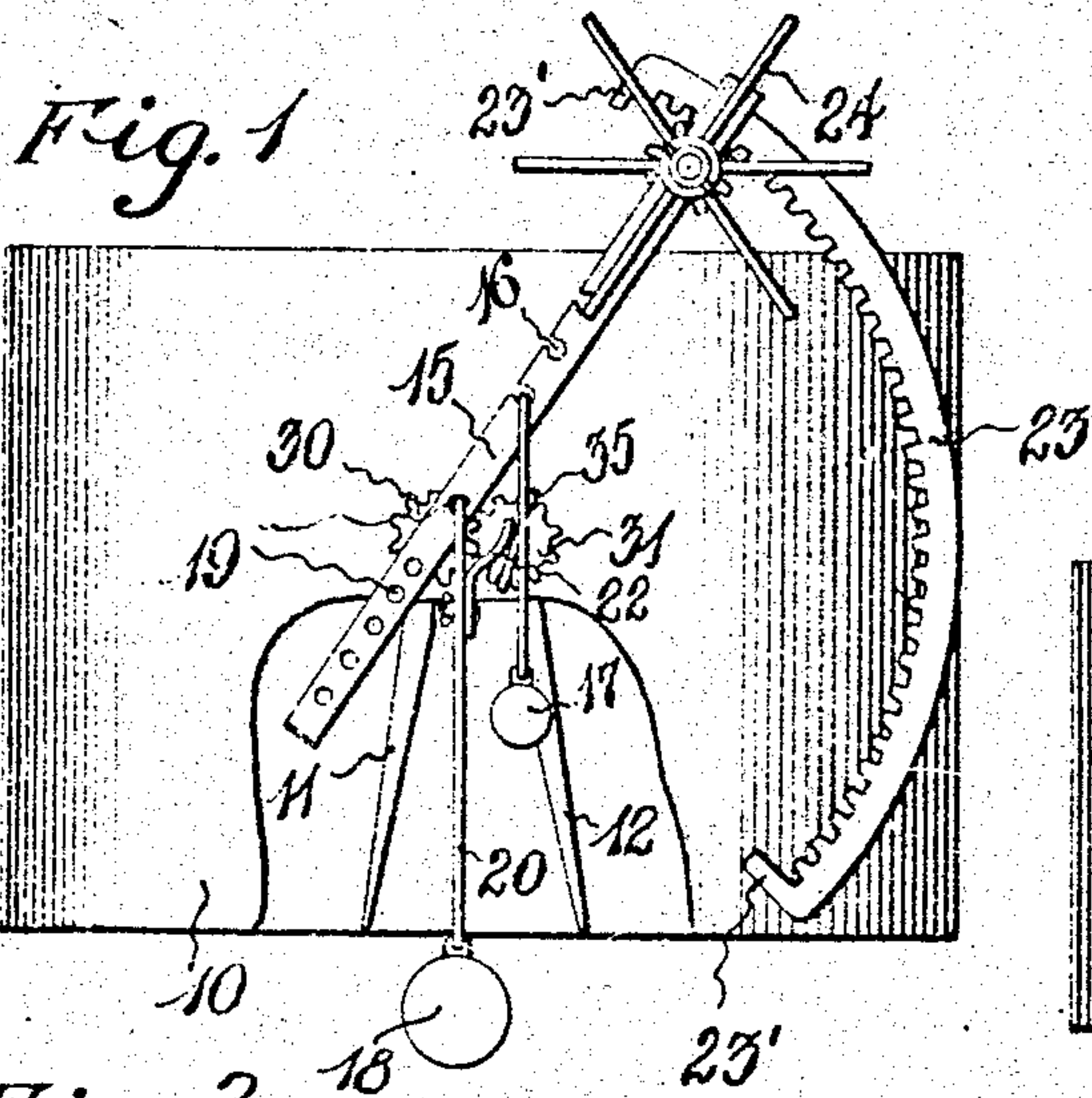
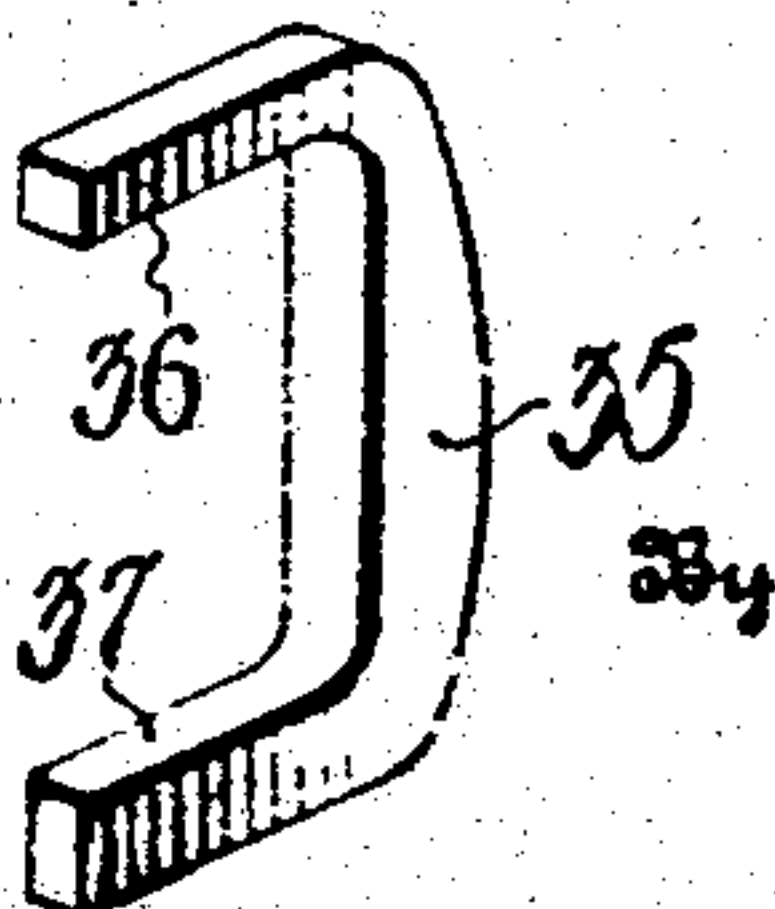


Fig. 5

Witnesses
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UNITED STATES PATENT OFFICE.

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AUTOMATIC FIRE-GOVERNOR.

970,599.

Specification of Letters Patent. Patented Sept. 20, 1910.

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To all whom it may concern:

Be it known that I, ARTHUR W. ARNOLD, a citizen of the United States, residing at Portland, county of Multnomah, and State of Oregon, have invented a new and useful Automatic Fire-Governor, of which the following is a specification.

This invention relates to that class of governors for automatic flue dampers set forth in my copending application, Serial Number 452,063, filed Sept. 8, 1908. In devices of this character it is desirable to provide a means whereby the currents of hot air and products of combustion carried thereby, as they pass upwardly through a stove-pipe or other flue, may be automatically regulated for the purpose of controlling the force of such currents. It is a well known fact that when a fire is being kindled the damper is desired to be open substantially to its maximum degree, but after the fire has become hot the dampers must be closed in order to prevent excessive burning of the fuel and danger arising from heat passing upwardly through the chimney or flue. Many fires in dwelling houses and the like originate during the night while the occupants are sleeping, the trouble arising from the fact that the fires when the occupants retire are low and seemingly inactive, but which fires burn up brightly during the night through many causes, such as unexpected changes of winds or other atmospheric conditions. By the invention herein set forth a flue damper is provided and so pivoted in the flue as to normally depend from its axis by the operation of gravity and which on being engaged by upward currents of hot air will close more or less of the flue by automatic operation of such currents.

The invention furthermore comprises adjustable means for controlling and limiting the automatic operation of such damper due to the hot air currents.

The foregoing and other objects of the invention are fully set forth hereinafter and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a preferred embodiment of this invention, portions being broken away to disclose interior structure, and with the parts in normal position; Fig. 2 is a view similar to Fig. 1, illustrating a slightly modified construction; Fig. 3 is a plan view of the structure disclosed in

Fig. 1, the damper being closed; Fig. 4 is a fragmentary elevation of the mechanism of Fig. 1, on an enlarged scale, and Fig. 5 is a detail of a part of the controlling mechanism to be hereinafter described.

Throughout the following description and on the several figures of the drawings, similar parts are referred to by similar reference characters.

At 10 is indicated a casing which may be considered for the purposes of this description as any kind of a practical hot air flue, of any suitable form in cross section and of any suitable material, or it may be a short section of tubing to be applied to any well known form of stove pipe or hot air flue. Pivoted within said casing 10 on a horizontal axis or axes is a damper, adapted to hang normally downward from the axis or axes of rotation within the path of the hot air currents. As illustrated herein said damper comprises a plurality of wings 11 and 12 pivoted on axes 13 and 14, respectively. While there are shown two of such wings, it is to be understood that a single wing structure is contemplated within the scope of this invention. The axis 13 of the wing 11, assuming that a single wing structure may be employed, may be pivoted at any suitable location in the casing 10. The wing 11 is so mounted and related to its axis 13 as to normally project from the vertical into the path of the upward currents of air through the casing so as to be engaged and operated thereby when such currents become sufficiently rapid.

A lever or arm 15 is connected to the axis 13 of the wing 11 and extends upwardly above the horizontal plane of said axis, when in normal position, and preferably on the outside of the casing. Said lever is provided with means for adjustably securing thereto counter-balancing means, whereby the effect of variable currents of air through the casing may be modified as to requirements, and whereby the variable effective weight of the wing is automatically compensated for throughout the movements thereof. As a means for providing such adjustable counter-balancing means the lever 15 is provided with a series of notches 16, in any one of which may be connected a pendent weight 17.

As illustrated in Figs. 1, 3, and 4, auxiliary counter-balancing and controlling means are illustrated, the same comprising a

weight 18 adjustably connected in any one of a series of holes 19 in the lever 15 by means of a rod 20. Said rod is provided with a slot 21 in which is adjustably secured a finger 22, against which the lower edge of the lever 15 is adapted to impinge at a certain point in the rotation thereof about the axis 13. By this construction the lever may swing comparatively freely on said axis until the finger 22 is impinged, at which time the weight 18 will have positive connection therewith and further movement of the lever 15 will require a positive lifting of the weight 18, thereby controlling and retarding such movement of the lever in accordance with the position at which the rod 20 is connected.

As a means for controlling the speed at which the damper will operate there is illustrated a fan construction embodying a toothed segment 23 secured in any suitable fixed position, and with which a fan 24 journaled upon the lever 15 has cooperation through a pinion 25. Said pinion is fixed upon one end of a short shaft 26 journaled for rotation in a bearing 27 connected to the lever 15. The fan is mounted on said shaft 26 to rotate therewith but having slight longitudinal movement thereon. When the lever 15 turns on its pivot or axis 13 the shaft 26 and parts connected thereto will be caused to rotate in its bearing 27. The speed of such rotation will be controlled by the blades of the fan 24. This construction is especially desirable in connection with flues leading from large furnaces, and in some instances it is essential that the rotation of the fan shall be further controlled, as by the use of a spring 28 and thumb nut 29, through which the hub of the fan may be caused to engage frictionally upon the adjacent end of the bearing 27. It is contemplated that the fan may have free rotation with respect to the bearing 27 if so desired. The ends of the segment 23 will preferably be provided with stops 23' to prevent any possibility of the lever 15 and parts carried thereby swinging too far in either direction.

The wings 11 and 12 are connected in any suitable manner for simultaneous operation on their axes. As shown herein there are provided pinions 30 and 31 connected to the respective axes and intermeshing with each other. In the construction illustrated in Figs. 1, 3, and 4, the pinions have loose connection with their axes and wings. Such loose connections may be of any suitable construction or character but as shown comprise a lug 33 rigidly connected to the axis and a key 34 connected to the pinion and extending along one side of the lug and thence partially around the axis. Such key 34, therefore, provides not only a positive connection for said parts in one direction, but by virtue of its circumferential extension

prevents longitudinal displacement of the pinion.

In certain types of furnaces, especially where oil or inflammable fuels are employed it frequently occurs that a sudden blast or explosion of the fuel takes place and which would tend to damage the damper mechanism. For this reason it is essential in such large structures to provide such loose connection between the wing and the lever mechanism. In case an explosion or sudden forcible blast occurs, such as could not otherwise be provided for by the lever and connected counter-balancing means, the wing or wings may swing upwardly against gravity independently of such lever connections. This operation it will be understood will be only momentary and immediately thereafter the parts will resume their normal positions. In addition to the controlling means and auxiliary thereto I provide a suitable positive stop for the pinions. This stop as shown is in the nature of a U-shaped chuck 35 adapted to engage one of the pinions in any two oppositely disposed spaces between gear teeth. This chuck is provided with legs 36 and 37, the former of which is thinner than the latter. By placing said chuck on the pinion as indicated in Figs. 1 and 2 the cooperating pinion will be limited in its relation thereto in an obvious manner. By changing the chuck from one set of spaces to another the degree of rotary movement of the pinion may be altered, and if it is found that the adjustment due to such change is not sufficiently delicate the chuck may be turned end for end so as to vary the thickness of the engaging leg thereof.

The structure illustrated in Fig. 2 is adapted particularly for simple structures such as domestic stove pipes, or the like, and if desired the lever 15 may have fixed relation to the wing 11.

Having thus described the embodiment of the invention now best known to me, but without desiring to be limited to the exact construction illustrated, what I claim and desire to secure by Letters Patent of the United States, is:

1. In an automatic fire governor, the combination of an upright flue casing, a wing pivoted therein on a horizontal axis and normally pendent from said axis, a lever connected to said wing and normally extending upward beyond the horizontal plane of said axis, and means connected to said lever whereby the same counterbalances the weight of the wing uniformly as the latter swings on its axis under the influence of upward currents of air within the casing.

2. In an automatic fire governor, the combination of an upright casing, a wing pivoted therein on a horizontal axis and normally pendent therefrom by gravity, a lever

connected to said wing and normally extending upwardly above said axis, counterbalancing means adjustably connected to said lever above said axis, and means to control the speed of movement of said lever, substantially as set forth.

3. In an automatic fire governor, the combination of an upright casing, a wing pivoted therein and normally pendent from its pivotal axis, a lever connected to said wing and extending normally above said axis, counterbalance means connected to said lever, and means associated with said wing for controlling its pivotal movement on its axis.

4. In an automatic fire governor, the combination of a casing, a wing pivoted therein and normally pendent from its pivotal axis, means connected to said wing and extending normally above said axis to counterbalance the wing throughout its pivotal movements, and an adjustable chuck for limiting the pivotal movements of said wing on its axis.

5. In an automatic fire governor, the combination of a casing, a wing pivoted therein on a horizontal axis, a pair of intermeshing pinions, one of which is connected to said axis and the other is pivoted in said casing, a counterbalancing lever connected to one of said pinions, a positive stop connected to the other of said pinions to limit the rotation of the pinions, and means connected to said lever to retard the movement thereof.

6. In an automatic fire governor, the combination of a casing, a plurality of wings pivoted therein on horizontal axes, intermeshing pinions connected to said axes, a counterbalancing lever connected to one of said pinions, positive stop means connected to the other of said pinions to limit the rotation thereof, retarding means connected to said lever, and means to vary the effect of said retarding means.

7. In an automatic fire governor, the com-

bination of a casing, a wing pivoted therein on a horizontal axis, cooperating pinions, one of which is journaled in the casing, means connecting the other of said pinions with said axis, such means comprising a lug on one of the members and a curved pin connected to the other of said members whereby the wing may have movement independently of the pinion connected thereto, and counterbalancing means connected to the pinion mounted on the wing axis, substantially as set forth.

8. In an automatic fire governor, the combination of a casing, a plurality of wings pivoted therein on a horizontal axis and normally pendent therefrom, interengaging pinions connected to said axes of the wings to cause simultaneous movement thereof, counterbalancing means connected to one of said pinions, adjustable retarding means connected to said counterbalancing means, and a positive chuck connected to the other of said pinions, substantially as set forth.

9. In combination, a flue, a plurality of wings journaled in the flue, means to cause simultaneous movement of the wings, and retarding means for said wings comprising a rack, a pinion to mesh with the rack, and a fan operable by the pinion.

10. In combination, a flue, a plurality of wings journaled in the flue, a lever connected to one of said wings, retarding means associated with said lever, counterbalancing means connected to said lever and adapted for such delicate adjustment as will permit free movement of the said wings upon a slight variation in the volume or force of draft through the flue.

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Witnesses:

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