May 12, 1925. 1,537,694

J. P. RIGSBY ET AL

AUTOSTOP GOVERNOR

Original Filed June 9, 1920 2 Sheets-Sheet 1

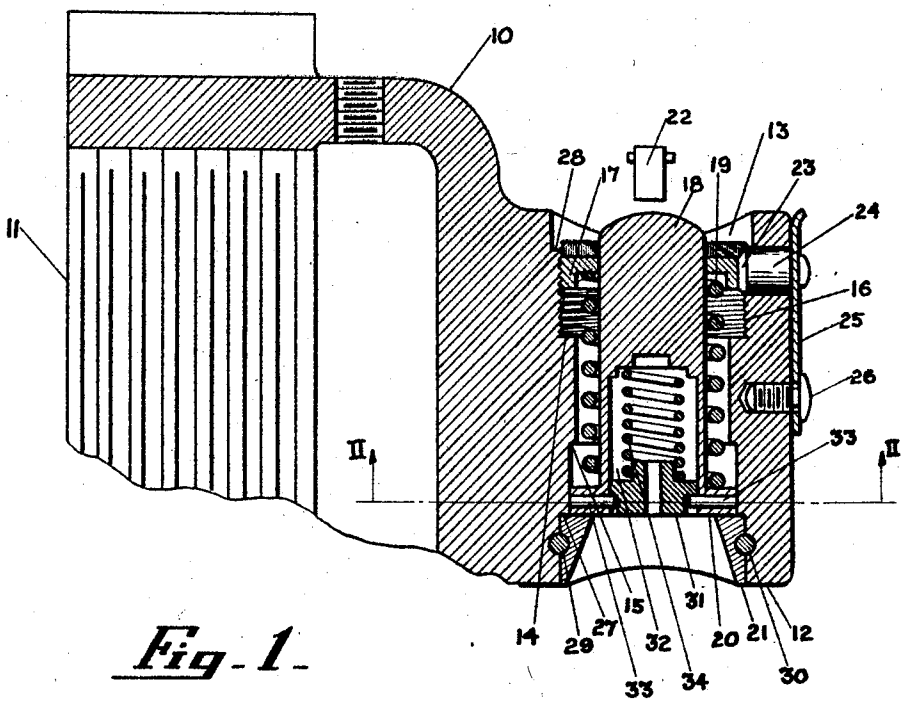


Fig. 1.

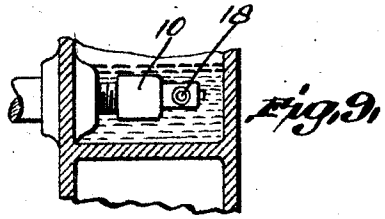


Fig. 3.

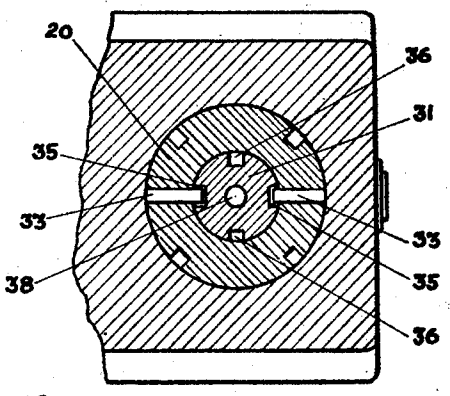


Fig. 2.

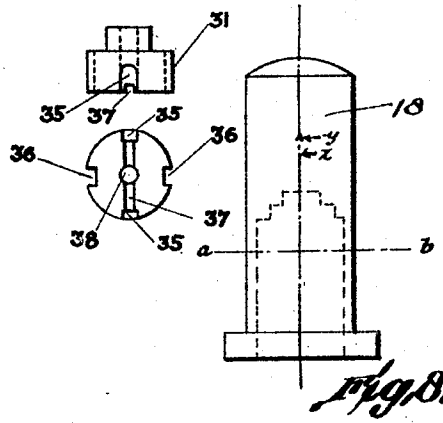


Fig. 4.

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Original Filed June 9, 1920 2 Sheets-Sheet 2

Fig. 4.

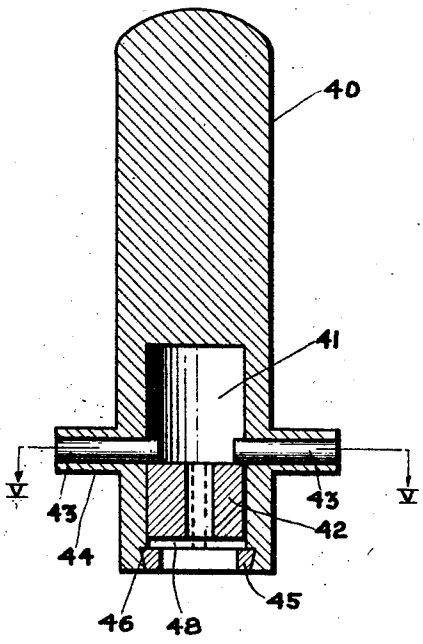


Fig. 6.

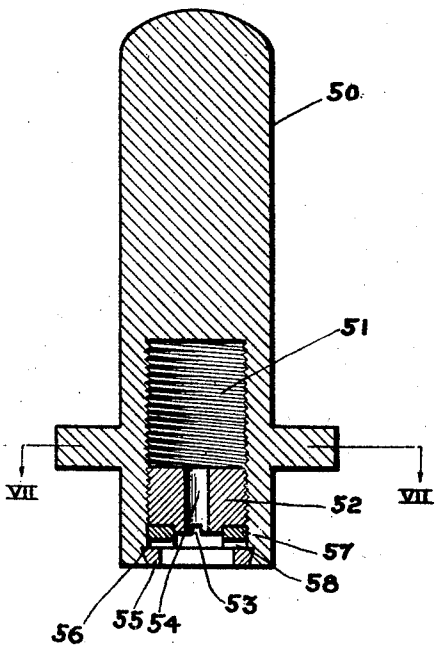


Fig. 5.

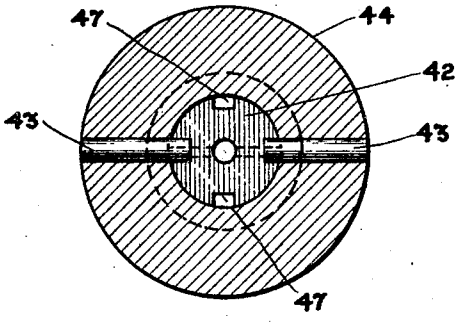
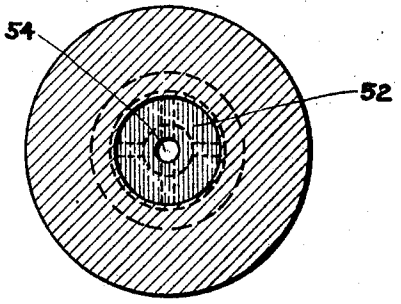


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN P. RIGSBY AND WILLIAM T. MANNING, OF ESSINGTON, PENNSYLVANIA, ASSIGNORS TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

AUTOSTOP GOVERNOR.

Application filed June 9, 1920, Serial No. 387,532. Renewed February 1, 1923.

To all whom it may concern:

Be it known that we, JOHN P. RIGSBY and WILLIAM T. MANNING, citizens of the United States, and residents of Essington, in the county of Delaware and State of Pennsylvania, have invented a new and useful Improvement in Autostop Governors, of which the following is a specification.

Our invention relates to improvements in governing mechanism for steam turbines, and more particularly to that class of governing mechanism employed to automactically shut off the steam supply to the turbine when a predetermined overspeed is reached.

The object of our invention is the provision of means, in connection with the centrifugal trip weight of the usual auto-stop governor, whereby the center of gravity thereof may be changed relatively to the axis of rotation so that tripping action may be effected at a speed below normal.

We attain these objects by the mechanism illustrated in the accompanying drawing, in which—

Fig. 1 is a sectional view through the turbine-driven element or cap to be mounted on the end of the turbine shaft; Fig. 2, a sectional view taken along line II—II of Fig. 1; Fig. 3, a detail of the detachable weight; Fig. 4, a modification of the tripping weight; Fig. 5, a sectional view taken along line V—V of Fig. 4; Fig. 6, a second modification of the tripping weight; Fig. 7, a sectional view taken along line VII—VII of Fig. 6; Fig. 8 is a detail view of the tripping weight member; and Fig. 9 is a sectional view, on a smaller scale, showing an oil bath for the governing mechanism.

The overspeed governing mechanism, hereafter referred to as the auto-stop governor, is mounted in a turbine-driven element or cap 10 having a thread 11 so that it can be screwed onto the end of the turbine shaft. The cap 10 is provided with an extension 12 having a diametral recess 13 with four shoulders 14, 15, 27 and 28, the top of the recess being threaded at 16 to receive the retainer ring, collar, or abutment 17 which is provided with a guide opening in which the weight 18 may slide. The retainer ring, collar or abutment 17 holds the spring 19 in place; and, due to the threaded connection thereof to the recess, the tension of the spring may be readily adjusted. The spring 19 also bears against the flange 20 of tripping weight or member 18 to maintain the flange in contact with the collar or abutment 21 when the turbine-driven element is rotating at normal speeds. The shoulder 15 and the abutment or collar 21 cooperate with the flange 20 to limit travel of the tripping weight 18, and thus the tripping weight 18 is prevented from passing beyond the point necessary to trip the lever 22 which acts through a suitable mechanism to shut off the supply of steam to the turbine. The tripping weight 18 is provided with a hollow or recess 32 for purposes hereinafter described and for the purpose of assuring that the center of gravity thereof shall be eccentric to the axis of rotation of the driven member so that, upon the attainment of a predetermined overspeed, the tripping weight moves out in response to centrifugal force to trip the element 22 in the usual way.

The retainer 17 is provided with a series of radial slots 23 cut around the edge into which the detention pin 24 may project and thus hold the retainer 17 in any desired position. The leaf spring 25 is connected to one end of the pin 24 to hold the latter in place, the spring in turn being held in place by means of the set screw 26.

The collar 21 tightly fits in the recess and is pressed up against the shoulder 27, being held firmly in place by means of the two pins 29 and 30.

In accordance with the form of our invention, shown in Figs. 1, 2, and 3, should it be desired to have the governor act at a speed below the predetermined speed, say 5% below, we have provided the detachable weight 31 which is mounted in the recess 32 of the tripping weight 18. The detachable weight is held in place by means of the two pins or lugs 33 carried by the weight 18 and which normally seat in recess 35 in the detachable weight, the spring 34 in recess 32 pressing against the detachable weight to hold the latter with the recesses seated about the pins or lugs.

Two slots 36 are cut the whole length of the detachable weight 31 which permit it to be removed. A slot 37 is provided across the face of the weight in order that a screw driver may be inserted to facilitate remov-

ing. The passage 38 through the center of the weight permits the escape of oil that may collect in recess 32 of weight 18.

To test the auto-stop governor the detachable weight 31 must be removed which causes the governor to act at 5% below normal speed instead of 10% above. To remove the detachable weight 31 together with the spring 34, it is simply necessary to push the weight in until it is disengaged from pins or lugs 33, then turn the weight 31 one-quarter of a turn until the slots 36, which extend the entire length of weight 31, register with pins 33. The spring 34 then forces the weight out to a point where it may be removed with spring attached.

In Fig. 4, showing a modification of the tripping weight or member, the weight or member 40 is provided with a recess 41 in the lower end in which is mounted a movable weight 42. In the normal running position as illustrated in the drawing, the weight is held in place by the two pins 43 mounted in the piston 44 of the weight, and also by the collar 45 pressed against the shoulder 46 and peaned firmly in place. The movable weight 42 is provided at its edge with two slots 47 extending the entire length of the weight which permit the weight to pass above the pins 43 and occupy the space between the pins and the bottom of the recess. The weight 42 is also provided with a slot 48 cut across the face which permits a screw driver to be inserted in order to turn the weight more easily. The passage 49 through the center of the weight permits any oil to escape which may be collected in the recess.

In order to test the auto-stop governor, it is simply necessary to insert a screw driver in the slot 48 and turn the weight 42 one-quarter of a turn until the slots 47, extending the whole length of the weight 42, register with the pins 43. The weight 42 may then be moved above the pins 43; and, when given a quarter turn, will be firmly held in place between pins 43 and the bottom of the recess 41. By thus moving the center of gravity of the centrifugal trip weight further away from the axis of rotation, the weight 40 will trip the element 22 at a speed of about 5% below normal instead of at about 10% overspeed.

While we have shown bayonet-like or pin and slot connections for securing the supplemental weight members 31 and 42 of Figs. 1 and 4, respectively, in position, it is to be understood that any suitable locking connection may be employed so long as such weight members may be readily locked in a single position only with respect to the tripping member (the element 18 of Fig. 1 or the element 40 of Fig. 4). In other words, the locking means should be capable of holding the supplemental weight member in a single position only with respect to the tripping member so that it may be removed when testing the governor and then may be replaced without the necessity for adjustment for a predetermined overspeed. When the auto-stop is installed, with the supplemental weight member locked in normal position, the tension of the spring 19 is adjusted until the tripping member moves out at a predetermined or desired overspeed. Thereafter, the supplemental weight may be removed, when making a test, and then it may be readily reinserted in its definitely locked position without disturbing the original setting and, therefore, without calling for readjustment.

In Fig. 6, there is shown a further modification of the tripping weight, in which the weight 50 is provided with a recess 51 threaded its entire length. The movable weight 52, due to the threaded connection with the recess, can be adjusted at will to vary the center of gravity of the weight 50. Here again the weight 52 is provided with a slot 53 in the face to permit the insertion of a screw driver to facilitate turning, and also with a passage 54 to permit oil to escape from the recess 51. The collar 55 is pressed up against shoulder 56 and peaned into place to prevent the weight 52 from coming out. In order to hold the weight 52 firmly in any desired position a lock nut 57 is provided, the nut having a slot 58 to permit the insertion of a screw driver so that it can be readily tightened against the movable weight 52.

In order to test the auto-stop governor it is simply necessary to loosen the lock nut 57, screw the movable weight 52 in until it occupies the bottom of the recess 51, and then screw lock nut 57 against it to hold it firmly in place. By thus moving the center of gravity of the centrifugal trip element further away from the axis of rotation, the weight will trip the element 22 at a speed of about 5% below normal instead of at about 10% overspeed.

As may be seen from Fig. 8, the tripping weight member, in the operation already referred to in connection with Figs. 1–5, inclusive, has two centers of gravity, namely, one (indicated at y), of greater eccentricity with respect to the axis of rotation (indicated by the line a—b) of the rotary member 10 when the supplemental weight member 31 is detached for testing purposes, and the other (indicated at x), a center of gravity of smaller eccentricity when the supplemental weight is in position. It will, therefore, be seen that we have provided means which renders the tripping weight of a governor of the character referred to readily susceptible of being tested without in any way disturbing the normal operative adjustment. Consequently, our improved governor may be readily and easily tested with a minimum of effort on the part of the operator.

While we have shown our invention in a plurality of forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications, without departing from the spirit thereof, and we desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What we claim is:—

1. In an auto-stop governing mechanism for rotary mechanism, the combination of a transversely movable tripping member, a detachable weight member, and releasable locking means for holding the detachable weight member in a single position only with respect to the tripping member, whereby, when the detachable weight member is locked in position the tripping member moves out to tripping position upon the attainment of a predetermined overspeed, and, when the detachable weight member is removed, the tripping member moves to tripping position at a speed below the predetermined overspeed.

2. In an auto-stop governing mechanism for rotary mechanism, the combination of a transversely movable tripping member, a detachable weight member, and means cooperating with the tripping member at its inner end to define a fixed position for and for holding the detachable weight member in that position so as to cause the tripping member to respond to a predetermined overspeed, said detachable weight member being provided with means whereby it may be removed from its position to secure tripping movement of the tripping member at a speed below said predetermined speed.

3. In an auto-stop governing mechanism for rotary mechanism, the combination of a transversely movable tripping member, an abutment carried by the tripping member, a detachable weight member, and means cooperating with the detachable weight member to maintain the latter in a predetermined position in contact with the abutment to render the tripping member responsive to a predetermined overspeed, said detachable weight member being provided with means whereby it may be removed to render the tripping member responsive to a speed below said predetermined overspeed.

4. In an auto-stop governing mechanism for rotary mechanism, the combination of a transversely movable tripping member, a detachable weight member, and a bayonet-like connection between the tripping member and the detachable weight member, whereby the detachable weight member may be readily secured to and removed from a predetermined and definite position with respect to the tripping member.

5. In an auto stop governing mechanism for rotary mechanism, the combination of a transversely movable tripping member having a recess at its inner end, one or more inwardly projecting lugs in the recess, a weight member having a longitudinal groove or grooves corresponding to the lug or lugs, whereby the weight member may be inserted in the recess and turned so as to be held by the lugs, and means cooperating with the weight member oppositely to the lug or lugs for holding it in position.

6. In an auto-stop governing mechanism for rotary mechanism, a transversely movable tripping member comprising an elongated body portion with a flange arranged at its inner end, a spring surrounding the elongated body portion and seating against the flange, means for varying the tension of the spring, a detachable weight member, and locking means arranged between the transversely movable tripping member and the detachable weight member, whereby the latter may be held in a predetermined and single position with respect to the tripping member to render the latter responsive to a predetermined overspeed, and, whereby, when the detachable weight member is removed, the tripping member is rendered responsive to a speed below the predetermined overspeed.

7. In an auto-stop governing mechanism for rotary mechanism, a transversely movable tripping member, adjustable means associated with the tripping member to oppose movement thereof to a tripping position until a predetermined speed of the rotary member is attained, a detachable weight member, a pin or pins carried by the tripping member and the detachable weight member being provided with a recess or recesses corresponding to the pin or pins, whereby the detachable weight member may be placed in position by passing the slot or slots thereof over the pin or pins and then turning it so that it rests against said pin or pins, and means cooperating with the detachable weight member for holding it in the latter position.

8. In an auto stop governing mechanism for rotary mechanism, a transversely movable tripping member having its center of gravity disposed eccentrically with respect to the axis of rotation of the rotary member and having a longitudinal recess therein, adjustable means associated with the tripping weight to oppose movement of the latter to a tripping position until a pre-determined speed of the rotary member is attained, a supplemental weight member within the longitudinal recess, inwardly projecting pins or lugs carried by the tripping member, slots or recesses on the supplemental weight member, the supplemental weight member being adapted to be placed into position by passing the slots thereof over

the lugs or pins and turning it so that the recesses thereof may be seated on the lugs or pins, and means for holding the supplemental weight member with the recesses seated on the lugs or pins.

9. The combination with a rotary member having a diametral opening, a tripping member in the opening and having a recess at the end opposite to the tripping end, a supplemental weight member in the recess, abutment means extending inwardly of said recess, said supplemental weight member being recessed so as to pass over said abutment means by longitudinal movement thereof with respect to the tripping member and to be turned so that one face of the supplemental weight member rests against said abutment means, and means cooperating with the tripping member and with the supplemental weight member for confining the latter with respect to the abutment means.

10. In an auto-stop governing mechanism for a rotary device, the combination of a tripping member movable transversely of the axis of rotation and having a longitudinal recess, one or more abutments extending inwardly from the sides of the recess adjacent to the open end thereof, a supplemental weight member having a recess or recesses to pass over the abutment or abutments, and elastic means in the recess for holding the supplemental weight member against the abutment or abutments after said weight member is turned to move the recess or recesses out of registry with the abutment or abutments.

11. The combination with a rotary member having a transverse opening, a tripping member in the opening and having a longitudinally-extending cylindrical recess, inwardly-extending lug or lugs on the interior of said recess, a supplemental weight member which fits the recess and which is recessed to pass over the lug or lugs, and a spring within the recess to hold the supplemental weight member in contact with the lug or lugs.

12. The combination with a rotary member having a transverse opening, a tripping member in the opening and having a longitudinally-extending cylindrical recess, inwardly-extending lug or lugs on the interior of said recess, a supplemental weight member which fits the recess and which is recessed to pass over the lug or lugs, and means cooperating with the tripping member and with the supplemental weight member for confining the latter in position with respect to the lug or lugs.

13. The combination with a rotary member having a transverse opening, a tripping member in the opening and having a longitudinally-extending cylindrical recess, inwardly-extending lug or lugs on the interior of said recess, a supplemental weight member which fits the recess and which is recessed to pass over the lug or lugs, said supplemental weight member having a tool-receiving portion in its exposed end, and means cooperating with the tripping member and with said supplemental weight member for confining the latter in position with respect to said lug or lugs.

In testimony whereof, we have hereunto subscribed our names this 4th day of June, 1920.

JOHN P. RIGSBY.
WILLIAM T. MANNING.