No. 896,649. PATENTED AUG. 18, 1908.

W. C. MARSH.

BRAKE.

APPLICATION FILED JAN. 16, 1908.

5 SHEETS—SHEET 1.

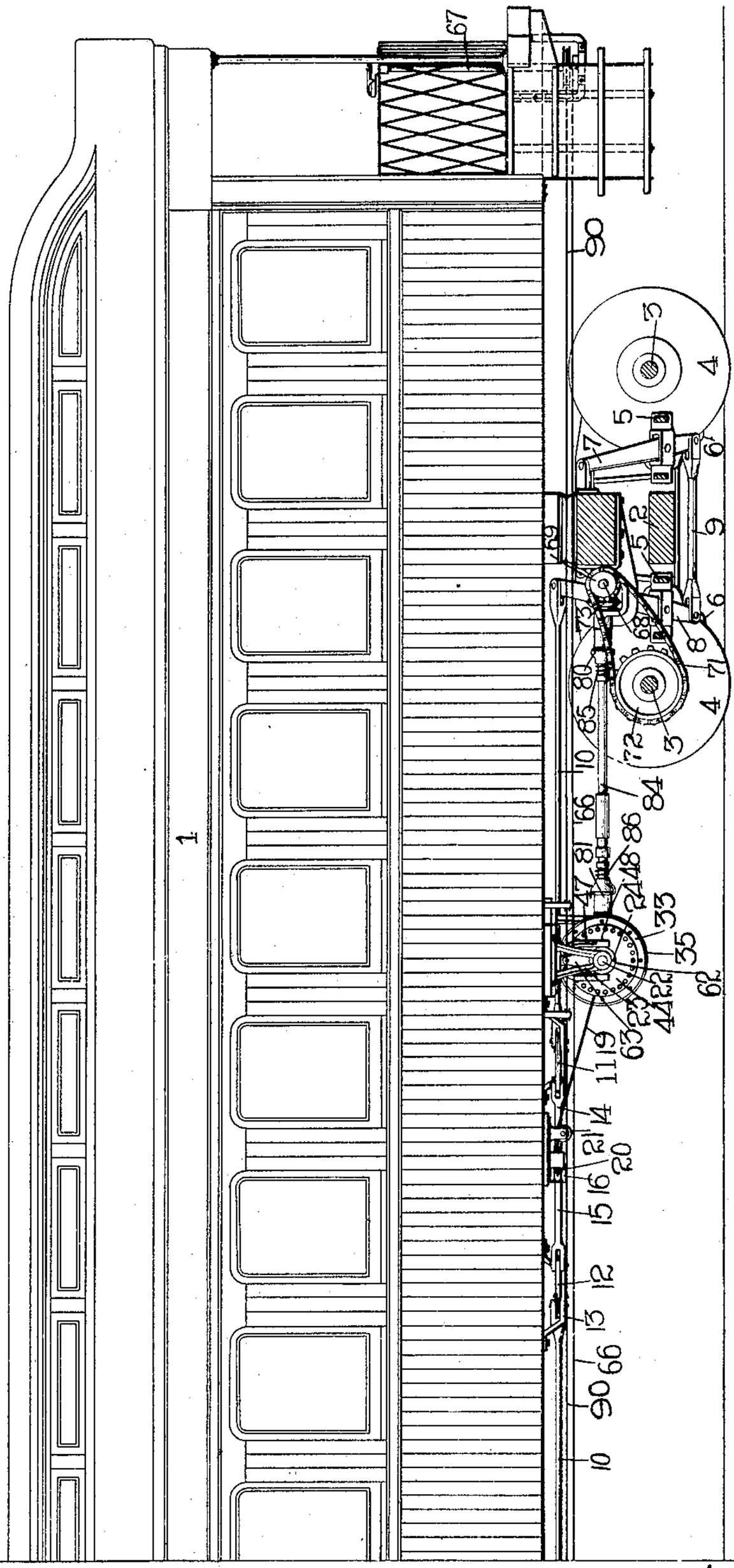


Fig. 1.

Witnesses.
L. M. Saugster.
George A. Neubauer

Inventor.
William C. Marsh
By A. J. Saugster, Attorney.

No. 896,649. PATENTED AUG. 18, 1908.

W. C. MARSH.

BRAKE.

APPLICATION FILED JAN. 16, 1908.

5 SHEETS—SHEET 2.

Fig. 2.

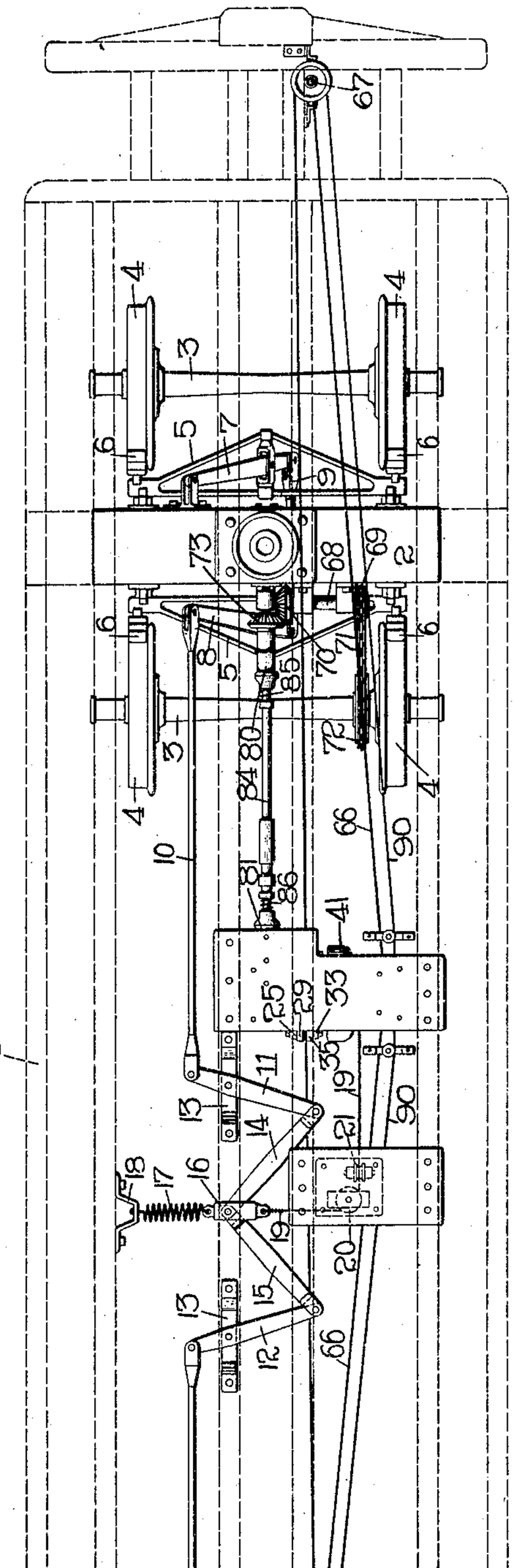
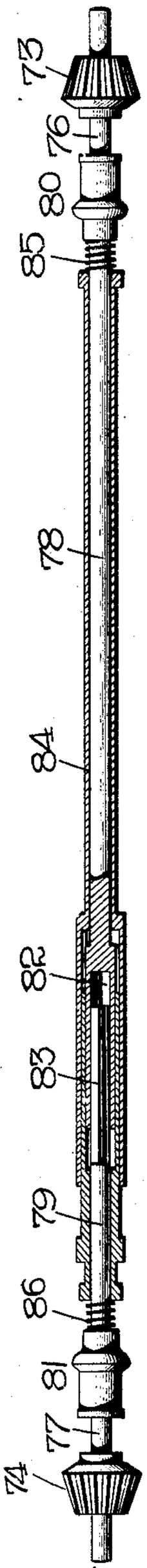


Fig. 3.



Witnesses.

L. M. Bangster.

George A. Neubauer.

Inventor.

William C. Marsh

By C. J. Langston. Attorney.

No. 896,649. PATENTED AUG. 18, 1908.

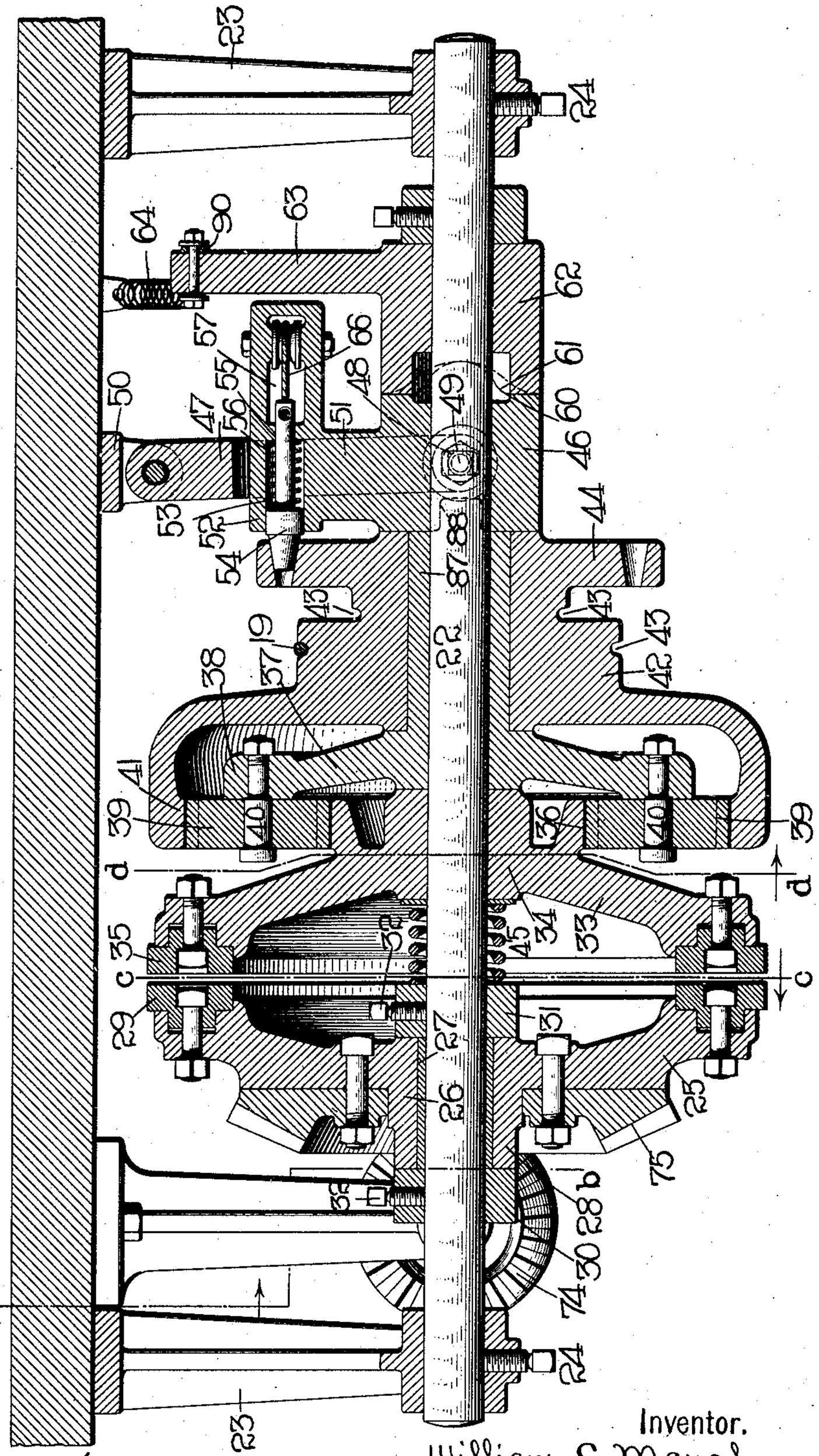
W. C. MARSH.

BRAKE.

APPLICATION FILED JAN. 16, 1908.

5 SHEETS—SHEET 3.

Fig. 4.



Witnesses.

L. M. Daugster.

George A. Neubauer.

Inventor.

William C. Marsh.

By C. J. Daugster, Attorney.

No. 896,649. PATENTED AUG. 18, 1908.

W. C. MARSH.

BRAKE.

APPLICATION FILED JAN. 16, 1908.

5 SHEETS—SHEET 4.

Fig. 5.

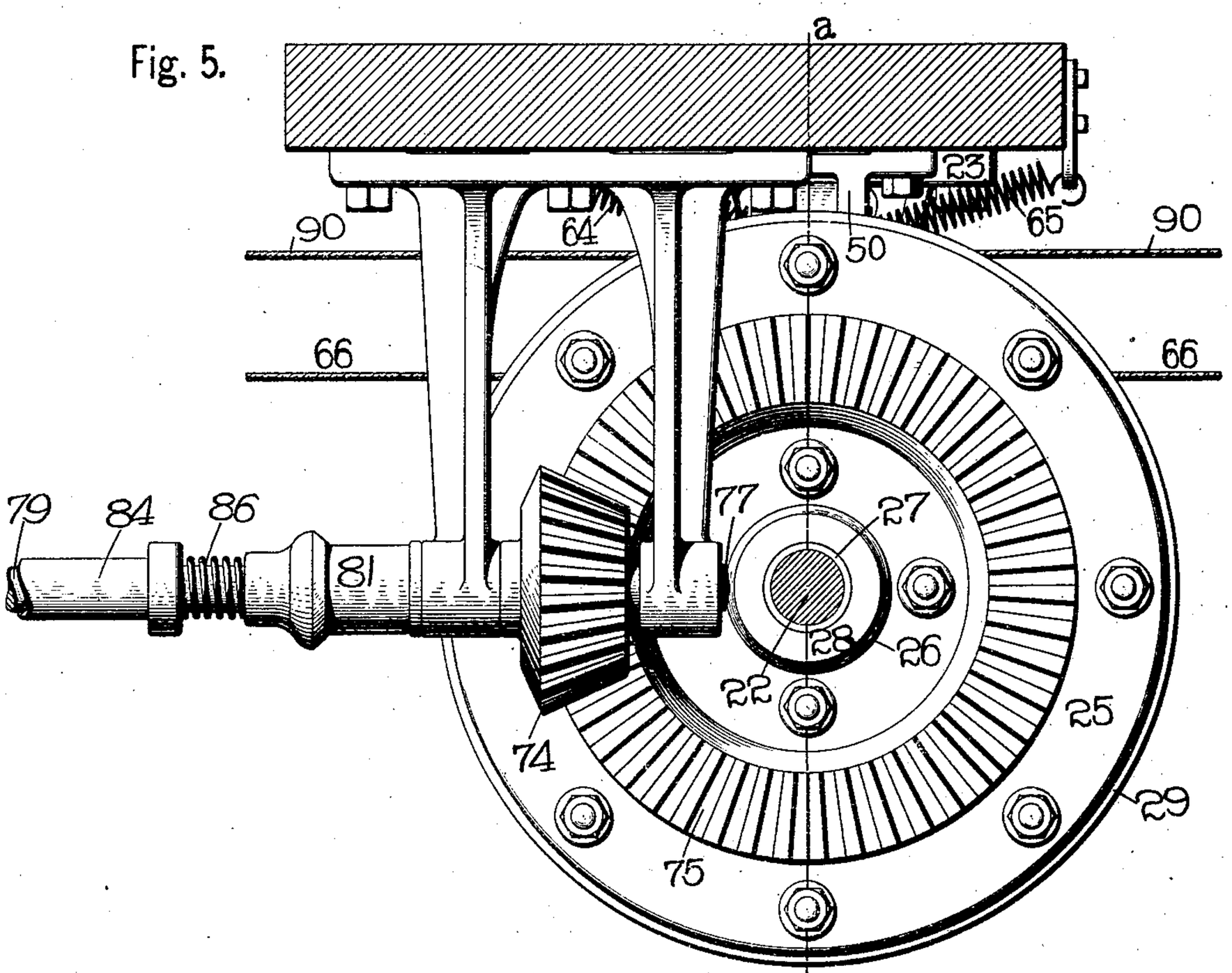
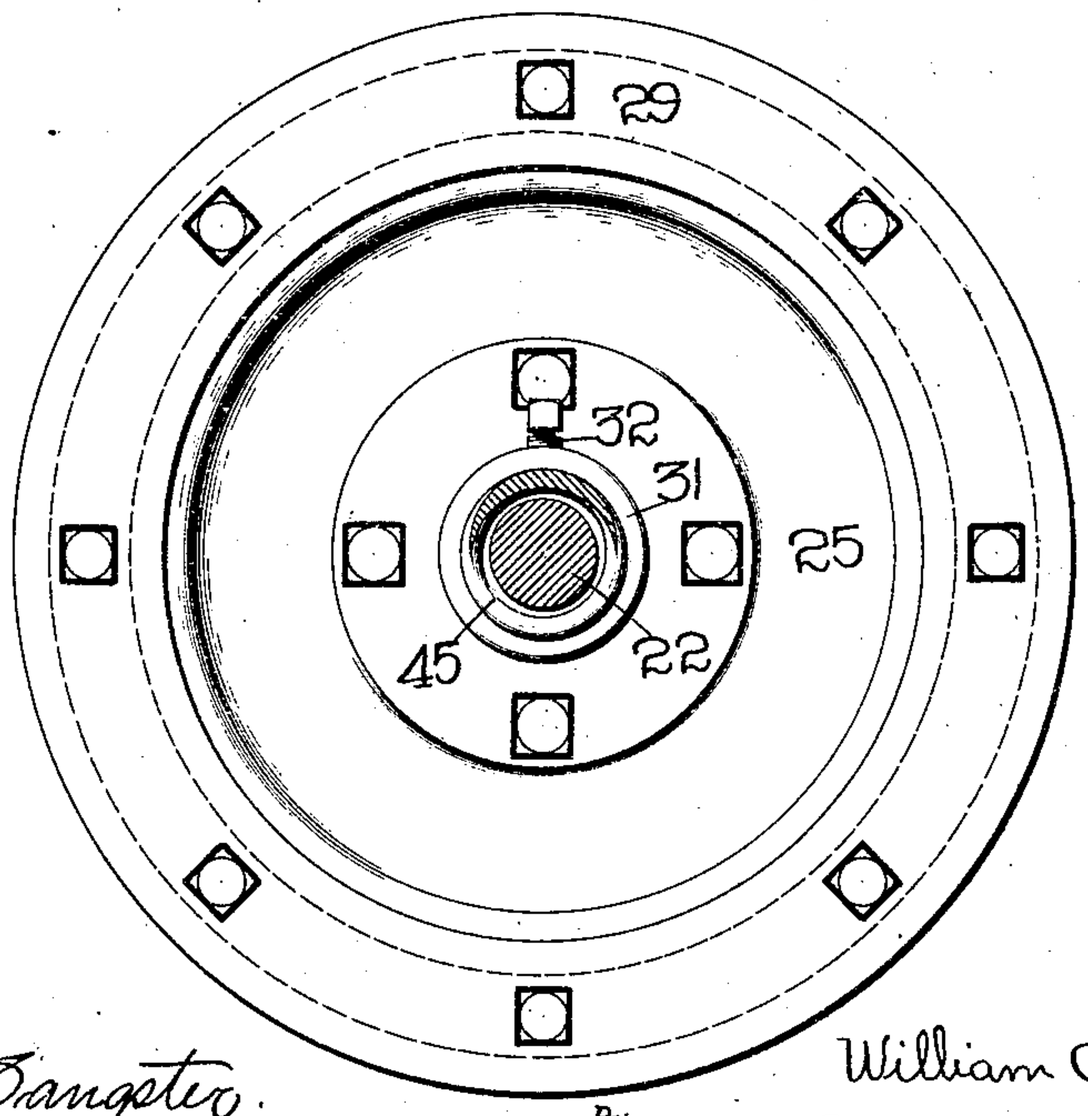


Fig. 6.



Witnesses.

L. M. Langston.

George A. Neubauer.

Inventor.

William C. Marsh.

By C. J. Langston, Attorney.

No. 896,649. PATENTED AUG. 18, 1908.

W. C. MARSH.

BRAKE.

APPLICATION FILED JAN. 16, 1908.

5 SHEETS—SHEET 5.

Fig. 7.

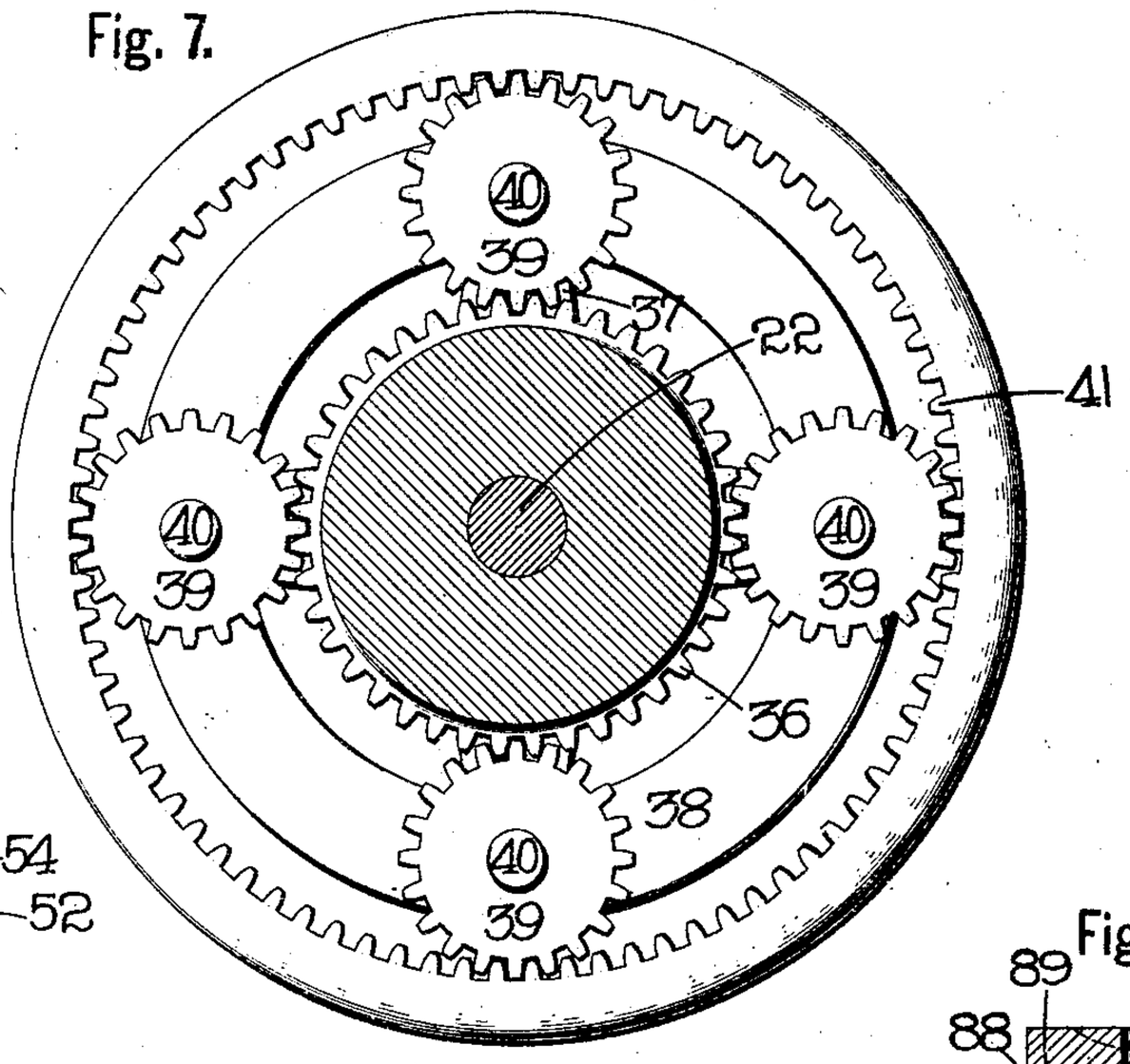


Fig. 10.

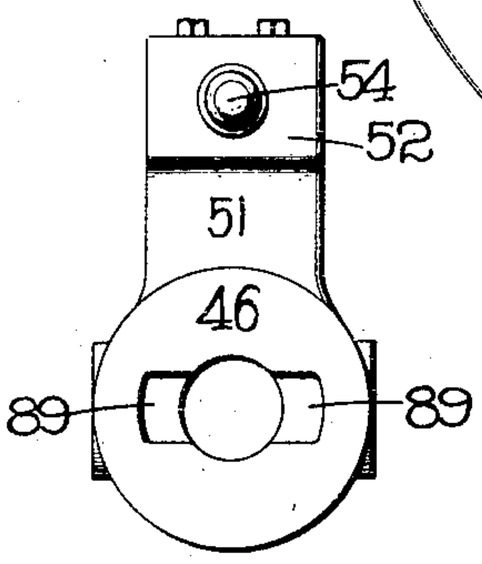


Fig. 11.

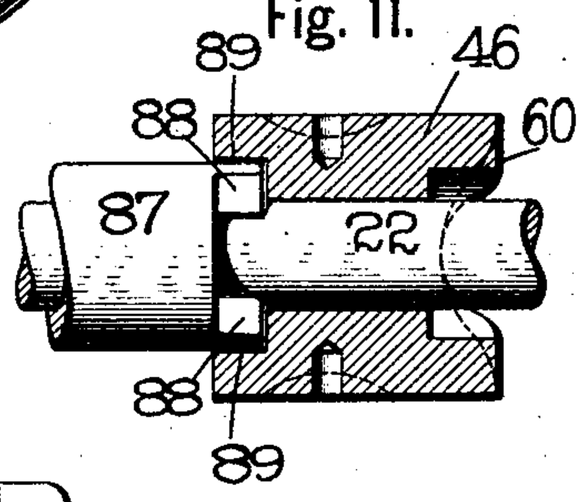


Fig. 8.

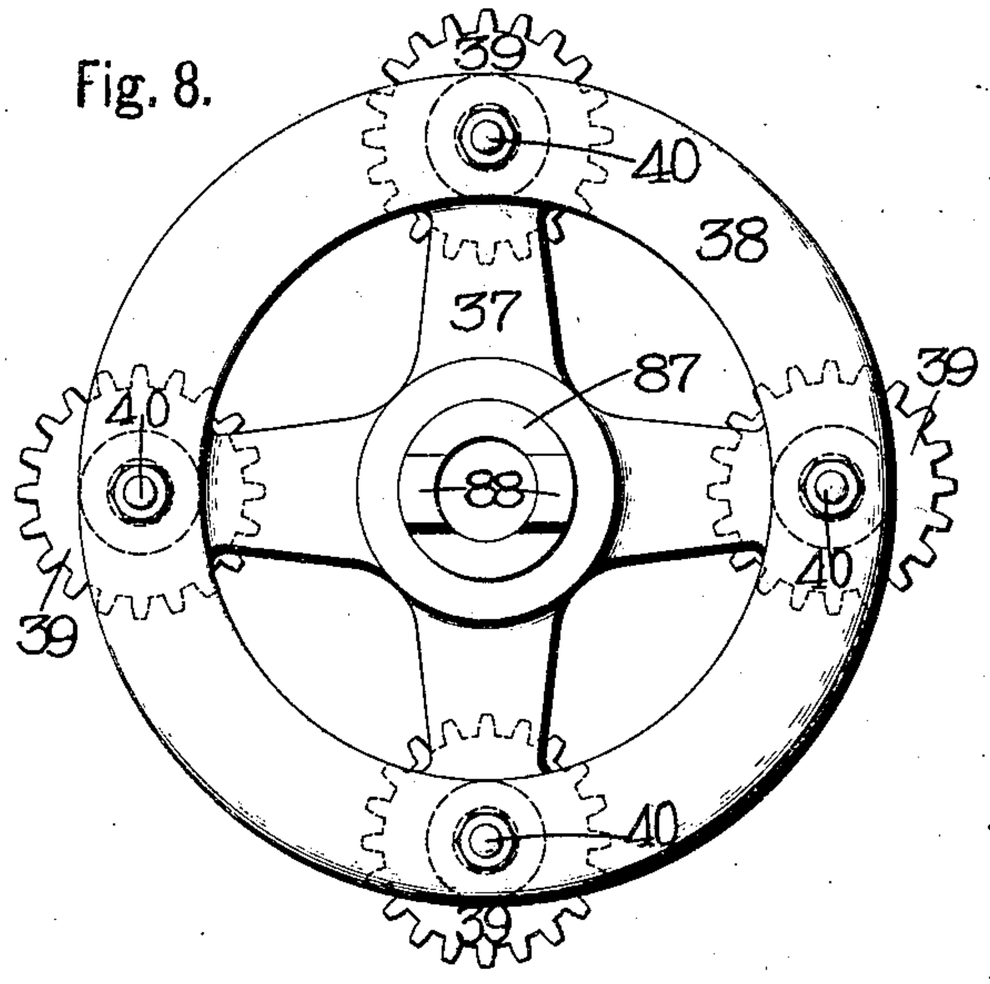
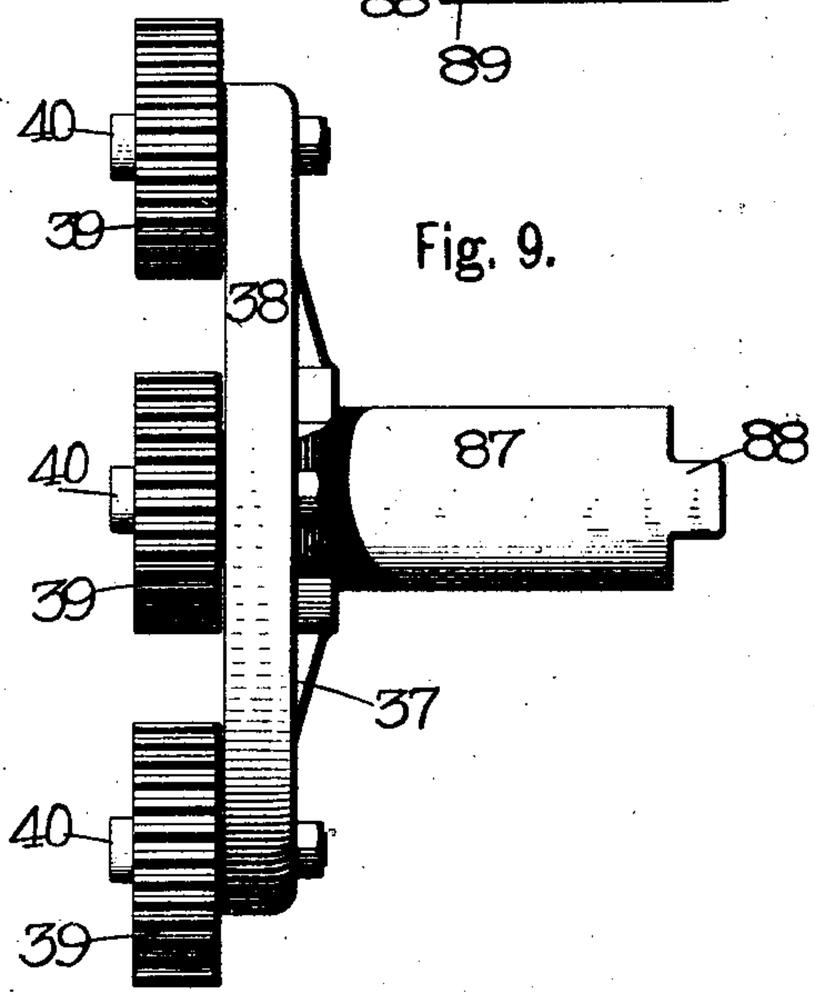


Fig. 9.



Witnesses.
L. M. Langston.
George A. Neubauer

William C. Marsh Inventor.
By C. J. Langston, Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM C. MARSH, OF DUNKIRK, NEW YORK.

BRAKE.

No. 896,649. Specification of Letters Patent. Patented Aug. 18, 1908.

Application filed January 16, 1908. Serial No. 411,070.

To all whom it may concern:

Be it known that I, WILLIAM C. MARSH, a citizen of the United States, residing at Dunkirk, in the county of Chautauqua and State of New York, have invented a certain new and useful Improved Brake, of which the following is a specification.

This invention relates to an improved brake which is more especially adapted for heavy street cars or other heavy vehicles and the principal object of the invention is to multiply the application of power to the brake so that it may be applied with great force.

The invention also relates to certain details of construction which will be hereinafter described and claimed reference being had to the accompanying drawings, in which,—

Figure 1 is a fragmentary side view of a street car equipped with the improved brake, the truck being shown in section to more clearly disclose the construction. Fig. 2 is a plan view of the improved brake, the bottom of the street car being shown in dotted lines. Fig. 3 is an enlarged detached view of the shaft shown partially in section. Fig. 4 is a central vertical section through the brake setting mechanism on line *a a*, Fig. 5 the supporting shaft being shown in full. Fig. 5 is a vertical transverse section on line *b b*, Fig. 4. Fig. 6 is a vertical transverse section on line *c c*, Fig. 4 through the supporting shaft of the brake setting mechanism, showing an inner view of the non-slidable friction member. Fig. 7 is a vertical transverse section through the brake setting mechanism on line *d d*, Fig. 4, showing the planetary power multiplying gearing. Fig. 8 is a detached end view of the pinions of the planetary power multiplying gearing, their supporting ring and spider. Fig. 9 is a detached side view of the same. Fig. 10 is a detached end view of the cam sleeve. Fig. 11 is a fragmentary view of the supporting shaft and the sleeve of the spider, also showing a section through the cam sleeve to show the means for holding the sleeve of the spider stationary upon the supporting shaft.

The improved brake is shown in Fig. 1 of the accompanying drawings attached to a heavy electric street railway car. This car has the usual body 1, truck 2, axles 3 and wheels 4. The type of brake shown is what is known as the inside truck hung brake, in which the brake beams 5 are hung transversely between the axles of the truck and carry brake shoes 6 which are adapted to bear against the wheel tread. The brake beams are arranged in pairs and are pivoted to near the lower ends of inclined levers 7 and 8. The lever 7 is pivoted at its upper ends to the truck and at its lower ends to one end of a connecting rod 9. The lever 8 is pivoted at its lower end to the opposite end of the connecting rod 9 and at its upper extremity to the outer end of a long longitudinal rod 10. The inner ends of the connecting rods 10 of which there are two extending from the brakes of each truck, are connected to brake levers 11 and 12. These brake levers are pivoted at an intermediate point to plates 13, attached to the bottom of the car and are pivoted at their outer ends to toggle levers 14 and 15 which in turn are pivotally connected at inner ends by a pivotal block 16. The outer end of the pivotal block 16 is secured to one end of a spiral spring 17 which has its opposite end secured to a bracket 18 attached to the car. A wire cable 19 is secured at one end to the block 16 and bends around pulleys 20 and 21 and then forward to one member of a friction power transmitting mechanism to which it is fastened.

The friction mechanism consists of two members which are rotatably mounted on a stationary shaft 22 hung in brackets 23 from the car. The stationary shaft 22 is fastened rigidly in the brackets by set screws 24. One of the members of the friction clutch which will hereinafter be termed the non-slidable friction member is rotated continuously while the car is traveling and the other member which will be hereinafter termed the slidable friction member is rotated only when frictionally contacting with the non-slidable member. The non-slidable friction member consists of a circular dished body 25, a hub 26 which is lined with antifriction metal 27 and has a reduced side extension 28 and a friction ring 29 which is bolted to the margin of the inner side of the body. The non-slidable member is supported against sliding movement on the stationary shaft by having its hub 26 and the side extension 28 of the hub located between outer and inner collars 30 and 31 rigidly fastened to the shaft by set screws 32. The slidable friction member consists of a dished body 33, a hub 34 and a friction ring 35 which is bolted to the margin of the inner side of the body.

A planetary power multiplying mechanism

is arranged in conjunction with the slidable friction member and comprises a spur gear wheel 36 which is located on the outer side of the dished body 33 and is preferably formed or cast integral with said body, a spider 37 mounted on the stationary shaft and carrying a ring 38 at the outer ends of its arms to which spur pinions 39 are rotatably attached by bolts 40 and an internal gear wheel 41 which surrounds the pinions 39. The pinions 39 are located between and mesh with the gear wheel 36 and the internal gear wheel 41. A lateral cam extension 42 of the internal gear wheel has a groove 43 formed in its surface in which the wire cable winds. A disk 44 located at one side of and preferably integral with the cam extension 42 has a series of holes in any one of which the dog of a locking mechanism is adapted to fit to lock the slidable member against rotation. The two members of the friction clutch are held normally in separated position by a spiral spring 45 which surrounds the shaft and is located between the two members.

The mechanism for locking the slidable member of the friction clutch against rotation is supported upon a sleeve 46 fitted on the stationary shaft. The sleeve 46 is loosely mounted on the stationary shaft but is prevented from rotating thereon by a yoke 47 which carries screw bolts 48 the inner plain surfaced ends 49 of which project into the openings in the sleeve. The yoke 47 is pivoted by a pin between the ears of a bracket 50 bolted to the car. An extension 51 projects vertically upward from the sleeve and has a horizontal enlargement 52 at its upper end which is hollowed out to provide a chamber 53 in which a dog 54 is slidably supported. The chamber 53 is reduced at its rear end to a diameter slightly greater than the stem of the dog to provide a shoulder 55 and a spiral spring 56 is located in the chamber around the stem of the dog with its opposite ends bearing respectively against an enlargement of the dog and the shoulder 55. The tendency of the spring 56 is to force the dog out into one of the holes in the disk. In the rear of the reduced portion of the chamber the enlargement is slotted horizontally out through its opposite sides to provide an elongated opening 57, extending horizontally through the rear portion of the enlargement 52 from side to side thereof. The sleeve 46 serves to slide the slidable friction member into contact with the non-slidable friction member being slidably moved itself on the stationary shaft by cam means which comprises a cam surface 60 formed on the end of the sleeve 46 and a cam surface 61 formed on the end of a rock sleeve 62. The sleeve 62 is rockably mounted on the stationary shaft and has a crank 63 extending upward therefrom, which is normally balanced in vertical position between coil springs 64 and 65.

The friction mechanism and its locking and shifting mechanism are controlled by means within convenient reach of the operator.

A rope 66 connects the dog 54 to a vertical shaft 67 located in the vestibule of the car. The power transmitting mechanism for connecting the non-slidable member of the friction mechanism to one of the car axles consists of a counter shaft 68, hung in bearings from the car and carrying a sprocket 69 and a bevel gear wheel 70, a chain 71 connecting a sprocket 72 on one of the axles to the sprocket 69 and a multi-part universally jointed shaft having bevel gears 73 and 74 at its opposite ends which mesh respectively with the bevel gear 70 and a bevel gear 75 bolted to the non-slidable friction member.

The connecting shaft is shown in detail in Fig. 3 and consists of two outer members 76 and 77 upon which the bevel gears 73 and 74 are respectively mounted and two inner members 78 and 79 which are connected at their outer ends to the outer members 76 and 77 by universal joints 80 and 81. The inner member 78 has a socket 82 which is substantially square in cross section and the other member 79 has a portion 83 of similar form in cross section which slidably fits in the socket 82 as shown in Fig. 3. The inner members are inclosed with a tubular housing 84 which is yieldingly tensioned between the spiral springs 85 and 86 at opposite ends.

In order to prevent the spider 37 from rotating, a long sleeve 87 is formed thereon, the outer end of which is provided with two lugs 88 which seat in depressions 89 formed in the end of the cam sleeve 46, see Fig. 11. The sleeve 87 also serves as a bearing upon which the internal gear 41, the cam extension 42 and the disk 44 are rotatively mounted.

The operation of the improved brake is as follows,—The brake setting mechanism is normally in the position shown in Fig. 4, when it is desired to set the brake to slow down or stop the car, the motorman operates the handle at the upper end of the vertical shaft 67 to release the dog 54 and also turns the shaft which is connected to the crank arm 63 on the rock sleeve 62 by a wire cable 90. The movement of the shaft rocks the sleeve 62 and by means of the cam surfaces 60 and 61 forces the power multiplying gearing and the slidable friction member toward the non-slidable friction member and brings said members into friction contact with each other. This causes the slidable friction member to revolve and through the spur gear 36 and pinions 39, rotates the internal gear 41 and winds up the wire cable 19 upon the cam extension 42, thereby exerting a pull upon the toggle levers 14 and 15. As the toggle levers straighten they move the brake levers 10 and 12 on their fulcrums and set the brakes. If the operator desires to hold the

brakes on, he releases the dog 54 which seats in one of the openings in the disk 44 and prevents backward rotation of the brake setting mechanism. To release the brakes, the vertical shaft 67 is returned to its normal position thereby permitting the rock sleeve to regain its former position and disengaging the friction members. The dog 54 is now retracted which permits the wire cable 19 to unwind and the toggle and brake levers to return to their normal position being assisted by the spring 17.

It will be noted that the intermeshing bevel gears 70 and 73 connecting the universally jointed shaft to the counter shaft 68, are located as near as possible to the pivotal center of the truck see Fig. 2, so that the swing of the truck as the car is rounding a curve will give but slight movement to the parts of the shaft. By this means much lateral play and consequent wear of the shaft parts is avoided.

I claim as my invention—

1. In a device of the class described, a car body, a truck attached to the car body, a brake and means for applying said brake including a power transmitting shaft, a counter shaft and connections between the power transmitting shaft and the counter shaft located in proximity to the pivotal center of the truck.

2. In a device of the class described, the combination with a brake, of means for applying said brake including a friction brake setting mechanism and a power transmitting shaft for transmitting power from the axle of the car to one member of the friction brake setting mechanism.

3. In a device of the class described, the combination with a brake, a car body and a truck, of means for applying said brake including a counter shaft journaled on the truck and operatively connected to one of the axles of the car, a friction mechanism connected to the brake and a power transmitting shaft connecting the friction mechanism to the counter shaft.

4. In a device of the class described, the combination with a brake, of means for applying said brake including a friction mechanism, a multi-part power transmitting shaft geared directly to one member of the friction mechanism and mechanism connecting the other member of the friction mechanism to the brake.

5. In a device of the class described, the combination with a brake, of means for applying said brake including a friction mechanism, a multi-part universally jointed power transmitting shaft, bevel gearing connecting the shaft to one member of the friction mechanism, mechanism connecting the other member of the friction mechanism to the brake and bevel gearing connecting the shaft to a source of power.

6. In a device of the class described, the combination with a brake, of means for applying said brake including a power transmitting extensible universally jointed shaft, a friction mechanism having one member geared to the shaft, a planetary power multiplying mechanism connected to the other member and mechanism connecting one element of the planetary power multiplying mechanism to the brake.

7. The combination with a brake and power means including a power transmitting shaft, of toggle mechanism, and power multiplying means between the power transmitting shaft and toggle mechanism.

8. The combination with a brake and power means including a power transmitting shaft, of a friction brake applying mechanism having a plurality of members one of which is connected to the power transmitting shaft and a power multiplying mechanism connected to another of said members.

9. The combination with a brake and a power means, of power transmitting mechanism including a power transmitting shaft connected to the power means, a friction mechanism having one member connected to the shaft and a toggle mechanism connected to another member of the friction mechanism and to the brake.

10. The combination with a brake and a power means, of power transmitting mechanism including a power transmitting shaft connected to the power means, a friction mechanism having one member connected to the shaft, a power multiplying mechanism connected to another member of the friction mechanism and a toggle mechanism connected to the power multiplying mechanism and to the brake.

11. The combination with a brake and an axle, of a counter shaft, power transmitting means connecting the counter-shaft to the axle, friction brake applying mechanism and a transmitting shaft connecting the counter shaft to one member of the friction brake applying mechanism.

12. The combination with a brake and power means of friction mechanism interposed between the brake and power means and planetary means whereby the power is multiplied in the friction mechanism.

13. The combination with a brake and power means of friction mechanism comprising a member having operative connection to the brake and a member adapted to frictionally engage said first mentioned member, and a power multiplying means between the first member and the brake.

14. The combination with a brake and power means, of friction mechanism comprising a member having operative connection to the brake and a member adapted to frictionally engage said first mentioned member, and a planetary gear power multiply-

ing means between the first member and the brake.

15. The combination with a brake and power means, of friction mechanism comprising a member having operative connection to the brake and a member adapted to frictionally engage said first mentioned member, and a planetary gear mechanism connected to the first member.

16. The combination with a brake and power means, of friction mechanism comprising a member having operative connection to the brake and a member adapted to frictionally engage said first mentioned member, and a planetary gear mechanism connected to the first member and having a spur gear wheel, a series of planetary pinions around said spur gear wheel, an internal gear wheel around the pinions and means connecting the internal gear wheel to the brake.

17. The combination with a brake and power means, of friction mechanism comprising a member having operative connection to the brake and a member adapted to frictionally engage said first mentioned member, and a planetary gear mechanism connected to the first member and one of its elements having operative connection to the brake.

18. The combination with a brake and power means, of friction mechanism comprising a member having operative connection to the brake and a member adapted to frictionally engage said first mentioned member, a planetary gear mechanism connected to the first member, and a toggle mechanism connected to the planetary gear mechanism and to the brake.

19. The combination with a brake and power means, of toggle mechanism, and power multiplying means between the power means and toggle mechanism.

20. The combination with a brake and power means, of toggle mechanism, friction brake applying mechanism having connection to the toggle mechanism, means connecting the toggle mechanism to the brake, and power multiplying means between the friction brake applying mechanism and the toggle mechanism.

21. The combination with a brake and power means, of a friction brake applying mechanism having a plurality of members and a power multiplying mechanism connected to one of said members.

22. The combination with a brake and power means, of a friction brake applying mechanism having a plurality of members and a power multiplying mechanism connected to one of said members and including a system of reducing gearing.

23. The combination with a brake and power means, of a friction brake applying mechanism having a plurality of members and a power multiplying mechanism connected to one of said members and including a system of planetary gearing.

24. The combination with a brake and power means, of a friction brake applying mechanism having a plurality of members and a power multiplying mechanism connected to one of said members and including a gear wheel on one member, a series of planet pinions around said gear wheel and an internal gear wheel around the planet pinions.

25. The combination with a brake and power means, of a friction brake applying mechanism having a plurality of members and a power multiplying mechanism connected to one of said members and including a spur gear wheel on one member, a series of planet pinions around said gear wheel and an internal gear wheel around the pinions and means connecting the internal gear wheel to the brake.

26. The combination with a brake and means for applying the brake, of planetary gear means for multiplying the power of brake application.

27. The combination with a brake and means for applying the brake, of a planetary gearing power multiplying means.

28. The combination with a brake and power means, of a combined friction power transmitting and planetary power multiplying means.

29. The combination with a brake and power means, of friction power transmitting means, and a power multiplying means connected to one of the members of the friction.

30. In a device of the class described, the combination with a brake and a power means, of a power transmitting mechanism including a planetary gearing power multiplying means.

WILLIAM C. MARSH.

Witnesses:
I. J. REED,
VILLA R. MARSH.