R. J. DAVIS.

DAMPER REGULATOR.

APPLICATION FILED AUG. 29, 1908.

990,236.

Patented Apr. 25, 1911.

7 SHEETS—SHEET 1.

Fig. 1.

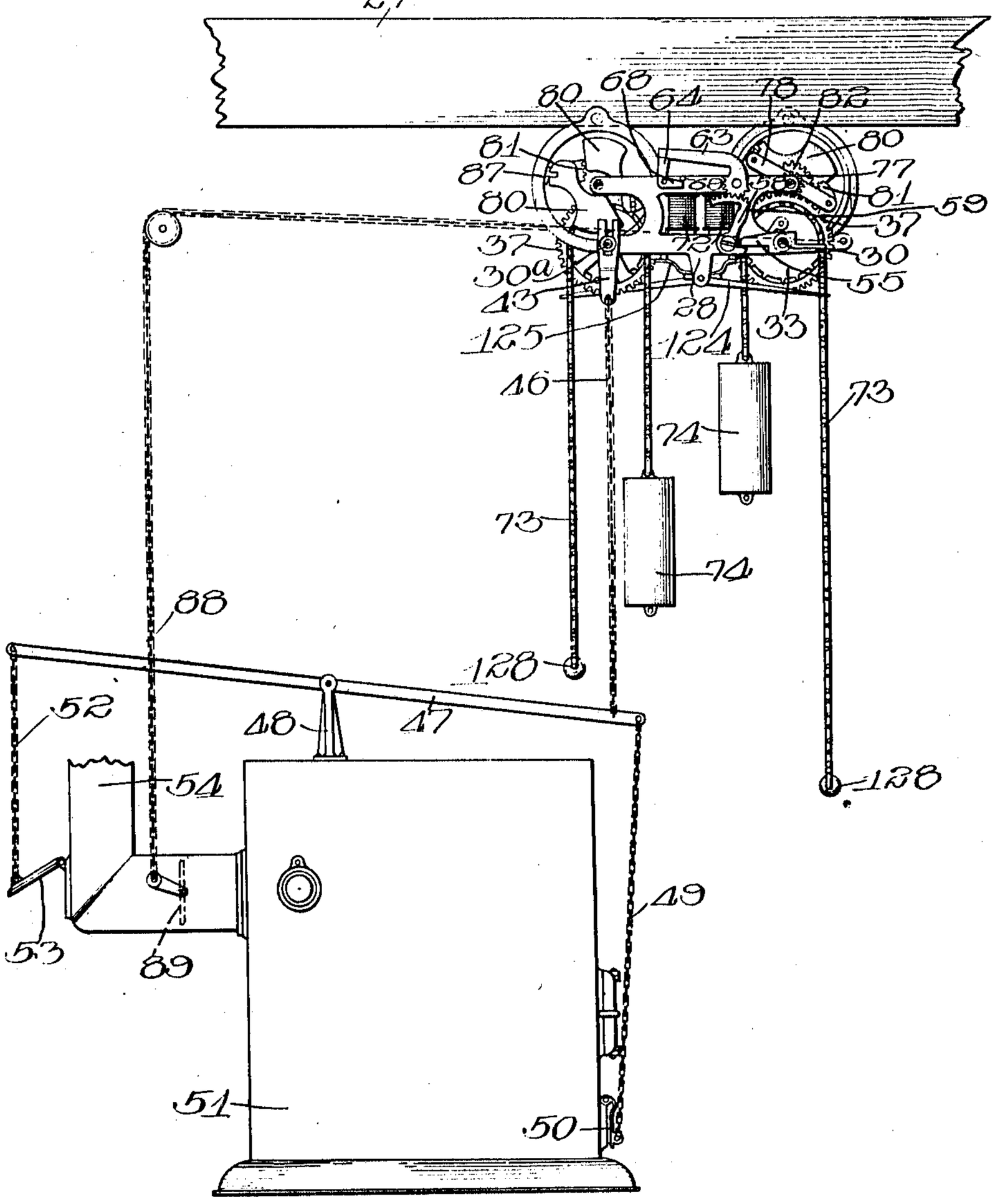
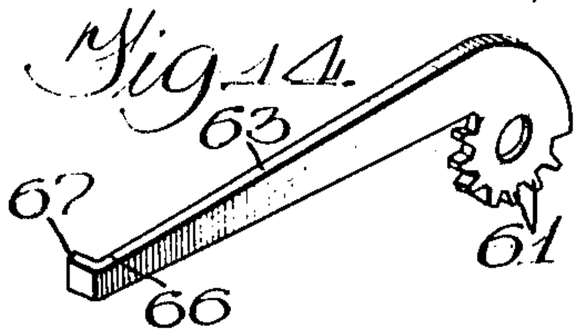


Fig. 14.



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7 SHEETS—SHEET 2.

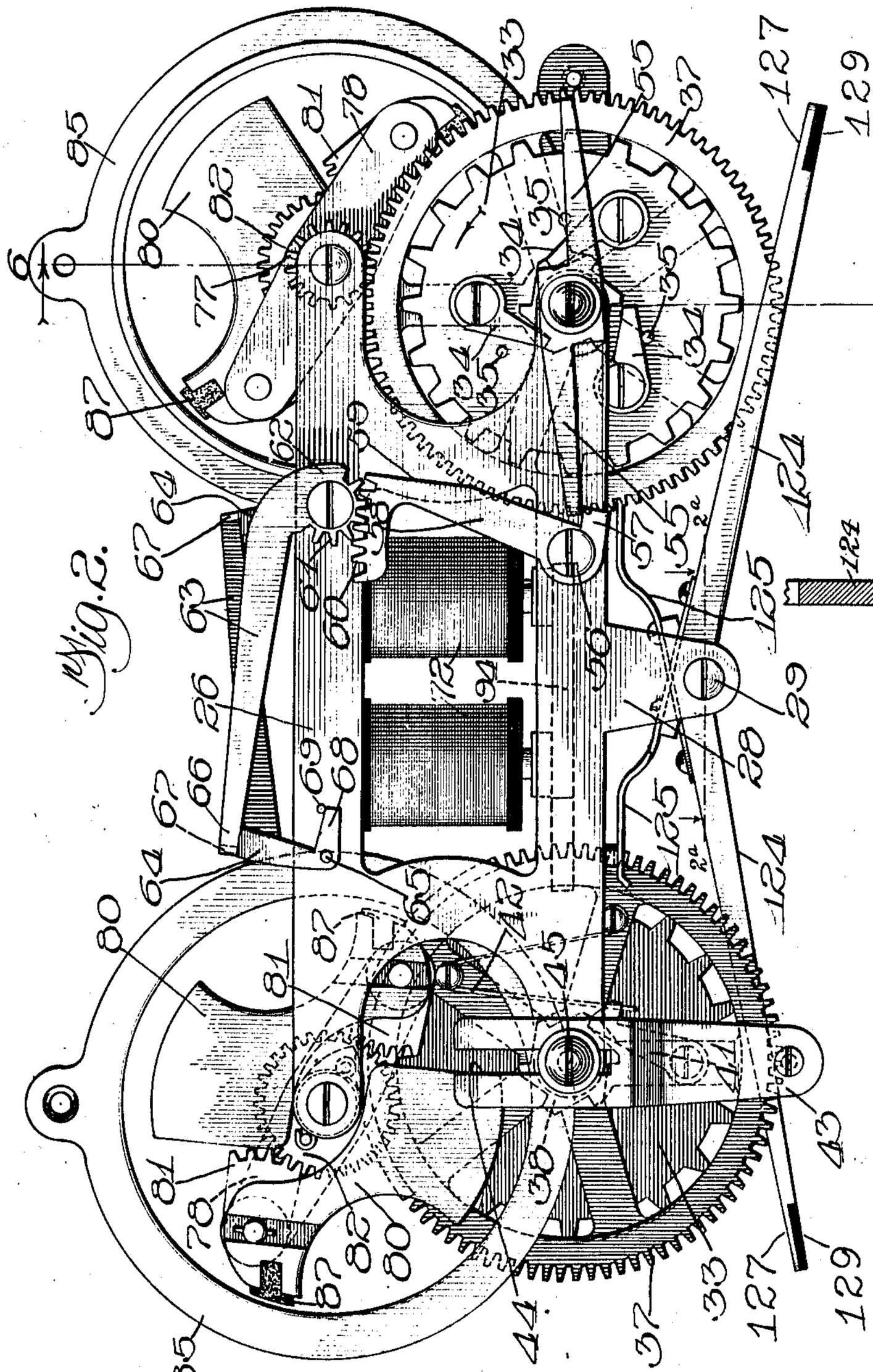

Fig. 2.

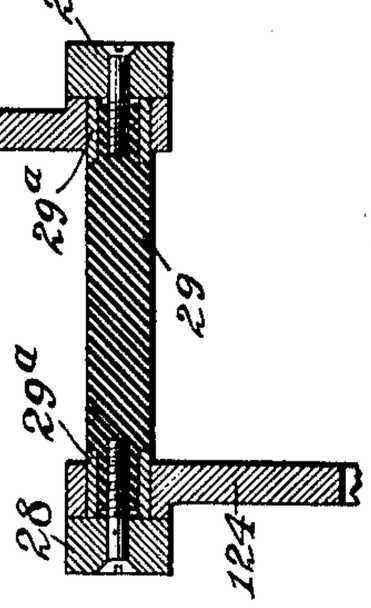

Fig. 2a

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7 SHEETS—SHEET 3.

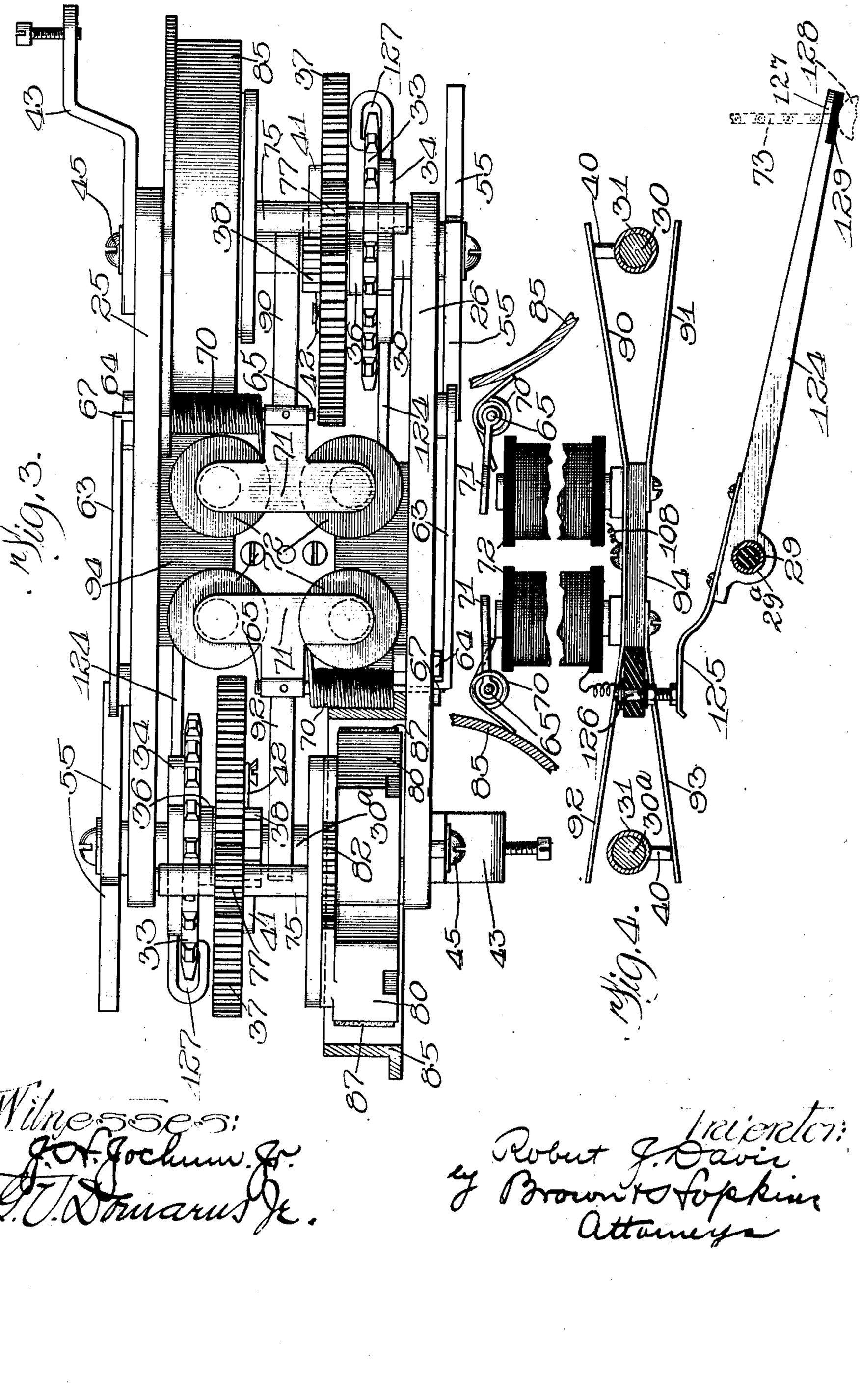

Fig. 3.

Fig. 4.

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7 SHEETS—SHEET 4.

Fig. 5.

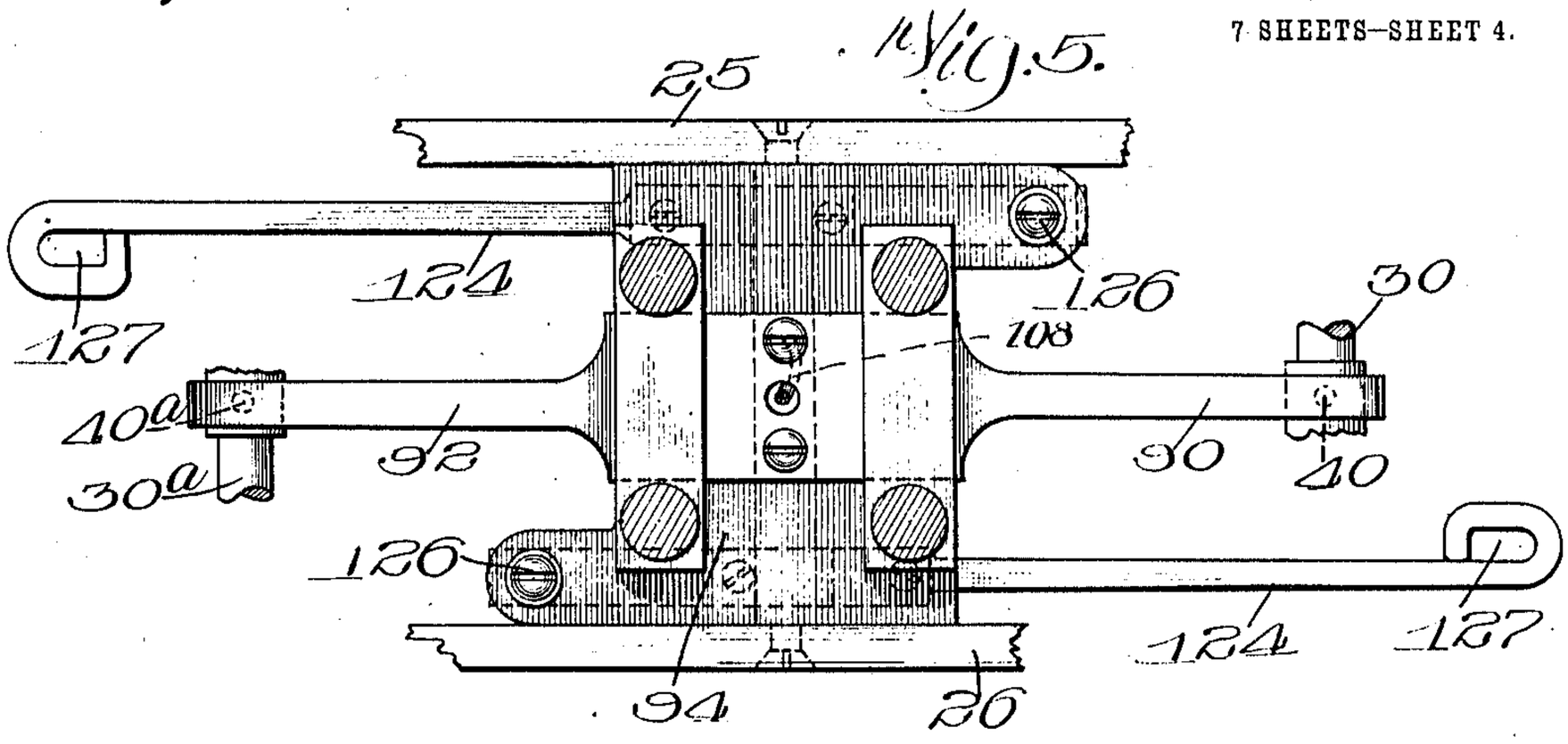


Fig. 6.

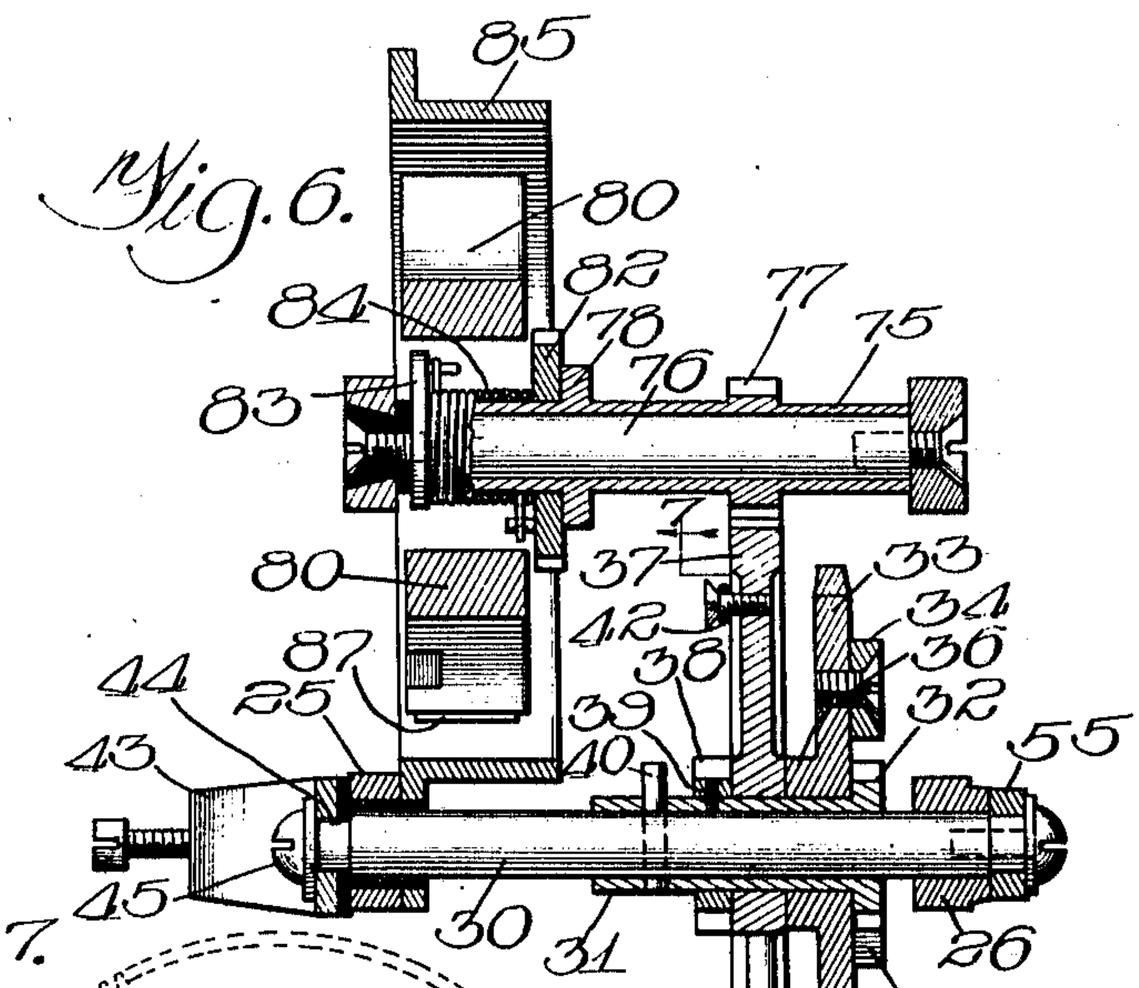


Fig. 7.

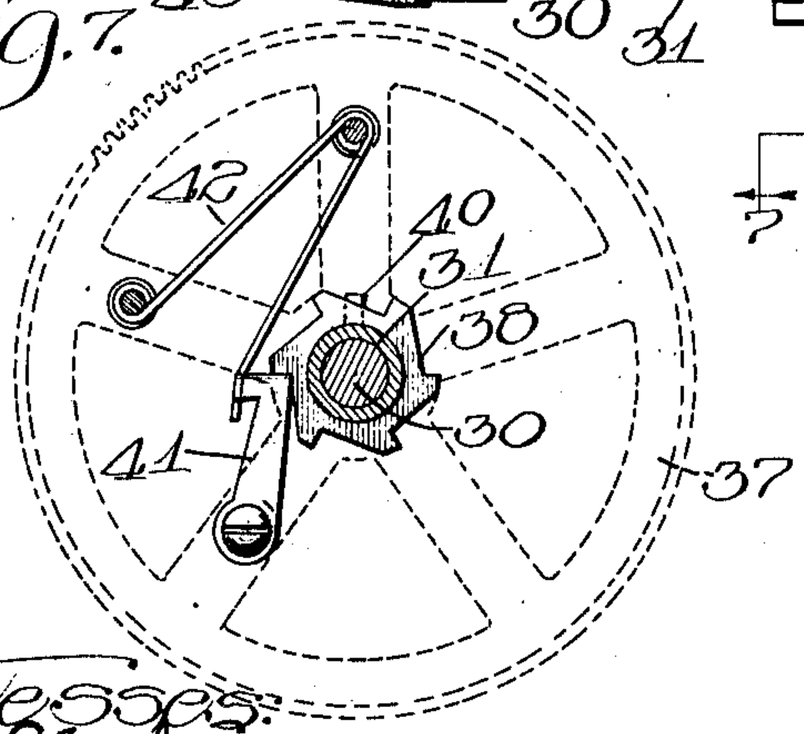
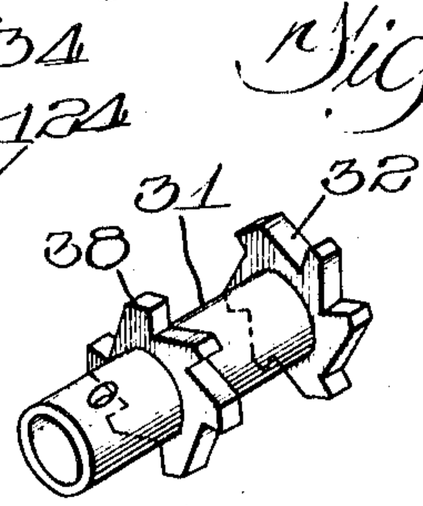


Fig. 8.



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7 SHEETS—SHEET 5.

Fig. 9.

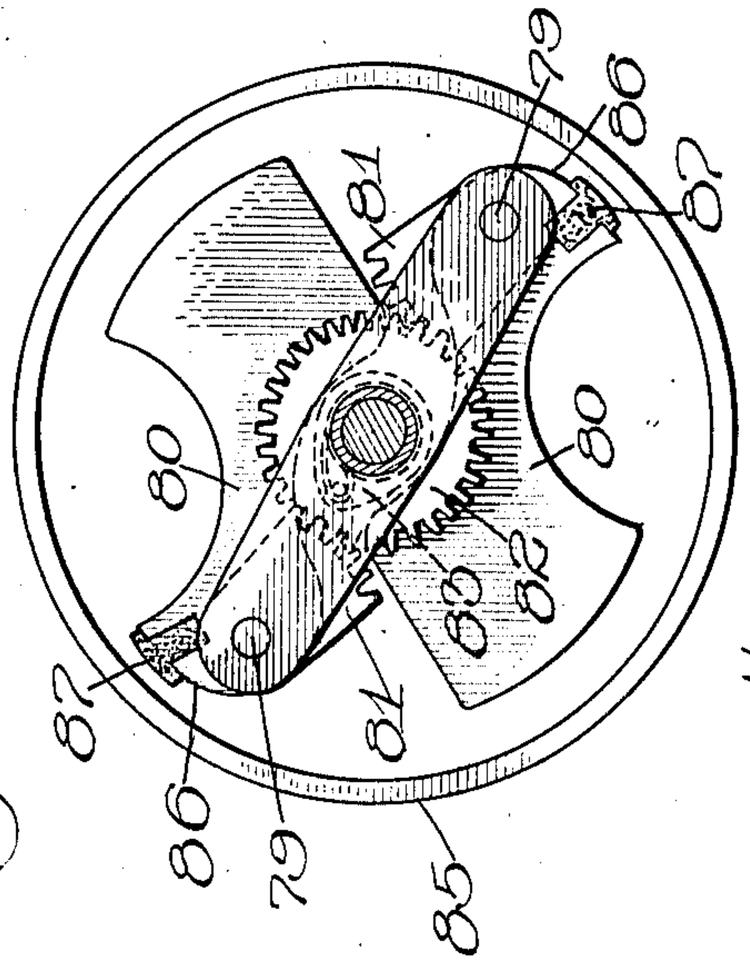


Fig. 10.

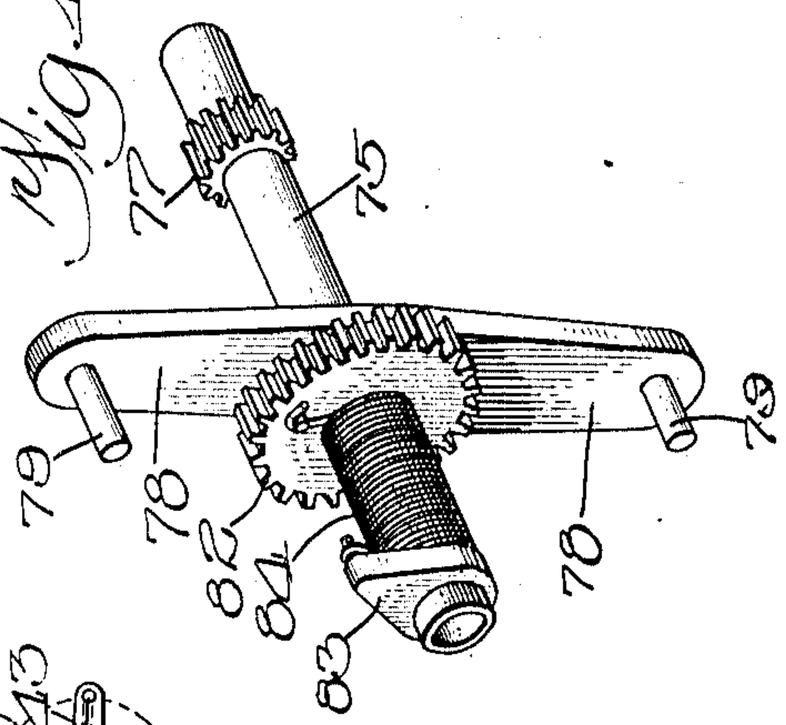
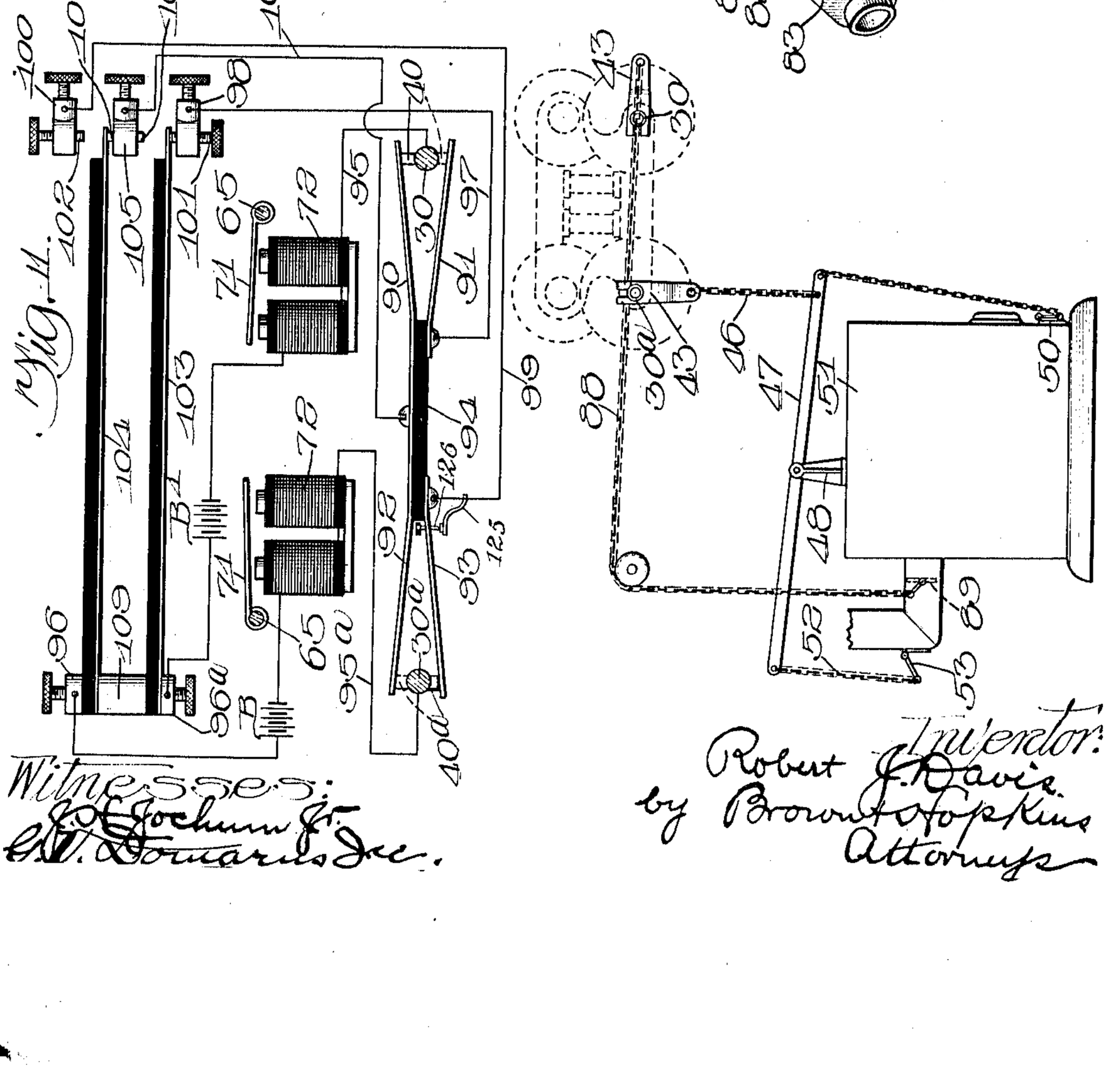


Fig. 11.



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7 SHEETS—SHEET 6.

Fig. 13.

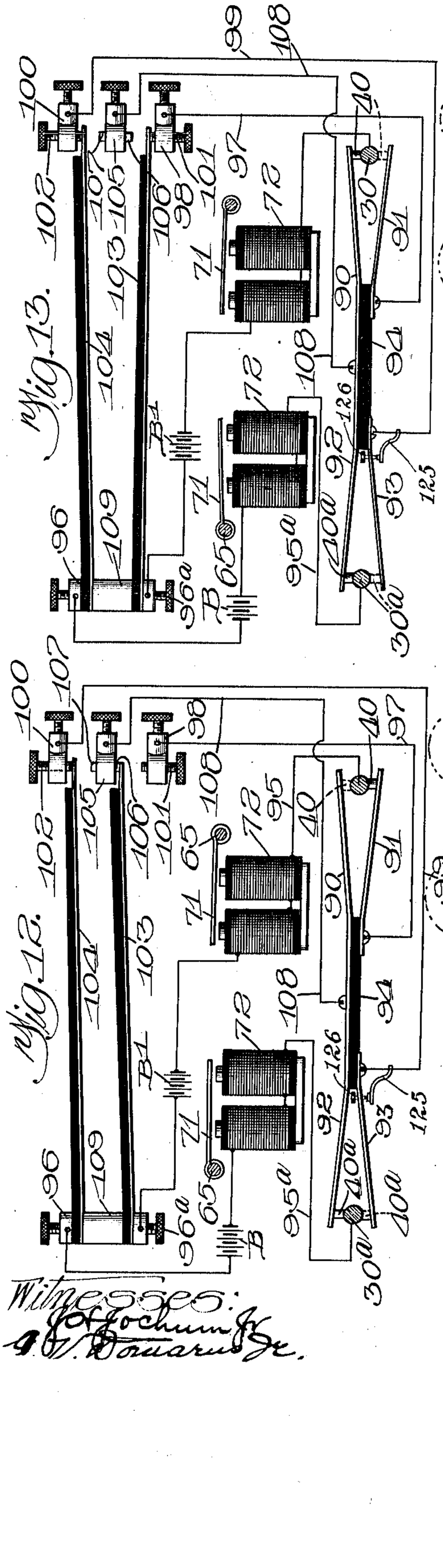
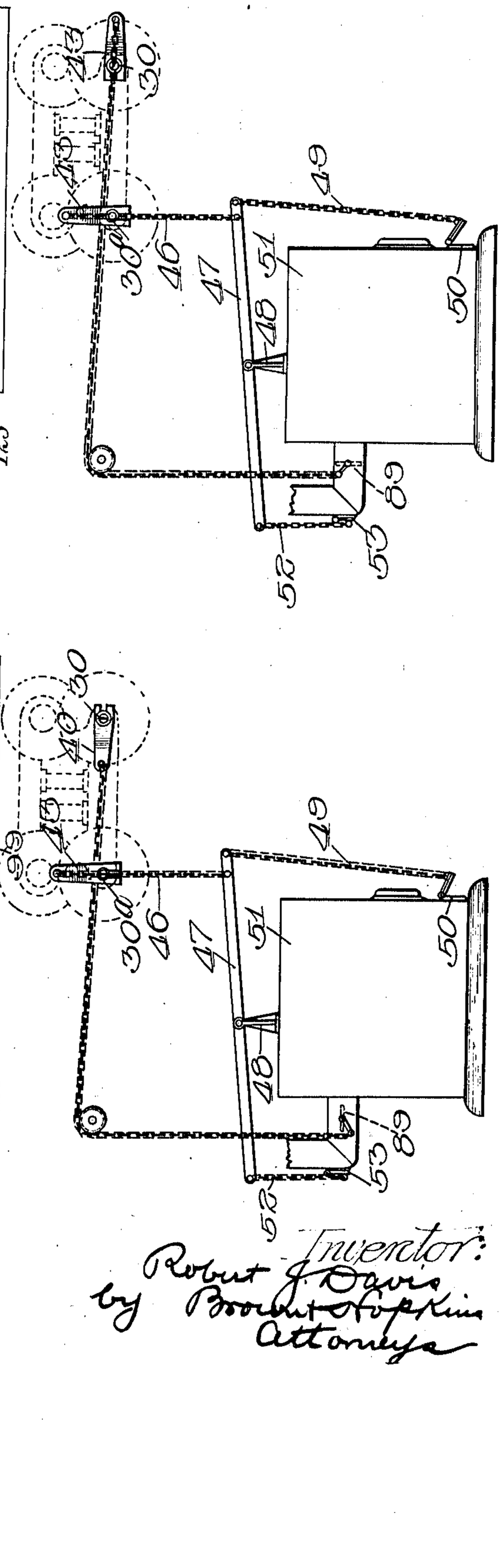


Fig. 12.



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DAMPER REGULATOR.

APPLICATION FILED AUG. 29, 1908.

990,236.

Patented Apr. 25, 1911.

7 SHEETS—SHEET 7.

Fig. 15.

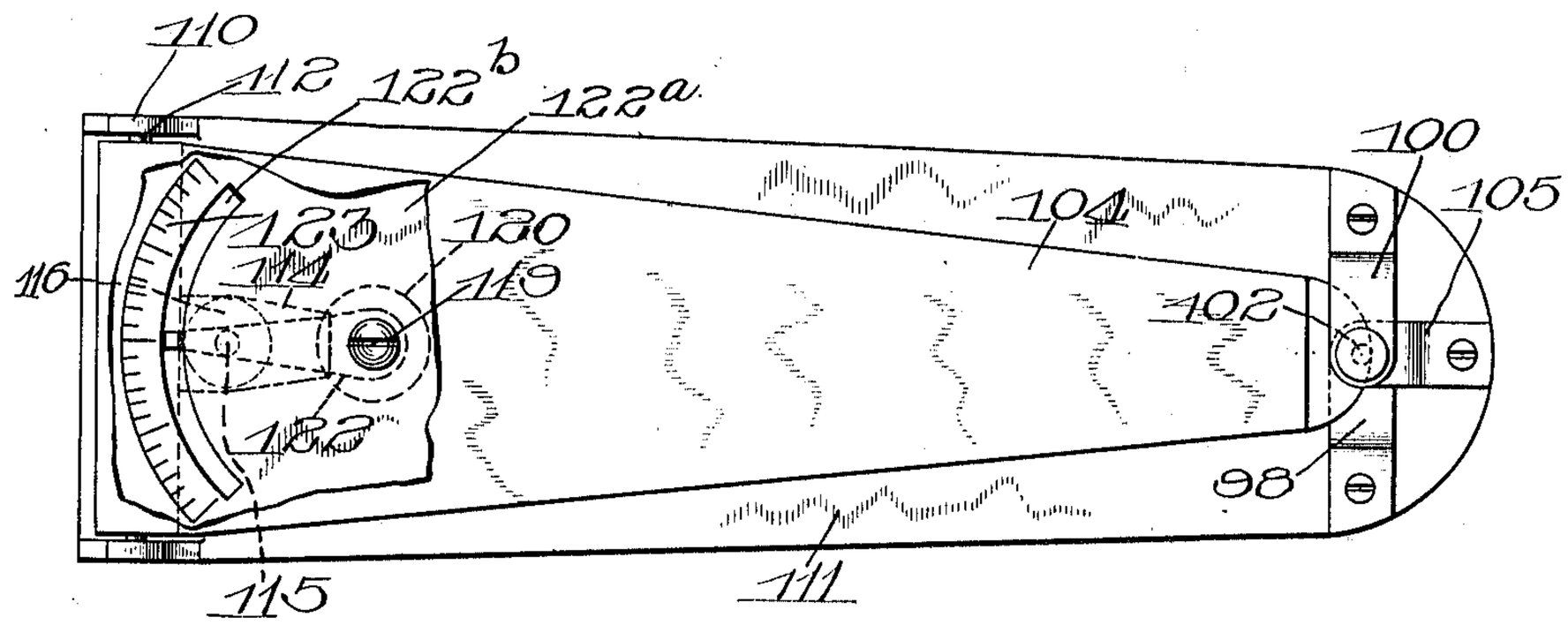
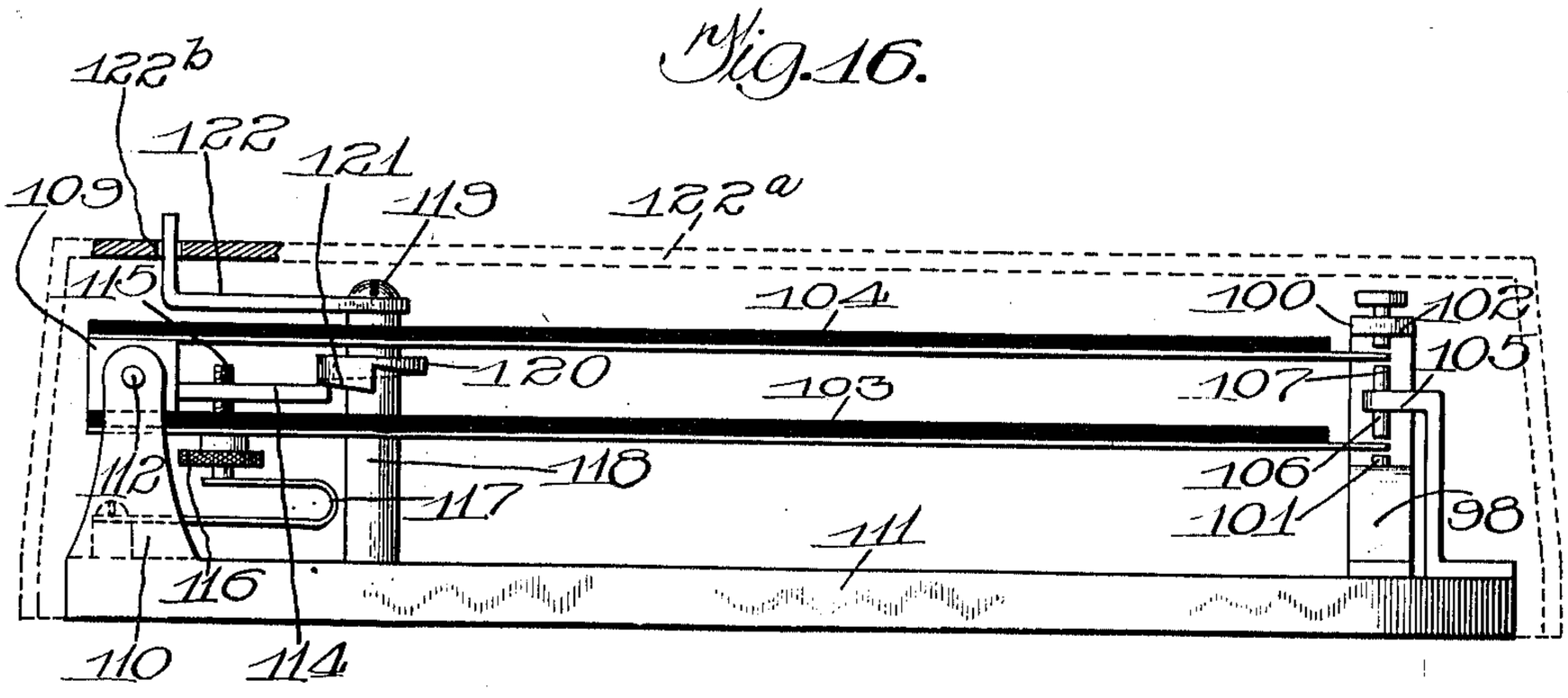


Fig. 16.



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UNITED STATES PATENT OFFICE.

ROBERT J. DAVIS, OF CHICAGO, ILLINOIS.

DAMPER-REGULATOR.

990,236. Specification of Letters Patent. Patented Apr. 25, 1911.

Application filed August 29, 1908. Serial No. 450,882.

To all whom it may concern:

Be it known that I, ROBERT J. DAVIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Damper-Regulators, of which the following is a specification.

This invention relates to improvements in damper regulators and more particularly to automatic damper regulators and the primary object of the same is to provide an improved device of this character which will be automatically controlled by the temperature of the room to automatically adjust the dampers of a furnace or the like.

A further object is to provide improved means for limiting the adjustment of the dampers.

A further object is to provide an improved device of this character including improved electrically controlled means for releasing the mechanism to permit the same to operate, and improved means whereby the releasing mechanism will be controlled by the temperature of the room.

A further object is to provide improved means for preventing the mechanism from being jarred by suddenly stopping the same.

A further object is to provide an improved thermostatic controlling device whereby the temperature of the room may be kept within certain predetermined degrees, and improved means for adjusting the thermostat whereby the range of degrees may be varied.

A further object is to provide an improved safety atachment for throwing the mechanism out of operation.

A further object is to provide an improved device of this character which will be simple and durable in construction, readily installed and effective and efficient in operation.

To the attainment of these ends and the accomplishment of other new and useful objects, as will appear, the invention consists in the features of novelty in the construction, combination and arrangement of the several parts hereinafter more fully described and claimed, and shown in the accompanying drawings illustrating an embodiment of the invention, and in which—

Figure 1 is an elevation of an improved device of this character constructed in accordance with the principles of this invention, and showing the same as applied to a furnace, the furnace being shown in diagram. Fig. 2 is an enlarged detail view of an improved controlling device constructed in accordance with the principles of this invention and with parts of the mechanism removed. Fig. 2ª is a detail sectional view showing the supporting axle and the safety levers, with portions of the levers broken away and as taken on line 2ª—2ª, Fig. 2. Fig. 3 is a detail top plan view, partly in section, of Fig. 2. Fig. 4 is an enlarged detail view, partly in section and partly in diagram, showing the circuit controlling mechanism and the safety device. Fig. 5 is an enlarged detail plan view, partly in section, of a portion of the mechanism showing the circuit making and breaking mechanism. Fig. 6 is a detail sectional view on line 6—6 of Fig. 2. Fig. 7 is a detail sectional view on line 7—7 of Fig. 6. Fig. 8 is a detail perspective view of the sleeve for supporting the gear wheels, and the ratchets for locking the gears to the damper operating shafts. Fig. 9 is a detail view of the governor or brake for preventing the mechanism from stopping too suddenly. Fig. 10 is a detail perspective view of the supporting and controlling members for the governor or brake elements. Figs. 11, 12 and 13 are diagrammatic views showing the circuits and the position of the dampers in the various positions of the circuit controlling mechanisms. Fig. 14 is a detail perspective view of one of the members for locking the controlling dog in its adjusted position for limiting the adjustment of the dampers. Fig. 15 is a top plan view of the thermostatic controlling device showing a portion of the inclosing casing. Fig. 16 is an elevation of the thermostat showing a portion of the inclosing casing in section.

Referring more particularly to the drawings and in the present exemplification of the invention, the support for the operating mechanism preferably comprises spaced members 25, 26, which are constructed of metal and may be secured to a suitable support 27. Each of these members 25, 26, is provided with a depending portion 28 located preferably between the extremities thereof which are connected by means of a suitable bolt or pin 29 which serves the purpose of holding the members spaced and also as a support for the safety attachments to be hereinafter described. Extending across the space between the members 25 and 26, adja-

cent each extremity thereof and in proximity to the lower edge of the members, is a shaft 30 and as the mechanism which is mounted upon and operated by each of the shafts is identical in construction, the specific description of one of the mechanisms will apply equally as well to the other.

A sleeve 31 is mounted upon the shaft 30 and is secured for rotation therewith in any desired or suitable manner. This sleeve 31 is of some length and is provided adjacent one extremity, preferably the extremity in proximity to the side member 26 of the supporting frame, with a ratchet wheel 32 and loosely mounted upon the sleeve is a sprocket wheel 33 pivotally secured to the outer face of which are a plurality of ratchet dogs 34, which latter are located beyond the ratchet wheel 32 and are adapted to coöperate therewith to lock the sprocket wheel 33 for rotation with the sleeve 31. Any number of these dogs or pawls 34 may be provided but in the present exemplification of the invention three are shown. These dogs may be controlled by gravity or in any other suitable manner and, if desired, suitable stops 35 may be provided for limiting the outward movement of the dogs. The sprocket wheel 33 is mounted upon the sleeve 31 in close proximity to the ratchet 32 and is preferably provided with a hub 36 which extends beyond the opposite face of the sprocket wheel for holding a gear wheel 37 which is also loosely mounted upon the sleeve 31, spaced from the sprocket 33 and which gear wheel is preferably of a greater diameter than the diameter of the sprocket wheel 33.

Mounted upon the sleeve 31 and beyond the opposite face of the gear wheel 37 and in close proximity thereto, is another ratchet 38, which is preferably of a diameter equal to the diameter of the ratchet 32 and this ratchet 38 is secured for rotation with the sleeve 31 in any desired or suitable manner, preferably by means of a fastening device 39 which passes through the ratchet and engages the sleeve 31. The ratchet 38 is also adapted to coöperate with the ratchet 32 to hold the sprocket 33 and gear 37 from longitudinal movement on the sleeve 31. The sleeve 31 preferably extends for some distance beyond the ratchet 38 and is secured for rotation with the shaft 30, preferably by means of a pin or projection 40 which extends through the sleeve 31 and the shaft 30, and one extremity of this pin or projection 31 projects beyond the sleeve to form a circuit making and breaking device, to be hereinafter described.

Pivotally mounted upon the gear 37 is a dog or pawl 41, which coöperates with the ratchet 38 to lock the gear 37 for rotation with the sleeve 31, and this dog or pawl 41 may be controlled in any desired or suitable manner, preferably by means of a spring 42 which is secured to the face of the gear 37 and which tends normally to hold the dog in engagement with the ratchet.

Secured to one extremity of the shaft 30, preferably beyond the member 25 of the supporting frame work, is an arm 43 which is preferably provided with a bifurcated extremity 44 adapted to receive one extremity of the shaft 30 and is secured in position by means of a suitable fastening device 45, preferably in the form of a screw and by means of which the arm may be adjusted for taking up the slack in the flexible member 46 (see Fig. 1) one extremity of which latter is secured to the arm 43 and the other extremity to an operating lever 47 which is pivotally mounted between its ends upon a fulcrum 48. One extremity of the lever 47 is preferably connected by means of a flexible member 49 to one of the dampers 50 of the furnace 51 and the other extremity of the lever is connected by means of a flexible member 52 to a damper 53 in the smoke box or chimney 54 of the furnace, so that upon each step of rotation of the shaft 30, the arm 43 will be rotated to move the lever 47 about its fulcrum to open or close the dampers 50, 53, respectively, according to the direction of movement of the lever 47. Secured to the opposite extremity of the shaft 30, preferably on the outside of the member 26 of the supporting frame and intermediate its ends is an arm 55 which is preferably of a length substantially equal to the diameter of the gear 37.

Pivotally mounted upon the frame work is a dog 56, one extremity 57 of which is adapted to be projected into the path of the rotary movement of the extremities of the arm 55. The other extremity 58 of the dog 56 preferably extends for some distance beyond the pivot thereof and is provided with an inclined or cam face 59 which normally stands beyond the path of movement of the extremities of the arm 55 when the extremity 57 thereof is projected into the path of movement of the arm. The extremity 58 of the dog is provided with a rack or spaced teeth 60, preferably in the form of a segment, and meshing with said segment are a plurality of gear teeth 61 which are provided on the extremity 62 of an arm 63, which latter is pivotally supported adjacent the dog 56 so that when the extremity 57 of the dog 56 is moved into or out of the path of arm 55 on shaft 30, the dog 56 through the medium of its rack or teeth 60 and teeth 61 on arm 63 will cause the latter to move about its pivot. The extremity 57 of the dog 56 may be locked into the path of movement of one of the extremities of the arm 55 in any suitable manner, preferably by means of a bell crank lever 64 which is pivotally supported as at 65 adjacent the free extremity 66 of the arm 63. The free ex-

tremity 66 of the arm 63 is deflected laterally as at 67 and is adapted to engage and rest upon one arm of the bell crank lever 64 when the arm 63 has assumed a position in which the extremity 57 of the dog 56 is in the path of movement of the extremities of the arm 55 and the other arm 68 of the bell crank lever is adapted to engage a suitable stop 69 for holding the lever in a position to lock the lever 63 against movement about its pivot.

When the bell crank lever 64 is rocked about its pivot 65 so that the arm 68 thereof will move away from the stop 69, the free extremity of the arm 63 will be released and will fall by gravity, which movement will, through the medium of the gear and rack 61, 60, and reinforced by the action of the weight 74 acting through arm 55 against the extremity 57 of the dog 56 rock the dog about its pivot to move the extremity 57 thereof out of the path of movement of the advancing extremity of the arm 55 as the latter is rotated. This movement of the dog 56 will cause the cam face 59 thereof to move into the path of movement of or assume a position to be engaged by the next advancing extremity of the arm 55 and when so engaged a further movement of the arm in the same direction will rock the dog 56 about its pivot in the opposite direction, which movement will, through the medium of the segment 60 and gear 61, raise the free extremity of the arm 63 and cause the extremity 57 of the dog to be again projected into the path of movement of the advancing extremity of the arm.

The bell crank lever 64 is preferably controlled by an elastic member 70 which surrounds the shaft or pivot 65 thereof and tends normally to hold the extremity 68 against the stop 69 so that when the bell crank lever is rocked to release the arm 63 it will be moved against the tension of the elastic member 70 and the deflected portion 67 of the arm will pass over the bell crank as it descends and as shown more clearly in Fig. 3 of the drawings. When the arm 63 is moved by the dog 56 and when the deflected extremity 67 thereof has passed above the bell crank lever, the latter will, through the medium of the elastic member 70, assume a position within the path of the return movement of the deflected extremity 67 so that the latter will engage and rest upon the bell crank lever to lock the parts in their adjusted position.

The bell crank lever 64 may be rocked in any desired or suitable manner but there is preferably provided an armature 71 which is secured to the pivot shaft 65 of the lever and this armature is controlled by suitable electro-responsive devices 72 in the form of magnet coils, so that when the electro-responsive devices are energized they will attract the armature 71 which will rock the pivot shaft 65. When the electro-responsive devices are deënergized, the armature 71 and bell crank lever 64 will be moved in the opposite direction by the elastic member 70.

The shaft 30 is rotated by means of the sprocket 33 and any suitable means may be provided for rotating the sprocket, such as a flexible member 73, preferably in the form of a sprocket chain, which hangs upon and passes over the sprocket wheel. This flexible member may be of any desired or suitable width and to one extremity thereof is secured a weight 74 which is adapted to draw the sprocket chain 73 over the sprocket wheel during which movement the latter will be rotated and as the sprocket is locked for rotation with the shaft 30 through the medium of the dogs or pawls 34, ratchet 32 and sleeve 31, the shaft will be also rotated. When the projection 57 on the dog 56 is engaged by one extremity of the arm 55, the sprocket 33 will be held against rotation but when the dog 56 is rocked to release the arm 55, the weight 74 will fall and rotate the sprocket 33 which rotary motion will continue until the projection 57 is engaged by the opposite extremity of the arm 55.

In order to prevent the mechanism from becoming jarred by suddenly arresting the falling movement of the weight 74, a suitable governor mechanism or brake may be provided. This governor or brake comprises a sleeve 75 which is rotatable about an axle 76 and is provided with a gear 77 which meshes with the gear 37. The sleeve 75 is provided with projecting arms 78 disposed diametrically opposite to each other and pivotally mounted upon the extremity of each of these arms, by means of projecting pins or axles 79, are weighted clutch or brake members 80, which are provided with segments 81 adapted to mesh with a gear 82, which latter is loosely mounted on the sleeve 75 between the members 80 and preferably adjacent the arms 78. The sleeve 75 is provided with a projection 83 which is located on the end of the sleeve adjacent the gear 82 and is spaced from said gear. An elastic member 84 in the form of a coil spring is located between the gear 82 and the projection 83 and surrounds the intermediate portion of the sleeve 75. One extremity of the elastic member 84 is secured to the projection 83 and the other extremity to the gear 82 so that when the gear 82 is rotated upon the sleeve 75 through the medium of the segments 81 by the separation of the members 80, a tension will be exerted upon the elastic member 84, which tension will tend to normally hold the members 80 in proximity to each other and out of operative position. The members 80 are inclosed within an encircling rim or casing 85, which may be secured to the side members 25, 26

of the supporting frame and is adapted to be engaged by the portions 86 of the members 80 when the latter are separated so as to act as a brake or governor for retarding the rotary movement of the shaft 30. If desired, a suitable pad 87, which may be constructed of any suitable insulating material, may be secured to the bearing faces 86 of the members 80 to increase the friction and to prevent the wearing of the parts. It will be thus seen that when the weight 74 is permitted to descend to rotate the shaft 30, the gear 37 will also be rotated as well as the sleeve 75 and gear 82 and the latter at a much higher rate of speed, which in turn will separate the members 80 by centrifugal force, and force the bearing surfaces 86 into engagement with the flange or rim 85 so as to create a friction between the parts and retard the downward movement of the weights, allowing the latter to stop easily while the most rapidly moving parts, consisting of the governor (Fig. 9) is allowed to run on in advance through the medium of the ratchet 38 on the sleeve 31 and pawl 41 on the gear wheel 37 until it gradually loses its momentum, thereby preventing any jerk and consequent strain to the mechanism through coming to a sudden stop.

As before stated, the construction and operation of each of the mechanisms for controlling certain of the dampers is the same and are arranged in tandem. In order to assemble the mechanism so as to be as compact as possible, one of the arms 43, the controlling dog 56, arm 63, and bell crank lever 64 are placed on one side of the supporting frame while the other is placed on the opposite side, the two electro-responsive devices 72 being arranged between the members of the frame and between each of the mechanisms. For the purpose of more clearly describing the operation of the machine, the two main shafts of the mechanism to which the various dampers are connected are designated in the diagrammatic views as 30 and 30ª while the pins 40 which act as circuit makers and breakers are designated respectively as 40 and 40ª.

The arm 43 on one side of the mechanism is connected to the flexible member 46 in the manner already described for controlling the dampers 50 and 53 and the arm 43 on the opposite side is connected by means of the flexible member 88 to the damper 89, and each of the arms is controlled by separate electro-responsive devices, each of which is arranged to be energized independently of the other and respectively by predetermined temperatures.

Supported by the frame work are two pairs of contact members 90, 91, and 92, 93. The contact members 90, 92 are electrically connected with each other, while the contacts 91, 93 are insulated from each other and from members 90, 92, by means of a suitable insulating block 94. The coöperating pairs of the contact members are adapted to respectively stand astride of the shafts 30, 30ª, so that when the shafts are rotated the respective pins 40, 40ª will move into engagement with one of the coöperating contacts and out of engagement with the other contacts.

Each of the electro-responsive devices 72 is connected to one of the shafts 30, 30ª by means of suitable conductors 95, 95ª and to separate binding posts 96, 96ª, and the contact 91 is connected by means of a conductor 97 to a binding post 98. The contact 93 is connected by means of a conductor 99 to a binding post 100 which is separated from and located in proximity to the binding post 98. The binding posts 98, 100 are provided with contacts 101, 102 to be respectively engaged by thermostatic members or bars 103, 104, which are secured respectively to the binding posts 96ª, 96, and are separated from each other. These thermostatic bars or members 103, 104 may be of any desired and well known construction so as to be readily influenced by heat and cold to cause them to automatically engage or disengage their respective contact points in the ordinary and well known manner.

A third binding post 105 is disposed between the binding posts 98, 100 and is provided with contact points 106, 107 disposed opposite to each other and in such positions as to respectively coöperate with the contact points 101, 102 and between which respective coöperating contact points, the respective thermostatic bars or members 103, 104 are adapted to move and to alternately engage. The binding post 105 is connected by means of a suitable conductor 108 with the contacts 90, 92.

The thermostatic bars 104 are each preferably formed of two strips of material, which expand at different ratios under the influence of heat, such as hard rubber and a metal, the hard rubber being preferably located, in the exemplification shown, on the same side of the respective thermostatic bars.

These thermostatic bars are secured at one end preferably to the spacing insulating block 109, such as fiber or the like, which separates the thermostats and this block is pivotally supported between projecting lugs 110 on a suitable insulating base or support 111 by means of suitable pivot pins or lugs 112. The binding posts 98, 100, 105 to which the contacts 101, 102 and 106 and 107 are secured, and between which the free ends of the thermostatic bars 103, 104 move, are preferably secured to the opposite end of the base 111. The thermostatic bars are mounted to move in unison and, being each constructed of the same material, will al-

ways move in the same direction and to the same extent under the influence of heat or cold, unless the motion of either is arrested by its meeting one of the contacts.

As the rubber expands to a greater extent than the metal under the influence of a rising temperature, the free ends of the thermostatic bars will move in a downward direction with a rising temperature if the rubber is placed on the upper side of the metal, and with a falling temperature they will move in the opposite direction. The contacts 102, 107, and 101, 106 between which the free ends of the thermostatic bars respectively move may be so adjusted by means of the contact screws 102, 101 that a change of one degree in temperature is sufficient to cause the thermostats to cross the intervening space and make contact either on one side or the other according to the direction of movement of the thermostats caused by the change of temperature. In the exemplification and diagrammatic views herein shown, the thermostatic bars are located one above the other but it is, of course, to be understood that they may be placed in any desired position, but in the description they will be referred to as being located one above the other.

The upper thermostat 104 is designed to operate the drafts 50, 53, when the shaft to which the lever 47 is connected is rotated and the lower thermostat 103 is designed to operate the damper 89 in the smoke pipe. Under normal conditions the thermostat 104 and drafts 50, 53, are adapted or so positioned to keep the temperature under proper control and the thermostat 103 will remain inactive with the damper 89 which is controlled thereby in a closed position and is adapted to be opened only when for any cause the temperature has fallen below a predetermined point, at which time the thermostat 103 will be operated to complete the circuit through the respective motor to open the damper 89 until the temperature has again become normal when the thermostat will move in the opposite direction to close the damper, which will remain closed as long as the temperature is normal or above normal, as will be more fully described.

Secured to the spacing block 109 and preferably projecting between the thermostatic bars 103, 104, is an arm 114 which projects for some distance beyond the pivot 112. An adjusting screw 115 passes through one of the thermostatic bars, preferably the bar 103, and has a threaded engagement with the arm 114. The screw 115 is provided with a head 116 which engages or rests against the face of the thermostatic bar 103 so that by rotating the head 116 the screw 115 will adjust the respective thermostatic bar with respect to the other thermostatic bar to vary the distance between the ends of the bars. A suitable elastic member 117, such as a spring or the like, may be secured by one extremity to the base 111 and the free extremity thereof is adapted to rest against and engage one extremity of the screw 115 and tends normally to move the thermostatic bars in one direction about their pivots.

In order to vary the range of temperatures between which the respective thermostats are adapted to control the circuits, a suitable adjusting member 118 is provided. This member 118 is preferably in the form of a sleeve which loosely surrounds a supporting member 119 in the form of a screw or bolt which preferably passes freely through the thermostatic members 103, 104, adjacent their pivot. This sleeve or member 118 is provided with a shoulder 120 having a cam face 121 which is adapted to project over and engage the free extremity of the arm 114 and the elastic member 117 is adapted to normally hold the extremity of the arm 114 adjacent the cam face 121, so that when the sleeve or member 118 is axially rotated, the cam face 121 will move the arm 114 in one direction to rock the thermostatic members about their pivot against the tension of the elastic member 117. If desired, a suitable handle or crank 122 may be provided for rotating the sleeve or member 118 to adjust the block 109. A suitable scale or graduation 123 may be provided preferably upon the inclosing casing 122^a of the thermostatic bars which indicates the different degrees of temperature and with which the handle 122 coöperates, and which latter projects through a slot 122^b in the casing so that by moving the handle 122 to indicate a predetermined degree of heat, the thermostats will be correspondingly adjusted and when so adjusted the handle will always indicate the degree of heat at which the thermostatic bar 104 will be in equilibrium between the contact points 102, 107 so that a slight change of temperature will cause it to make contact with either one or the other of the contact points.

By means of the screw 115 the thermostatic bar 103 is intended to be fixed in permanent adjustment relatively to bar 104 so as to always operate their respective drafts at the same relative difference in temperature independent of the position in which it may be set by member 118. Referring to Fig. 11 with bars 103 and 104 in contact as there shown, let the screw 115 be turned so as to cause bar 103 to press against contact 101 with a greater tension than that with which bar 104 presses against contact 107. Then with a falling temperature bar 104 will first act by moving toward and engaging with contact 102 and set drafts 50,

53, as in Fig. 13. During this period the tension of bar 103 against contact 101 has been diminishing and after a sufficient fall predetermined by the initial tension caused by screw 115 the tension will have become zero and any further fall in temperature will now cause bar 103 to move toward and engage with contact 106 and set damper 89 as in Fig. 12. During this period bar 104 has pressed against contact 102 with a continually increasing tension until when bar 103 has engaged with contact 106 the tension of bar 104 against contact 102 is equal to the initial tension of bar 103 against contact 101. Now under the influence of a rising temperature, the operation just described would be repeated in the same manner but in an opposite direction.

If the thermostatic bar 103 is so adjusted in relation to bar 104 by the screw 115 that when member 118 is so turned as to bring the bar 104 into contact with the point 102, bar 103 will be in contact with point 101, each bar being under no tension against its respective contact. In this position the thermostat 103 would then operate at exactly one degree of temperature below that at which the thermostat 104 operates, because in this instance a change of temperature would have no initial tension of the thermostatic bar to overcome but the thermostat is ready to respond instantly to the influence of temperature, as for example, suppose that the thermostat is set to maintain a temperature between 70° and 71°. At 70° the thermostat 104 would be lightly engaging the contact 102 and the thermostat 103 would be lightly engaging the contact 101, as shown in Fig. 13. Now if the temperature rises to 71°, then the thermostat 104 would cross the space in the direction of and make contact with the point 107 and to assume the position shown in Fig. 11 and the thermostat 103 would tend to move in the same direction but as its movement is arrested by the contact 101 the result of the movement of the thermostat 103 would cause its extremity to exert a pressure against the contact 101 with a tension equal to the change of one degree in temperature. If, however, the temperature had fallen from 70° then the thermostat 103 would immediately move toward and make contact with the point 106 after a fall of one degree or at 69°. In this case, the range of the thermostat 104 would be between 70° and 71° while the range of the thermostat 103 would be between 69° and 70°.

If the bar 103 is so adjusted by screw 115 that when member 118 is turned to bring bar 104 into contact with point 102, the bar 103 will be in contact with point 106 as in Fig. 12, both being under no tension or, if any, an equal tension against their respective contacts, then they will both operate at the same degree of temperature, and although this position would very rarely, if ever, be used, it is simply mentioned to show the possibilities of the adjustment of the thermostats. If the bar 103 be so adjusted by screw 115 that it will be in contact with the central contact 106 when member 118 is moved to bring bar 104 into contact with the central contact 107, then the thermostat 103 will operate at a temperature of one degree or more above the thermostat 104, depending upon the amount of tension, if any, they exert upon the points 106, 107. If this adjustment of the thermostats is used, it will of course be understood that the connections to the various dampers must also be reversed.

It is thought that the operation will be clearly understood from the foregoing description and in the various positions of the thermostats and circuit makers and breakers, the circuits may be traced out as follows: Assuming the parts to be in position as shown in diagram in Fig. 11, that is, with the thermostats 103, 104, respectively in engagement with the contacts 101, 107 and the pins 40, 40ª, respectively in engagement with the contacts 90, 93, (as shown in full lines) there will be no circuit and the mechanism will be at rest. Should the temperature fall, the thermostat 104 will move from the position shown in Fig. 11 and into engagement with the contact 102 to the position shown in Fig. 13 at which time the circuit will be completed from the battery B, through the electro-responsive device 72, conductor 95ª, shaft 30ª, pin 40ª, contact 93, conductor 99, binding post 100, contact 102, thermostat 104, binding post 96, and back to the battery B. As soon as this circuit is completed, the respective motor will be released in the manner already set forth and the shaft 30ª will revolve to cause the pin 40ª to move from the position shown in full lines in Fig. 11 and dotted lines in Fig. 13, out of engagement with the contact 93 and to the position shown in dotted lines in Fig. 11 and in full lines in Fig. 13, which will break the circuit to deënergize the electro-responsive device 72 to permit the respective bell crank lever 64 to assume a position in the path of the return movement of the free end of the arm 63 to lock the projection 57 on the dog 58 into the path of the movement of the advancing extremity of the arm 55.

If the thermostat 103 should move from the position shown in Fig. 11 and into engagement with the contact 106 while the thermostat 104 is in engagement with the contact 102 or to the position shown in Fig. 12, while the pin 40 on the shaft 30 is in the position shown in full lines in Figs. 11 and 13, or in engagement with the contact 90, the circuit will be completed from the battery B^1 through the electro-responsive de-

vice 72, shaft 30, pin 40, contact 90, conductor 108, contact 106, thermostat 103, binding post 96[a] and back to the battery B[1], which will start the shaft 30 to rotate to move the pin 40 from engagement with the contact 90, as shown in full lines in Fig. 11 and in dotted lines in Fig. 12, into engagement with the contact 91, as shown in dotted lines in Fig. 11 and full lines in Fig. 12, which will break the circuit and deënergize the electro-responsive device 72. If the thermostat 103 should move under the influence of a rising temperature back from the position shown in Fig. 12 to that shown in Figs. 11 and 13 or in engagement with the contact 101 while the shaft 30 is in a position to cause the pin 40 to engage the contact 91 as shown in full lines in Fig. 12 and dotted lines in Figs. 11 and 13, then the circuit would be completed from the battery B[1] through the electro-responsive device 72, conductor 95, shaft 30, pin 40, contact 91, conductor 97, binding post 98, contact 101, thermostat 103, binding post 96[a], and back to the battery, B[1], which will start the respective motor in operation to adjust the dampers connected therewith.

In order to provide means whereby the mechanism may be automatically stopped to prevent injury thereto by a sudden jar when the weights 74 have reached the limit of their downward movements, safety devices may be provided which preferably comprise a pair of levers 124 which are pivotally supported preferably by means of the bolt or pin 29. The shafts 30 and 30[a] are in electrical connection with the electro-responsive devices 72 through the medium of the frame work of the mechanism and the levers 124 are preferably constructed of a suitable conducting material and are arranged within the connections between the shafts and their respective electro-responsive devices. These levers 124 are each provided with a contact 125 which is adapted to engage a suitable contact 126 to which is secured the extremity of one of the conductors, so that when the respective contact 125 is in engagement with the contact 126 the circuit will be complete when the thermostats are properly adjusted, through the frame work of the machine and to the respective shafts. The supporting axle 29 is constructed of insulating material, as shown more clearly in Fig. 2[a], and is provided at its extremities with encircling metallic bands 29[a] upon which bands these arms or levers 124 are pivotally mounted. The free extremities of these levers are provided with eyes 127 through which one end of the flexible member 73 passes and the levers 124 are disposed opposite to each other and arranged adjacent each of the respective motors. The flexible members are provided on their free extremities with an enlargement or ball 128 and the respective member is adapted to freely pass through the eye 127 of the respective lever 124 when the respective weight 74 descends or is raised. During the descent of the weight, the flexible member will pass freely through the eye 127 until the ball or enlargement 128 engages the extremity of the lever to rock the same about its pivot and break the circuit which will stop the machine and hold the contact separated until the weight 74 is raised into an operative position which may be done by drawing downwardly upon the raised end of the flexible members 73. During this latter movement the sprocket 33 will freely rotate upon the sleeve 31 and the dogs 34 will pass over the ratchet 32, and the gear 37 being also loosely mounted upon the sleeve 31 will remain still.

When the weight 74 is descending after the mechanism has been released, a rapid motion will be imparted to the sleeve 75 through the medium of the gears 37 and 77. The rapid rotation of the sleeve 75 will cause the weights 80 to be thrown outwardly on their pivots by centrifugal force, which motion will, through the medium of the segments 81 and gear 82 (the latter being loosely mounted upon the sleeve 75), create a tension upon the elastic member or spring 84 and when the sprocket 33 is arrested or stopped, the momentum of the governor and its coöperating parts will cause the sleeve 75 to rotate for a short space of time after the sprocket 33 is stopped and as the gear 37 is loosely mounted upon the sleeve 31, the parts coöperating with the gear may continue to rotate until they gradually stop. As the gear 37 stops, the sleeve 75 will also stop and the tension which has been created upon the elastic member 84, will now be exerted in the opposite direction upon the gear 82 so as to draw the weights 80 back into close proximity with each other, through the medium of the segments 81.

In order that the invention might be understood, the details of the foregoing embodiment thereof have been thus described, but

What I claim as new is—

1. In combination with damper controlling apparatus, a rotatable shaft, locking means comprising a member carried by said shaft, and engaging and disengaging elements coöperating therewith whereby the said shaft is held against rotation, means for automatically disengaging said elements for releasing the shaft, means for rotating the shaft when released, means supported by one of the engaging elements and adapted to be directly engaged and positively moved by said member for resetting the said locking means, a furnace damper and means whereby the rotation of the shaft will adjust the damper.

2. In combination with damper control-

ling apparatus, a rotatable shaft, locking means comprising a member carried by said shaft, and engaging and disengaging elements coöperating therewith whereby the said shaft is held against rotation, means controlled by the temperature of the room for disengaging said elements for releasing the shaft, means for rotating the shaft when released, means supported by one of the engaging elements and adapted to be directly engaged and positively moved by said member for resetting the said locking means, a furnace damper and means whereby the rotation of the shaft will adjust the damper.

3. In combination with damper controlling apparatus, a rotatable shaft, locking means comprising a member carried by said shaft, engaging and disengaging elements coöperating therewith whereby said shaft is held against rotation, an electro-responsive device for disengaging said elements for releasing the shaft, means for energizing the electro-responsive device including means influenced by the temperature of the room, means for rotating the shaft when released, means supported by one of the engaging elements and adapted to be directly engaged and positively moved by said member for resetting the said locking means, a furnace damper and means whereby the rotation of the shaft will adjust the damper.

4. In combination with damper controlling apparatus, a rotatable shaft, locking means comprising a member carried by said shaft, and engaging and disengaging elements coöperating therewith whereby said shaft is held against rotation, an electro-responsive device for disengaging said elements to release the shaft, means for energizing said electro-responsive device including a thermostat, means for rotating the shaft when released, means supported by one of the engaging elements and adapted to be directly engaged and positively moved by said member for resetting said locking means, means operatively related to the shaft for breaking the circuit to deënergize the electro-responsive device after the shaft starts to rotate, a furnace damper and means whereby the rotation of the shaft will adjust the damper.

5. In combination with damper controlling apparatus, a rotatable shaft, locking means comprising a member carried by said shaft, and engaging and disengaging elements coöperating therewith whereby said shaft is held against rotation, means for automatically disengaging said elements for releasing the shaft, means for rotating the shaft when released including a gravity member, means supported by one of the engaging elements and adapted to be directly engaged and positively removed by said member for resetting the said locking means, a furnace damper, and means whereby the rotation of the shaft will adjust the damper.

6. In combination with damper controlling apparatus, a rotatable shaft, means for rotating the shaft, means for locking the shaft against rotation including a member operatively related to the shaft, and a dog adapted to project into the path of movement of the member to be engaged thereby to arrest the movement of the member, means whereby the said member will engage and move the dog into the said path of motion, means for locking the dog within the path of movement of the member, and means for automatically moving the dog out of the path of the movement of the member to permit the shaft to rotate.

7. In combination with damper controlling apparatus, a rotatable shaft, means for rotating the shaft, means for locking the shaft against rotation including a member operatively related to the shaft and a dog to be projected into the path of movement of the member to be engaged thereby to arrest the movement of the member, means whereby the movement of the said member will engage and move the dog into the said path of motion, means for locking the dog within the path of movement of the member, and means controlled by the temperature of the room for automatically moving the dog out of the path of movement of the arm to permit the shaft to rotate.

8. In combination with damper controlling apparatus, a rotatable shaft, means for rotating the shaft, means for locking the shaft against rotation including a member operatively related to the shaft, and a dog adapted to be projected into the path of movement of the member to be engaged thereby to arrest the movement of the member, means whereby the member will move the dog into the said path of motion, means for locking the dog within the path of movement of the member, means for moving the dog out of the path of movement of the member to permit the shaft to rotate, and a thermostat for controlling the last said means.

9. In combination with damper controlling apparatus, a rotatable shaft, said shaft being provided with a projection, means for rotating the shaft, means for locking the shaft against rotation including a dog adapted to be projected into the path of movement of the projection to be engaged thereby, means operatively related to the dog adapted to be engaged and moved by the projection to move the dog into the said path of motion, means for locking the dog against movement, means controlled by the temperature of the room for unlocking the dog, and means for automatically moving the dog out of the path of movement of the said projection to permit the shaft to rotate.

10. In combination with damper controlling apparatus, a rotatable shaft, said shaft being provided with a projection, means for rotating the shaft, means for locking the shaft against rotation including a dog adapted to be projected into the path of movement of the projection to be engaged thereby, means whereby the projection will set the dog in such position, means for locking the dog against movement, means controlled by the temperature of the room for unlocking the dog, means for automatically moving the dog out of the path of movement of the said projection to permit the shaft to rotate, and gravity means for arresting such movement of the dog.

11. In combination with damper controlling apparatus, a rotatable shaft, said shaft being provided with a projection, gravity means for rotating the shaft, means for locking the shaft against rotating including a dog adapted to be projected into the path of movement of the projection to be engaged thereby, means whereby the said projection will move the dog to such position, means for locking the dog against movement, means controlled by the temperature of the room for unlocking the dog, means for automatically moving the dog out of the path of movement of the said projection to permit the shaft to rotate, and gravity means for assisting in such movement of the dog.

12. In combination with damper controlling apparatus, a rotatable shaft, said shaft being provided with a projection, gravity means for rotating the shaft, means for locking the shaft against rotation including a dog adapted to be projected into the path of movement of the projection to be engaged thereby, means whereby the projection will move the dog into a position to be engaged by the projection, positive means for moving the dog out of the path of movement of said projection, gravity means for also moving the dog, means for locking the said gravity means against movement to hold the dog in operative position, and means controlled by the temperature of the room for releasing the last said gravity member to assist in shifting the dog.

13. In combination with damper controlling apparatus, a rotatable shaft, said shaft being provided with a projection, gravity means for rotating the shaft, means for locking the shaft against rotation including a dog adapted to be projected into the path of movement of the projection to be engaged thereby, means whereby the projection will move the dog into a position to be engaged by the projection, means for moving the dog out of the path of movement of the said projection, gravity-controlled means for also moving the dog, means for locking the said gravity means against movement to hold the dog in operative position, electro-responsive means for releasing the last said gravity means, and a thermostat for controlling the said electro-responsive means.

14. In combination with damper controlling apparatus, a rotatable shaft, means for rotating the shaft, a dog, means operatively related to the shaft and adapted to engage the dog when the latter is set to lock the shaft against rotation, means operatively related to the dog and adapted to be engaged by the second said means to set the dog, means for locking the dog in its set position, and means for automatically releasing the shaft.

15. In combination with damper controlling apparatus, a rotatable shaft, means for rotating the shaft, a dog, means operatively related to the shaft and adapted to engage the dog when the latter is set to lock the shaft against rotation, means operatively related to the dog and adapted to be engaged by the second said means to set the dog, means for locking the dog in its set position, and means for automatically releasing the shaft, said means including a thermostat.

16. In combination with damper controlling apparatus, a rotatable shaft, means for rotating the shaft including a flexible member passing over the shaft, and a gravity controlled member connected to one end of the flexible member, a locking dog, means operatively related to the shaft and adapted to engage the dog when the latter is set to lock the shaft against rotation, the last said means being also adapted to set the dog to lock the shaft, means for locking the dog in a set position, and means for automatically shifting the dog to release the shaft.

17. In combination with damper controlling apparatus, a rotatable shaft, means for rotating the shaft including a flexible member passing over the shaft and a gravity controlled member connected to one end of the flexible member, a locking dog, means operatively related to the shaft and adapted to engage the dog when the latter is set to lock the shaft against rotation, the last said means being also adapted to set the dog to lock the shaft, means for locking the dog in a set position, and means controlled by the temperature of the room for automatically shifting the dog to release the shaft.

18. In combination with damper controlling apparatus, a rotatable shaft, means for rotating the shaft including a flexible member passing over the shaft and a gravity controlled member connected to one end of the flexible member, a locking dog, means operatively related to the shaft and adapted to engage the dog when the latter is set to lock the shaft against rotation, the last said means being also adapted to set the dog to lock the shaft, means for locking the

dog in a set position, means for shifting the dog to release the shaft including electro-responsive means, and a thermostat for controlling the said electro-responsive means.

19. In combination with damper controlling apparatus, a rotatable shaft, means for rotating the shaft, an arm projecting from the shaft, a dog, a portion of said dog being adapted to be engaged by the arm when the shaft is rotated, to move the dog into the path of movement of the arm to be engaged thereby to lock the shaft against rotation, means for locking the dog in the last said position, means for automatically releasing the dog, and means for automatically moving the dog when released out of the path of movement of the arm to permit the shaft to rotate.

20. In combination with damper controlling apparatus, a rotatable shaft, means for rotating the shaft, an arm projecting from the shaft, a dog, a portion of said dog being adapted to be engaged by the arm when the shaft is rotated, to move the dog into the path of movement of the arm to be engaged thereby to lock the shaft against rotation, means for locking the dog in the last said position, electro-responsive means for automatically releasing the dog and means for automatically moving the dog when released out of the path of movement of the arm to permit the shaft to rotate.

21. In combination with damper controlling apparatus, a rotatable shaft, means for rotating the shaft, an arm projecting from the shaft, a dog, a portion of said dog being adapted to be engaged by the arm when the shaft is rotated, to move the dog into the path of movement of the arm to be engaged thereby to lock the shaft against rotation, means for locking the dog in the last said position, electro-responsive means controlled by the temperature of the room for automatically releasing the dog, and means for automatically moving the dog, when released, out of the path of movement of the arm to permit the shaft to rotate.

22. In combination with damper controlling apparatus, a rotatable shaft, means for rotating the shaft, an arm projecting from the shaft, a dog, a portion of said dog being adapted to be engaged by the arm when the shaft is rotated, to move the dog into the path of movement of the arm to be engaged thereby to lock the shaft against rotation, means for locking the dog in the last said position, electro-responsive means for automatically releasing the dog, a thermostat for controlling the electro-responsive means, means for automatically moving the dog when released out of the path of movement of the arm to permit the shaft to rotate, and means for deënergizing the electro-responsive means when the shaft starts to rotate.

23. In combination with damper controlling apparatus, a rotatable shaft, locking means comprising a member carried by said shaft, and engaging and disengaging elements coöperating therewith whereby said shaft is held against rotation, means for automatically disengaging said elements for releasing the shaft, means for rotating the shaft when released, means supported by one of the engaging elements and adapted to be directly engaged and positively moved by said member for resetting said locking means, a furnace damper, means whereby the rotation of the shaft will adjust the damper and means for retarding the rotation of the shaft whereby sudden jars and stops are prevented.

24. In combination with damper controlling apparatus, a rotatable shaft, locking means comprising a member carried by said shaft, and engaging and disengaging elements coöperating therewith whereby said shaft is held against rotation, means for automatically disengaging said elements for releasing the shaft, means for rotating the shaft when released, means supported by one of the engaging elements and adapted to be directly engaged and positively moved by said member for resetting said locking means, a furnace damper, means whereby the rotation of the shaft will adjust the damper and brake mechanism operatively related to the shaft.

25. In combination with damper controlling apparatus, a rotatable shaft, locking means comprising a member carried by said shaft, and engaging and disengaging elements coöperating therewith whereby said shaft is held against rotation, means for automatically disengaging said elements for releasing the shaft, means for rotating the shaft when released including a gravity member, means supported by one of the engaging elements and adapted to be directly engaged and positively moved by said member for resetting the said locking means, a furnace damper, means whereby the rotation of the shaft will adjust the damper and governor mechanism for checking the movement of the gravity member.

26. In combination with damper controlling apparatus, a rotatable shaft, locking means comprising a member carried by said shaft, and engaging and disengaging elements coöperating therewith whereby said shaft is held against rotation, means for automatically disengaging said elements for releasing the shaft, means for rotating the shaft when released including a gravity member, means supported by one of the engaging elements and adapted to be directly engaged and positively moved by said member for resetting the said locking means, a furnace damper, means whereby the rotation of the shaft will adjust the damper and means including centrifugally-controlled

brake elements for checking the movement of the gravity member.

27. In combination with damper controlling apparatus, a rotatable shaft, locking means comprising a member carried by said shaft, and engaging and disengaging elements coöperating therewith whereby said shaft is held against rotation, means for automatically disengaging said elements for releasing the shaft, means for rotating the shaft when released including a gravity member, means supported by one of the engaging elements and adapted to be directly engaged and positively moved by said member for resetting the said locking means, a furnace damper, means whereby the rotation of the shaft will adjust the damper and means for checking the movement of the gravity member, the last recited means including centrifugally-controlled brake elements operatively related to the shaft and a bearing surface surrounding the shaft with which the said brake elements are adapted to engage.

28. In combination with damper controlling apparatus, a rotatable shaft, a connection between said shaft and a damper of a heater, a sprocket for rotating the shaft, said sprocket being rotatable independently of the shaft in one direction, a flexible member passing over the sprocket, means connected to one end of the flexible member and tending normally to rotate the shaft, means comprising coöperating elements for locking the shaft against rotation, means controlled by the temperature of the room for releasing the shaft to permit the latter to be rotated by the weight, and means whereby the locking elements will automatically re-set themselves with relation to each other to stop the shaft.

29. In combination, with damper controlling apparatus, a rotatable shaft, a connection between the shaft and a damper of a heater, a sprocket for rotating the shaft, said sprocket being rotatable independently of the shaft, in one direction, a flexible member passing over the sprocket, means connected to one end of the flexible member and tending normally to rotate the shaft, means for locking the shaft against rotation including coöperating locking elements, means controlled by the temperature of the room for releasing the shaft to permit the latter to be rotated by the weight, means whereby the locking elements will positively re-set themselves with relation to each other to stop the shaft, and means for preventing the weight from suddenly stopping.

30. In combination with damper controlling apparatus, a rotatable shaft, a connection between the shaft and a damper of a heater, a flexible member passing over the shaft, a weight secured to one end of the member for drawing the same over the shaft to rotate the latter, means for locking the shaft against rotation, means controlled by the temperature of the room for releasing the shaft to permit the weight and flexible member to rotate the same, means for resetting the locking means, a governor, and means operatively connecting the governor to the shaft for gradually stopping the weight.

31. In combination with damper controlling apparatus, a rotatable shaft, a connection between the shaft and a damper of a heater, a flexible member passing over the shaft, a weight secured to one end of the member for drawing the same over the shaft to rotate the latter, means for locking the shaft against rotation, means controlled by the temperature of the room for releasing the shaft to permit the weight and flexible member to rotate the same, means for resetting the locking means, a governor, said governor including means for permitting the parts to move independently of the said shaft into an inoperative position.

32. In combination with damper controlling apparatus, a rotatable shaft, a flexible member passing over the shaft, a weight connected to said member for drawing the same over the shaft to rotate the latter, means including locking elements for locking the shaft against rotation, means controlled by the temperature of the room for releasing the shaft to permit the weight to rotate the latter, means whereby one of the said locking elements will positively and automatically set the other element to stop the shaft, and means for rendering the mechanism inactive.

33. In combination with damper controlling apparatus, a rotatable shaft, a flexible member passing over the shaft, a weight connected to said member for drawing the same over the shaft to rotate the latter, means including locking elements for locking the shaft against rotation, means controlled by the temperature of the room for releasing the shaft to permit the weight to rotate the latter, means whereby one of the said locking elements will positively and automatically set the other element to stop the shaft, and means controlled by the free end of the flexible member for rendering the mechanism inactive.

34. In combination with damper controlling apparatus, a rotatable shaft, a flexible member passing over the shaft, a weight connected to said member for drawing the same over the shaft to rotate the latter, means including locking elements for locking the shaft against rotation, means controlled by the temperature of the room for releasing the shaft to permit the weight to rotate the latter, means whereby one of the said locking elements will positively and automatically set the other element to stop

the shaft, the last said means including safety mechanism, and means operatively related to the free end of the flexible member for operating the said safety mechanism.

35. In combination with damper controlling apparatus, a rotatable shaft, a flexible member passing over the shaft, a weight connected to the said member for drawing the same over the shaft to rotate the latter, means including locking elements for locking the shaft against rotation, electro-responsive means including a circuit for releasing the shaft to permit the weight to rotate the latter, a thermostat for controlling the electro-responsive means, means whereby one of the said locking elements will positively and automatically reset the other element to stop the shaft, a circuit breaker within the circuit and means for automatically operating the circuit breaker to render the mechanism inactive.

36. In combination with damper controlling apparatus, a rotatable shaft, a flexible member passing over the shaft, a weight connected to said member for drawing the same over the shaft to rotate the latter, means including locking elements for locking the shaft against rotation, electro-responsive means including a circuit for releasing the shaft to permit the weight to rotate the latter, a thermostat for controlling the electro-responsive means, means whereby one of the elements will positively and automatically set the other element to stop the shaft, a circuit breaker within the circuit and means operatively related to the flexible member for operating the circuit breaker.

37. In combination with damper controlling apparatus, a rotatable shaft, a flexible member passing over the shaft, a weight connected to said member for drawing the same over the shaft to rotate the latter, means including locking elements for locking the shaft against rotation, electro-responsive means including a circuit for releasing the shaft to permit the weight to rotate the latter, a thermostat for controlling the electro-responsive means, means whereby one of the elements will positively and automatically set the other element to stop the shaft, a circuit breaker within the circuit, said circuit breaker including an arm, and means operatively related to the flexible member and adapted to engage and rock the arm to operate the circuit breaker when the weight reaches a predetermined position.

38. In combination a pair of motors, electro-responsive devices for respectively controlling said motors, circuits for the electro-responsive devices including contact points, a thermostat in each of said circuits coöperating with the respective contact points for controlling the respective circuits, said contacts being opposed to each other, one extremity of the thermostats being arranged to move between the said contacts and to respectively engage one of the contacts, an additional circuit within which the electro-responsive devices are included, said circuit including a contact common to both of the thermostats, the last said contact being disposed between the thermostats and common to both of the thermostats, means connecting the thermostats to move in unison, and means whereby the position of the thermostats may be adjusted with respect to the respective contacts.

39. In combination a pair of motors, electro-responsive devices for respectively controlling said motors, circuits for the electro-responsive devices including contact points, a thermostat in each of said circuits cooperating with the respective contact points for controlling the respective circuits, said contacts being opposed to each other, one extremity of the thermostats being arranged to move between the said contacts and to respectively engage one of the contacts, an additional circuit within which the electro-responsive devices are included, said circuit including a contact common to both of the thermostats, the last said contact being disposed between the thermostats and common to both of the thermostats, means connecting the thermostats to move in unison, and mechanical means under the control of the operator for adjusting the thermostats to a predetermined position with respect to the respective contacts.

40. In combination a pair of motors, electro-responsive devices for respectively controlling said motors, circuits for the electro-responsive devices including contact points, a thermostat in each of said circuits cooperating with the respective contact points for controlling the respective circuits, said contacts being opposed to each other, one extremity of the thermostats being arranged to move between the said contacts and to respectively engage one of the contacts, an additional circuit within which the electro-responsive devices are included, said circuit including a contact common to both of the thermostats, the last said contact being disposed between the thermostats and common to both of the thermostats, means connecting the thermostats to move in unison, means for varying the distance between the thermostats, and means for adjusting the position of the thermostats with respect to their respective contact points.

41. In combination a pair of motors, electro-responsive devices for respectively controlling said motors, circuits for the electro-responsive devices including contact points, a thermostat in each of said circuits cooperating with the respective contact points for controlling the respective circuits, said contacts being opposed to each other, one extremity of the thermostats being arranged

to move between the said contacts and to respectively engage one of the contacts, an additional circuit within which the electro-responsive devices are included, said circuit including a contact common to both of the thermostats, the last said contact being disposed between the thermostats and common to both of the thermostats, means connecting the thermostats to move in unison, means for varying the distance between the thermostats and means for simultaneously adjusting the position of the thermostats with respect to their respective contact points.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 27th day of August A. D. 1908.

ROBERT J. DAVIS.

Witnesses:
J. H. JOCHUM, JR.,
M. W. CANTWELL.