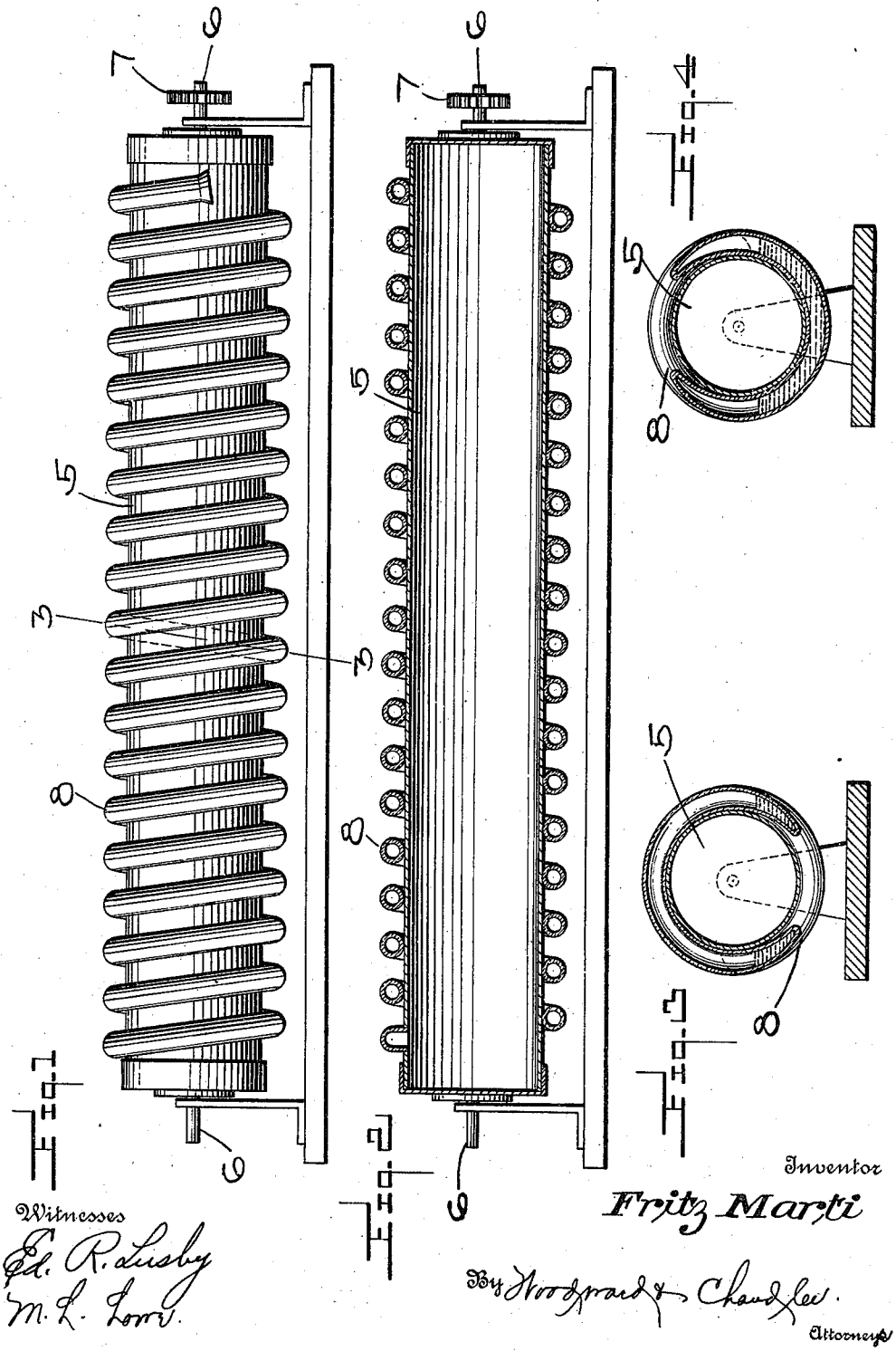
F. MARTI.

THERMOSTATIC MOTOR.

APPLICATION FILED DEC. 15, 1909. RENEWED DEC. 31, 1910.

984,579. **Patented Feb. 21, 1911.**

3 SHEETS—SHEET 1.



Witnesses

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3 SHEETS—SHEET 2.

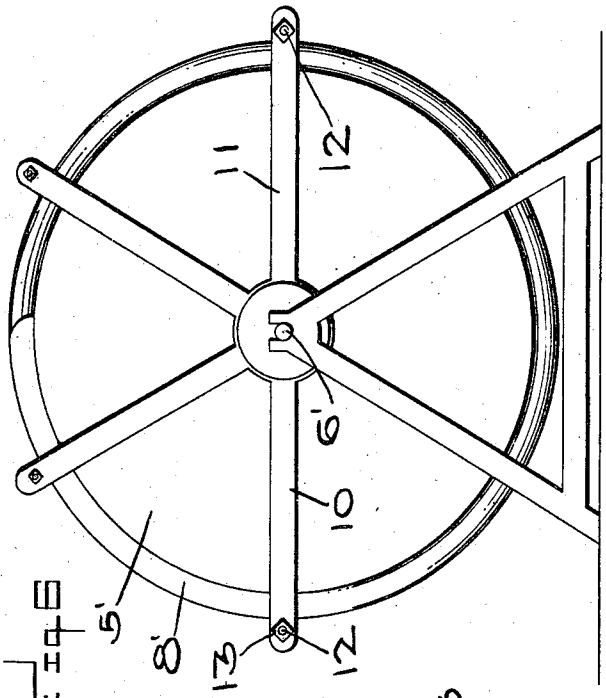

Fig. 6

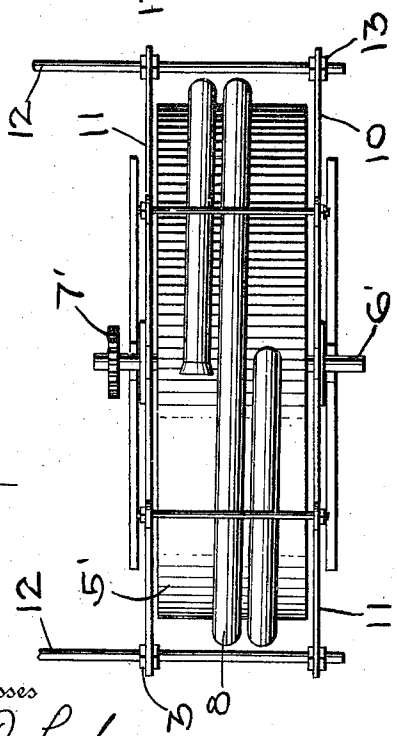

Fig. 5

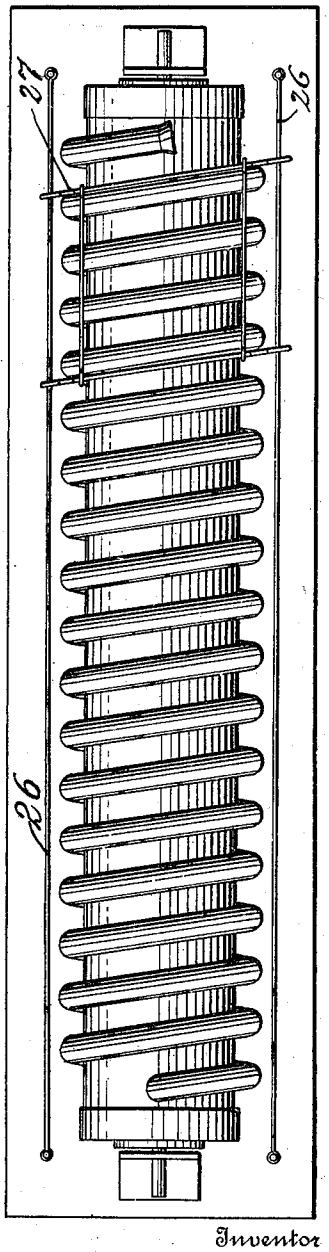

Fig. 7

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3 SHEETS—SHEET 3.

Fig. 3.

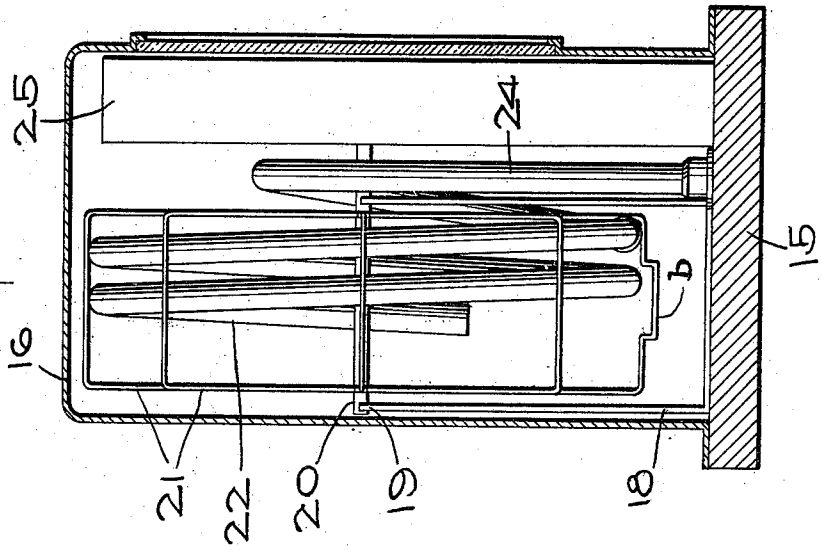
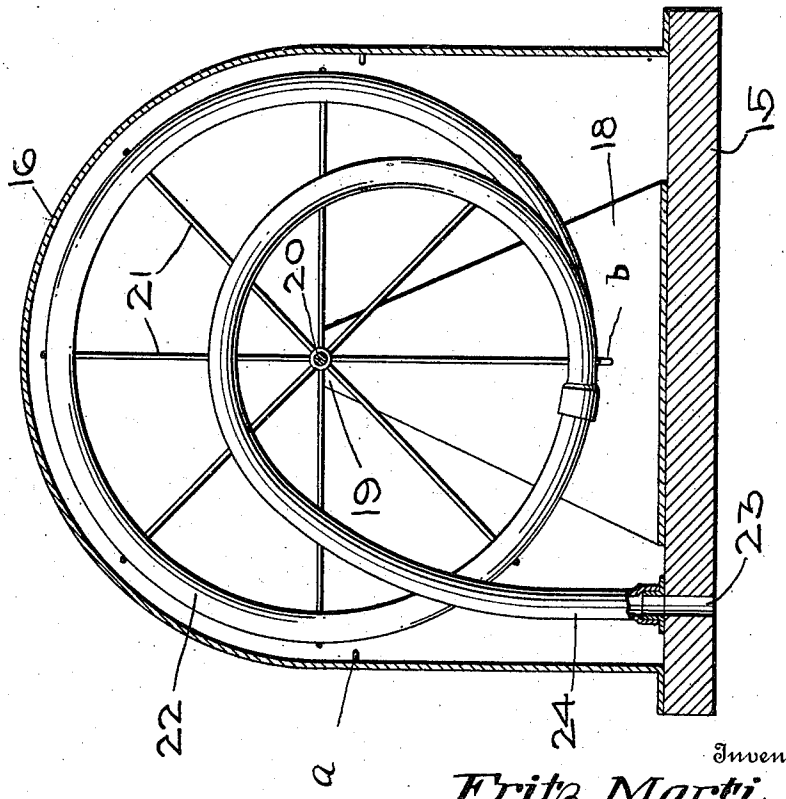


Fig. 4.



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UNITED STATES PATENT OFFICI

FRITZ MARTI, OF BAS OBISPO, PANAMA.

THERMOSTATIC MOTOR.

984,579. Specification of Letters Patent. Patented Feb. 21, 1911.

Application filed December 15, 1909, Serial No. 533,302. Renewed December 31, 1910. Serial No. 600,283.

To all whom it may concern:

Be it known that I, FRITZ MARTI, a citizen of Switzerland, residing at Bas Obispo, in the Republic of Panama, have invented certain new and useful Improvements in Thermostatic Motors, of which the following is a specification.

This invention relates to certain new and useful improvements in thermostatic motors and has for its object to provide a device of this character which is adaptable for winding clock mechanisms and other mechanical contrivances where small power is required.

A further object is to provide a motor of the above type wherein a revolubly mounted drum is employed having wound thereon a tube adapted to contain a quantity of mercury intermediately of its length, said tube communicating with the interior of the drum at one end thereof, whereby the mercury is moved by the expansion and contraction of the air due to changes of temperature or atmospheric pressure.

With these and other objects in view, the present invention consists in the combination and arrangement of parts as will be hereinafter more fully described and particularly pointed out in the appended claims, it being understood that changes in the specific structure shown and described may be made within the scope of the claims without departing from the spirit of the invention.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a side elevation of the device, Fig. 2 is a vertical longitudinal section thereof, Fig. 3 is a transverse section on the line 3—3 of Fig. 1, Fig. 4 is a similar view after the movement of the mercury has occurred, under a rise of temperature. Fig. 5 is a top plan view of a slightly different form of the device, Fig. 6 is a side elevation thereof. Fig. 7 is a similar view of a further modification. Fig. 8 is a vertical section of a further modification of the device, Fig. 9 is a similar view at right angles to Fig. 8.

Referring to the drawings, 5 indicates a hollow drum upon the ends of which the trunnions 6 are mounted. One of these trunnions is adapted to carry a pinion 7 which may be connected with a clock gearing in any suitable manner. This drum may be mounted in the clock casing in any suitable manner, and a glass tube 8 is spirally coiled around the drum and communicates at one end with the interior thereof. The other end of the tube is open. Into the open end of the tube mercury is poured, while the air in the drum is raised to slightly beyond the probable maximum temperature which mundane climates may produce, until slightly less than one half of one of the coils is filled. Upon cooling of the air the mercury will be drawn into the tube to normal position which is approximately midway of the tube. The drum 5 is of such volume that the mercury will be able to move in the tube under the influence of the highest and lowest atmospheric temperature, and the additional effect possible from variations in atmospheric pressure. As the temperature, on the average, varies about twenty degrees between the warmest part of the day and the coldest of the night, the length of the drum 5 and the tube 8 should be great enough to allow sufficient movement of the mercury to produce the power needed in this range of temperature. The diameter of the tube should be such that with one of the coils filled for five-twelfths of the circumference of the coil it will contain mercury weighing sufficient to produce a little more than twice the maximum rotative force to be generated when it is displaced from the lower side of the coil and forced upwardly in either direction to a position centrally of one side.

In the operation of the device the change of temperature of the atmosphere will expand or contract the air within the drum, which causes the mercury to circulate in the tube 8, and it will be obvious that the mercury will tend to maintain a constant position with relation to a vertical line through the axial center of the drum. The drum being rotatably mounted as above described and the position of the mercury in the tube being fixed by atmospheric pressure, the movement of the mercury will cause the drum to rotate in a direction opposite to that of the movement of the mercury.

Suitable means may be used for utilizing the rotation of the gear or pinion 7 when the rotative movement of the drum is reversed. The amount of power which may be attained by a device of this character will

depend upon the air volume of the drum and the diameter of the mercurial tube. The temperature is constantly fluctuating, which will insure the positive rotation of the drum.

In Figs. 5 and 6 a slightly modified form of the motor is shown, which is designed with particular reference to the winding of clocks. In this construction the drum 5′ is of less length than the drum 5 of the previously described form. Around the periphery of this drum the tube 8′ is spirally coiled but twice and communicates at one end with the interior of the drum, the other end being open. The drum is mounted in a supporting frame 10, which comprises the strap bars 11 through the ends of which hanger rods 12 are passed and secured thereto by means of the nuts 13. The drum 5′ is also provided with the central trunnions 6′ which extend through the bars 11, one of said trunnions carrying a pinion or other driving element 7′. As this device will produce power enough to run the clock with but small movement, it is arranged to be checked at opposite limits of this movement so that escape of the mercury out of the tube or into the drum is prevented. The operation of this form of the device is exactly the same as that of the preferred form.

From the foregoing it will be seen that I have provided a thermostatic motor of very simple construction, and one which may be manufactured at a minimum cost. It requires no attention whatever as its operation is constant, beyond the renewal of the mercury.

The device will be found admirably adapted to use in such cases where but small power is required for the driving of various mechanisms.

In the modification shown in Fig. 7, guides 26 are arranged at either side of the cylinder 5, to support a carriage 27, which may be provided with an indicating finger adapted to register with a scale arranged along the base member, the revolution of said tube being adapted to move said carriage on said guides.

In Figs. 8 and 9 there is shown a further modification of the device, in which the use of space is largely economized by disposing the moving parts within the drum. In this form of the device, there is used a base plate 15, upon which there is secured the metallic chamber 16 having laterally extending flanges around its base adapted to be secured upon the base in any suitable manner. Before disposition of the chamber 16 upon the base, the mechanism is assembled thereon, which comprises the supporting frame 18 of any suitable form having the bearings 19 supporting a shaft 20 revolubly therein, from which radiates the arms 21 upon which the spiral tube 22 is supported. This tube preferably comprises about three coils, in the central one of which the mercury is disposed at the mean temperature. Formed in the base, there is a suitable opening 23 having a nipple therearound upon which is engaged one end of a flexible tube 24, the opposite end of which is engaged over one end of the tube 22, a suitable length of tube being allowed to intervene for free revoluble movement of the tube. After the disposition of the chamber member 16 upon the base, it will be readily understood that any variations in atmospheric pressure exteriorly of the casing will be communicated to the space within the casing through the tube 24, by which means the force thereof will be directed against the mercury in the tube causing its rotation. One side of the casing may be made of glass as illustrated, and a dial disposed adjacent thereto, the clock mechanism disposed within the chamber 16 as illustrated at 25, and suitable connections made between the clock mechanism and the shaft 20.

What is claimed is:

1. A device of the character described comprising a rotatably mounted container, a tube extended from said container, one end of said tube having communication with the interior of the container and adapted to contain mercury, whereby said device will be rotated by variations of density of air in the container.

2. A device of the character described comprising a rotatably mounted air container, a tube spirally coiled about said container, said tube having communication with the interior of the container at one end and adapted to contain mercury, whereby said device will be rotated by variations of density of the air.

3. A device of the class described comprising a rotatably mounted container member, a curved tube extended from said member, one end of said tube communicating with the interior of the member, said tube being adapted to receive a quantity of mercury, the movement of which due to difference in density of the surrounding atmosphere and air in the member is adapted to rotate said member.

4. A device of the class described comprising a rotatably mounted hollow drum, a tube spirally coiled about said drum, one end of said tube communicating with the interior of the drum, the other end of said tube being open and adapted to receive a quantity of mercury sufficient to fill one-half of one of the coils of the tube, to be moved by the expansion or contraction of the air within the drum due to the variation of atmospheric temperature to rotate the drum.

5. In a device of the class described, a reservoir member, a spiral tube containing material reciprocable therein, said tube being coiled around said reservoir member, said

tube and reservoir being adapted to revolve, and connections between said reservoir and one end of said tube.

6. In a device of the class described, a revoluble arcuate member, weight material disposed centrally thereof and reciprocable therein, a reservoir and connections between the reservoir and one end of the arcuate member, as and for the purpose described.

7. A device of the class described comprising a fluid operated device, a chamber member the interior of which is isolated from the ambient atmosphere and connections between the interior of the chamber member and the fluid operated device whereby difference of potential in the density of matter in the chamber member and said atmosphere will be caused to act upon said fluid operated device.

8. A device of the character described comprising a rotatably mounted container, a tube extended from said container, one end of said tube having communication with the interior of the container and adapted to contain matter reciprocably, said device being adapted to be rotated under movement of matter in the tube by variations of density of air in the container.

9. A device of the character described comprising a rotatably mounted container, a tube carried by the container, and extending laterally with respect to the axis of the container said tube having communication with the interior of the container at one end and adapted to contain a body of matter reciprocably therein said device being adapted to be rotated under movement of matter in the tube such matter being adapted to be moved by variations of density of matter in the container.

10. In a device of the class described, a revoluble arcuate tube, weight material disposed centrally thereof and reciprocable longitudinally thereof, a container, and connections between the container and one end of the tube, for the purpose described.

11. In a device of the class described a container an arcuate tube revoluble upon an axis within and extending transversely of the arc of a tube, weight material centrally of the tube and reciprocal longitudinally thereof and connections between the container and one end of the tube for the purpose described.

12. In a device of the class described a container a tube, a body reciprocal in the tube and connections between the tube and container whereby changes of density in material in the retainer will act upon said body for reciprocation thereof longitudinally of the tube to produce motion in the container.

In testimony whereof I affix my signature, in presence of two witnesses.

FRITZ MARTI.

Witnesses:
DAVID T. EDWARDS, Jr.,
EDWARD W. MITCHEL.