T. S. MILLER.

POWER TRANSMITTER AND CONTROLLER.

APPLICATION FILED JULY 3, 1906.

915,458.

Patented Mar. 16, 1909.

3 SHEETS—SHEET 1.

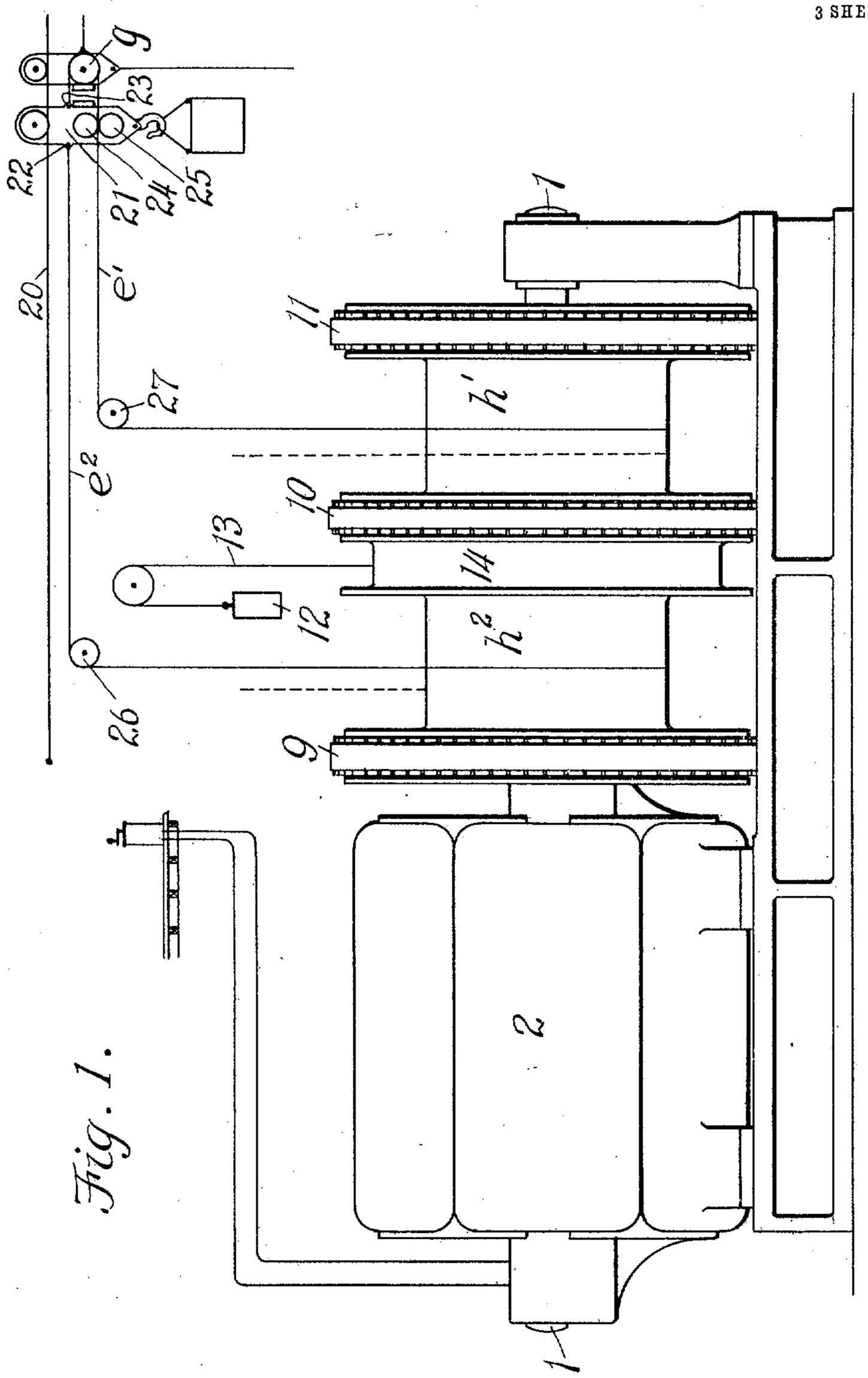

Fig. 1.

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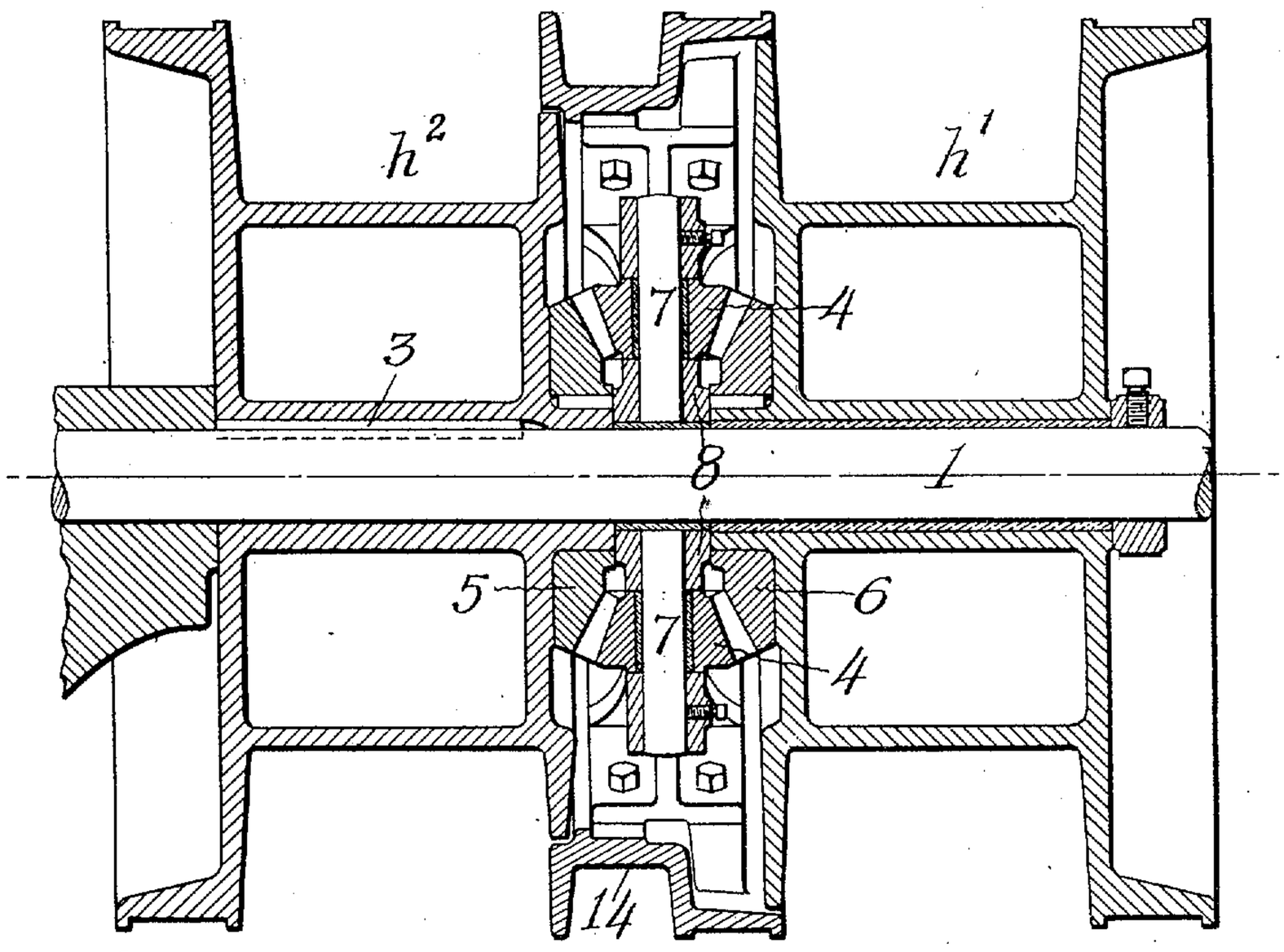

Fig. 2

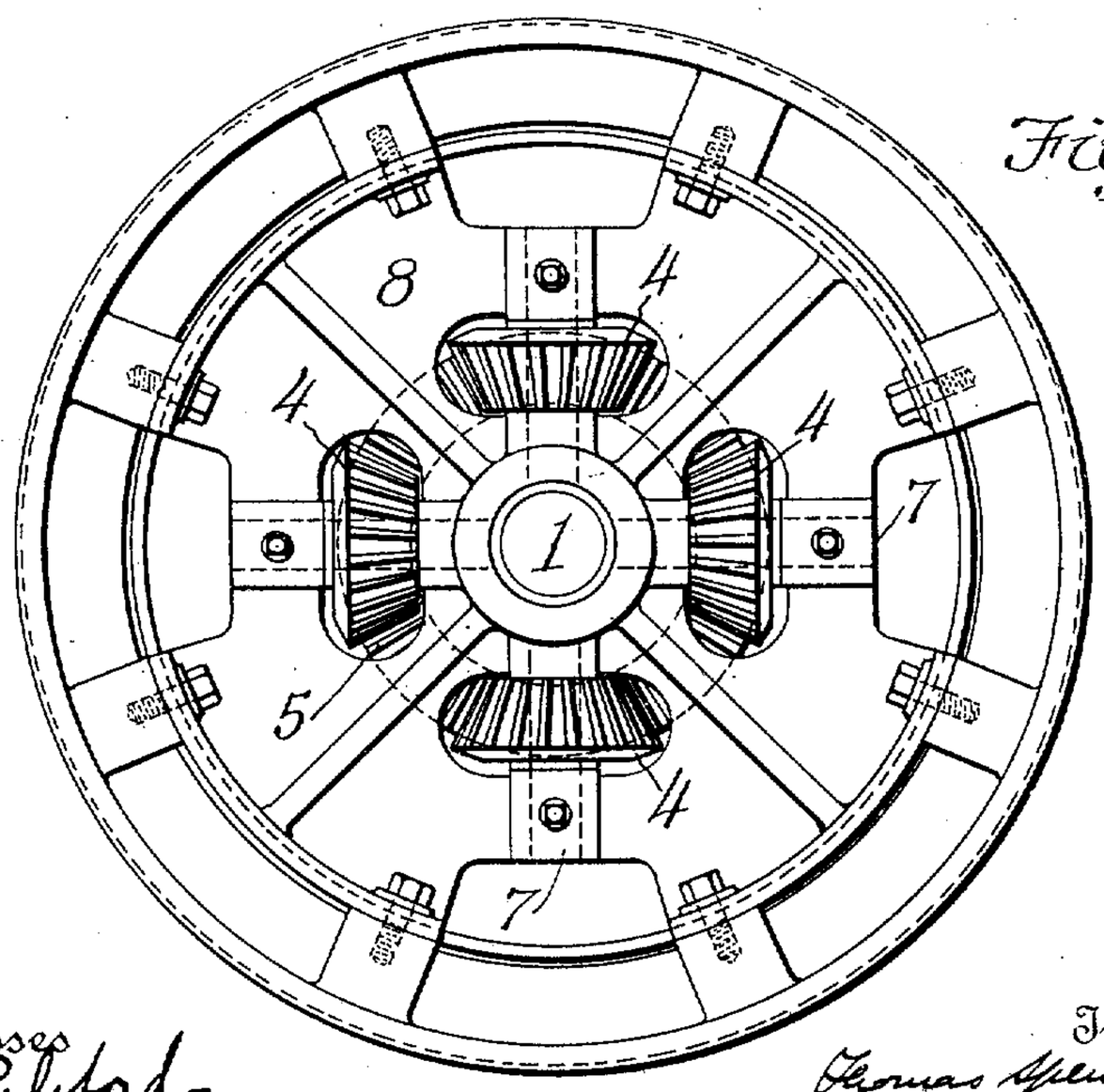

Fig. 3.

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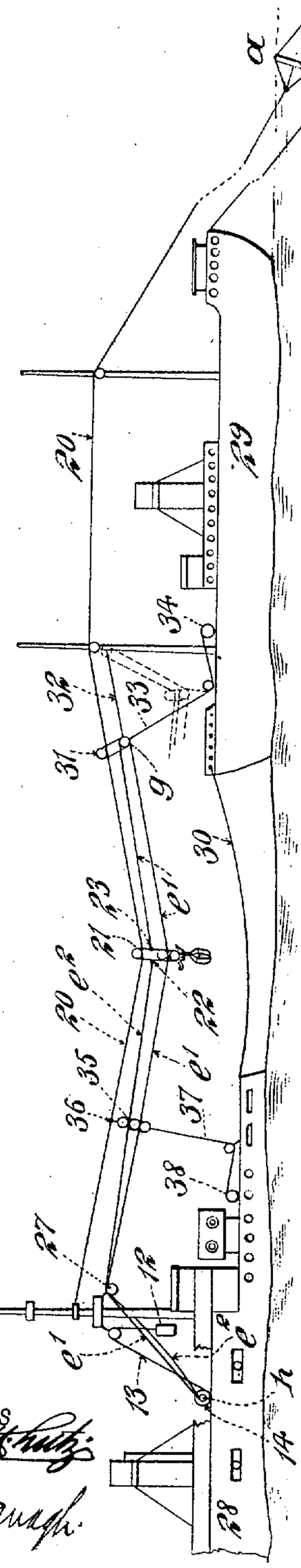

Fig. 4.

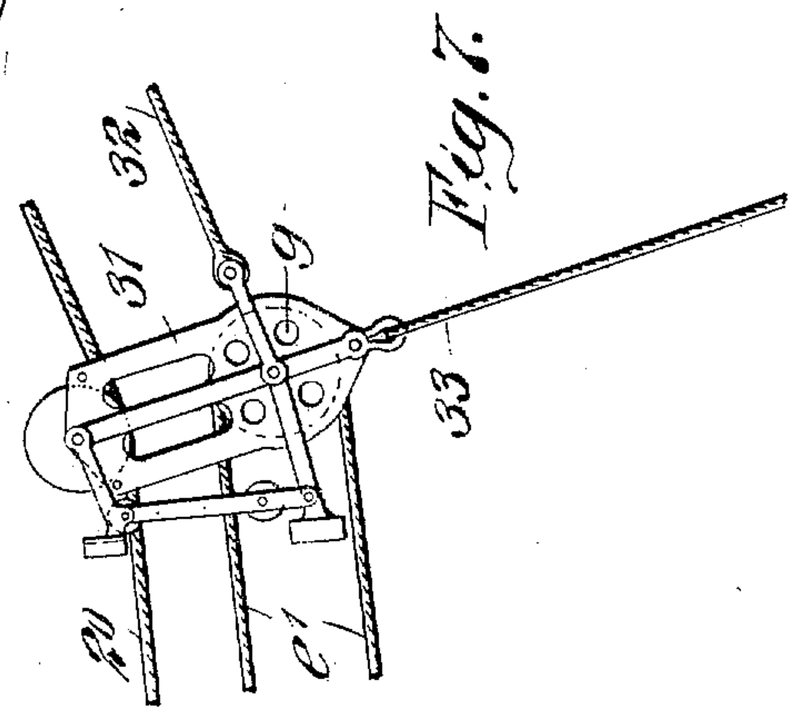

Fig. 6.

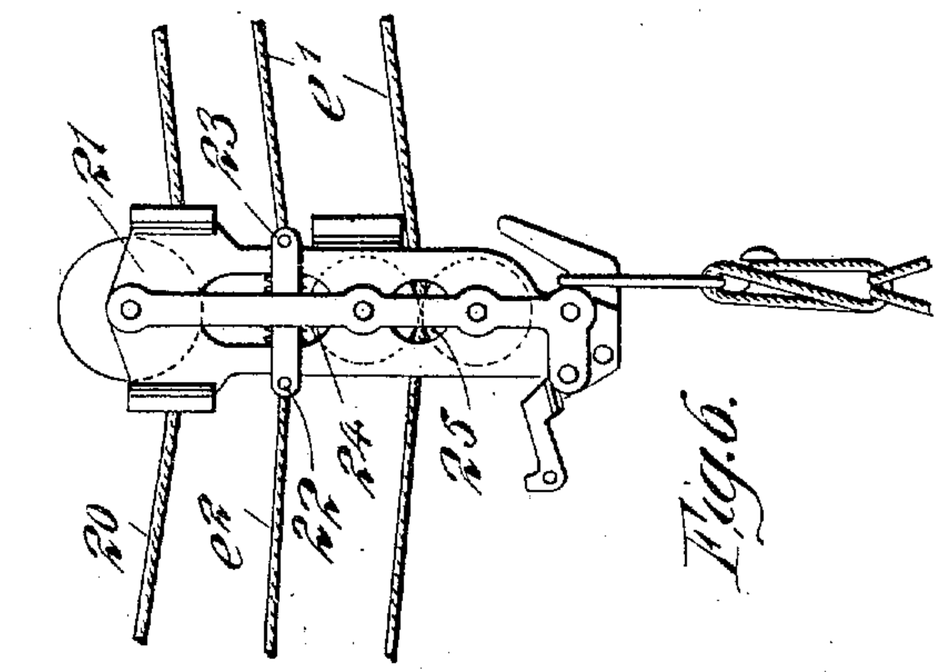

Fig. 7.

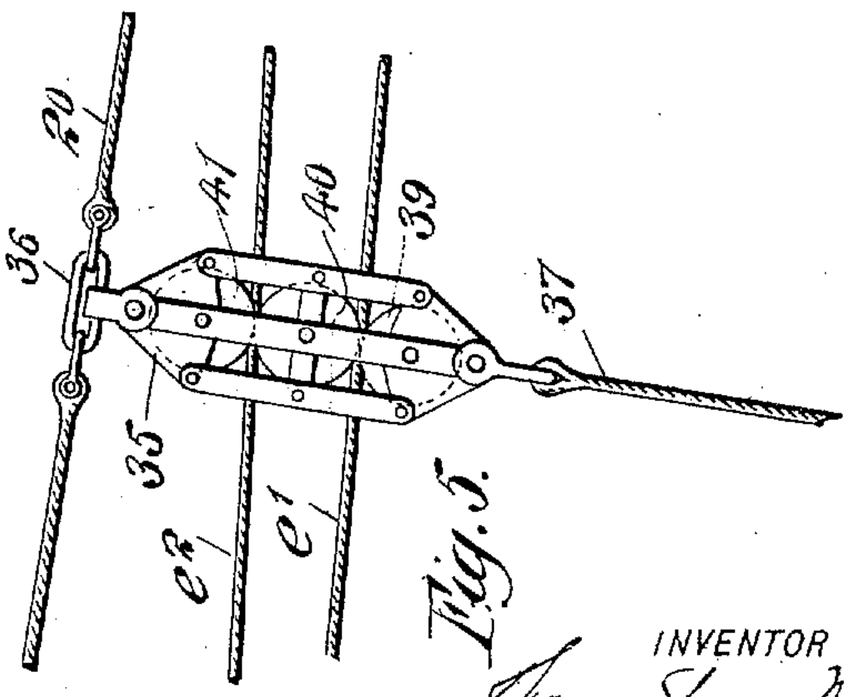

Fig. 5.

WITNESSES

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UNITED STATES PATENT OFFICE.

THOMAS SPENCER MILLER, OF SOUTH ORANGE, NEW JERSEY.

POWER TRANSMITTER AND CONTROLLER.

No. 915,458. Specification of Letters Patent. Patented March 16, 1909.

Application filed July 3, 1906. Serial No. 324,587.

To all whom it may concern:

Be it known that I, THOMAS SPENCER MILLER, a citizen of the United States, and a resident of South Orange, Essex county, and State of New Jersey, have invented a new and useful Power Transmitter and Controller, of which the following is a specification.

The first part of my invention consists of mechanism whereby the power of the prime mover may be transmitted to two actuators and its distribution between the same adjusted in its transmission.

Another part of my invention consists in the combination of said mechanism with a conveying apparatus as the actuator therefor.

Still another part of my invention consists in combining said mechanism with the transit rope of a marine cableway.

In the accompanying drawings, Figure 1 is a side view of my transmitter in a form adapted for a marine cableway. Fig. 2 is a longitudinal section of the drums and intermediate gearing. Fig. 3 is an end view of the same with one of the drums removed to display the intermediate gearing. Fig. 4 is a side view of two ships at sea connected by a cableway containing my transmitter. Figs. 5, 6 and 7 are details of parts of a marine cableway.

h', h^2 are two actuators which will be of a proper form to suit the system that they are to actuate. In the accompanying drawings, they are shown as two rope-drums (not necessarily duplicates) actuating the transit rope of a marine cableway of the class originated by me in my Patents Nos. 637143 and 637142 dated November 14, 1899; No. 691911 dated January 28, 1902, and No. 786510 dated April 4, 1905. 1, is a shaft driven by a suitable motor, such as the reversible electric motor 2 secured to the same. There are two motions imparted to said actuators h', h^2: first, a driving motion; and, second, what I will herein term an adjusting motion, which produces a temporary gain or loss of one actuator over the other in its driving motion. The driving motion is imparted from the shaft 1 to the actuator h^2 which is keyed fast thereon by the key 3 and thence transmitted by the rotation of the pinion or pinions 4 around their own axes, to the two actuator h' which is rotatable on the shaft and which is thus rotated at the same number of revolutions with h^2 but in the opposite direction. The pinions mesh with the gears 5 and 6 fixed respectively to the two actuators. The adjusting motion is produced by a bodily movement of the transmitter pinion or pinions 4 around the shaft 1. This is provided for by mounting the shafts 7 of the pinions 4 radially in a pinion carrier or spider 8. A rotative movement of this transmitter carrier in one direction is accompanied by a gain of actuator h^2 over h' and, vice versa, a rotative movement of the transmitter carrier in the opposite direction is accompanied by a gain of actuator h' over h^2. So long as the transmitter carrier is stationary, in whatever position it may be, the actuators h' and h^2 rotate at equal speeds in revolution per minute.

The actuator h^2, transmitter carrier 8 and actuator h' are respectively provided with band-brakes 9, 10 and 11 each secured to a fixed support. So long as the brake 10 is set, the transmitter carrier is stationary and the speeds (meaning revolutions per minute) of the actuators are equal. If the brake 10 is unset, the speed of the actuator h' may be retarded by the brake 11 and the adjustment of the two actuators may thus be changed by a gain of the actuator h^2 over h' to any extent desired. By unsetting the brake 11 and setting the brake 10, the two actuators will again proceed at equal speeds but at the new relative adjustment.

If the two actuators be in the form of rope-drums of equal diameters and two rope runs be oppositely coiled thereon, as shown in dotted lines in Fig. 1, the driving motion will drive these two ropes in unison and the adjusting motion will enable the unwound lengths of the two rope runs to be relatively adjusted to any difference desired while the driving is in progress. In other words, by running the motor in one direction, both ropes will be hauled in and by running the motor in the opposite direction, both ropes will be paid out and at equal speeds so long as the pinion carrier is held stationary; but at any stage, the unsetting of the brake 10 and the setting of the brake 11 will retard the motion of the drum h' so as to change the relative adjustment of the two ropes to any difference of length desired. If, however, the two ends of a loop of rope be coiled in the same direction on the drums h' and h^2, as shown by the full lines e', e^2, in Fig. 1, the

driving motion will drive these two ends inversely and at equal speeds so long as the transmitter carrier is stationary but the unwound length of the loop may be adjusted either longer or shorter by retarding the drum h' when the motor is running in one direction or the other.

The adjusting motion whereby the unwound length of the loop e', e^2, is shortened or lengthened, is made automatic by applying to the transmitter carrier 8 a tension motor tending constantly to rotate it in the hauling-in direction of the drums h' h^2. This tension, when the brakes are unset, will counterbalance the load crossing the span with the cableway at normal deflection and will take up abnormal deflection or pay out if the deflection becomes less than normal, thus serving to maintain the deflection of the cable substantially constant under variable conditions, such as are produced by shortening or lengthening the span due to the relative movement of two vessels at sea. Or, it may serve to permit the hauling down of the cableway at either end. The simplest form of tension motor is shown in the accompanying drawings and consists of a weight 12, suspended by a rope 13 coiled upon a rope-drum 14, fixed to the periphery of the transmitter carrier, in a direction opposed to that in which the rope runs e' e^2 are coiled upon the drums h' h^2. In place of the weight on the end of the rope, any other suitable equivalent may be employed for accomplishing the same purpose.

In the example shown in the drawings, e' and e^2 constitute two runs of substantially a single loop of rope extending around the tail sheave g and coiled at opposite ends upon the rope-drums h' h^2.

20 is a supporting cable. 21 is a load carriage running thereon to which the rope runs e^2 and e' are respectively fastened at 22, 23, so that e^2 is the in-haul and e' the out-haul rope. e', after passing around the tail-sheave g passes between the guide-sheaves 24 and 25 on its return through the load-carriage.

26 and 27 are the sheaves on the head-support over which the ropes pass to the actuators h', h^2.

In Figs. 4, 5, 6 and 7, a cableway of the same general arrangement as Fig. 1 is shown between a warship 28 towing a collier 29 by the tow-line 30. In these figures, it is, however, shown in greater detail as regards cableway parts. The main cable 20 is fastened to the mast of the warship and passes over sheaves elevated on the collier's masts, thence off the stern of the collier where it is fastened to a sea-anchor or drag in the water. The tail-sheave g is mounted in the collier haul-down-block 31 which has a running engagement with the main cable 20, which haul-down-block 31 is maintained at such a distance from the foremast of the collier by the pennant 32 as will bring the load to the right position on the deck when the cableway is hauled down by the rope 33 wound on the winch 34. A warship haul-down 35 is shown in Figs. 4 and 5, as fastened to the main cable 20 at 36 at such a distance from the warship's mast as will insure the proper disposition of the load on the deck when the cableway is hauled down by the rope 37 wound on the winch 38. The rope run e' passes between the sheaves 39 and 40 and rope run e^2 passes between sheaves 40 and 41 of the haul-down-block 35 before passing over the head sheaves 26 and 27 to the drums h', h^2 of the power transmitter on the deck of the warship. If, now, the head-sheaves 26, 27, be on one ship and the tail-sheave g on or attached to another ship, as shown in Fig. 4, so that variations due to wave motion take place in the length of the span, the operation may be described as follows: Suppose the shaft 1 and the drum h^2 fast thereto to be driven in a clockwise direction. Should the transmitter carrier 8 remain stationary, the pinions 4 would transmit to the drum h' an anti-clockwise movement of the same speed as h^2. Thus, the rope runs e', e^2 would be driven at equal speeds and the length of the loop will remain constant. In practice, this would seldom occur for the rope may be uncoiling from one drum slower or faster than coiling upon the other. Again, the cableway is constantly being hauled down or permitted to rise. Again, the ships always have some relative motion. If, now, an extraordinary strain be applied, for any reason, while h^2 is hauling in, which requires that the loop e', e^2, be lengthened, the drum h' will respond to the strain and, for the instant, will pay out faster than the drum h^2 hauls in. This difference causes the rotation of the transmitter carrier 8 in opposition to the strain of the rope 13 and hoists the weight 12. If, on the contrary, under the same conditions, a slack occurs in the length of the loop e', e^2 the descent of the weight 12 will momentarily retard the drum h' so that the rope-drum h^2 will haul in faster than the drum h' pays out and thus said slack will be taken up. Or, to express it differently: An outward pull on the loop e' e^2 will turn the transmitter carrier 8 against the tension of the weight 12. A slack in the outward pull on the loop e', e^2 will permit the tension of the weight 12 or its equivalent, to pull the transmitter carrier backward. Thus, in the one case, the extra length of rope will be supplied and in the other case the slack will be taken up, and in both cases this will be done instantly and automatically and without any substantial prejudice to the transit movement of the rope by which the load is being conveyed across the span. In practice, the transmitter carrier will be in almost constant

motion, first one way and then the reverse. It will thus be seen that the tension applied to the transmitter carrier 8 has the function of a take-up or pay-out mechanism, at all times automatically compensating for variations occurring in the length of the rope runs e', e^2, so that the traversing motion of said rope runs may be performed without interference from the strain or slack due to such variations in said span.

My transmitter or pinion carrier has the capacity of varying the length of the rope runs without altering the tension of the ropes; or, in other words, of maintaining a uniform tension in the ropes with a variable length of rope run. This variation in the length of the rope run may be due to various causes, such as the variation in the length of the span or variation in the deflection of the cableway.

The construction of the marine cableway herein shown operates, when coaling at sea, upon the principle originated by me in Patent No. 637143 in that it contains two actuators h', h^2 operating in antagonistic directions upon opposite ends of the transit rope combined with a tension device tending to cause one of said actuators to act as a tension upon the other by giving it a tendency to haul in faster than the other pays out.

I am well aware of the fact that my power transmitter and controller may be advantageously employed in numerous ways, not only for conveying devices but for hoisting as well; for instance, in hoisting a tub or skip which is to be tipped, or hoisting and operating a two rope "clam shell" bucket, I do not wish to limit myself to the direction of wrapping the ropes on either of the drums, for it is evident that in the handling of a "clam shell" bucket, it is necessary to hoist both ropes at the same time, at the same speed and preferably with the same tension. This would make it obligatory that the rope be wrapped on the drums in such a way as to both pull in the same rate of speed. In Fig. 1 I have shown the counterweight rope as being applied in opposition to the rope wrapped about the fixed drum. It is clear that there are advantages in having the counterweight rope act in the opposite direction and it is then a device capable of rotating the pinion carrier in one direction.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In combination, a motor, two actuators by which its power is delivered, a driving connection between the motor and the first one of said actuators, a transmitter between the first and second of said actuators, a movable transmitter carrier and means whereby a uniform strain may be applied to said transmitter.

2. In combination, a motor, two actuators by which its power is delivered, a driving connection between the motor and the first one of said actuators, a transmitter between the first and second of said actuators, a revoluble transmitter carrier and means for maintaining a uniform torque on said transmitter carrier.

3. In combination, a motor, two actuators by which its power is delivered, a driving connection between the motor and the first one of said actuators, a transmitter between the first and second of said actuators, a movable transmitter carrier and a tension motor for said carrier.

4. In combination, a motor, two actuators by which its power is delivered, a driving connection between the motor and the first one of said actuators, a transmitter between the first and second of said actuators, a movable transmitter carrier and a tension motor and a brake for said carrier.

5. In combination, a motor, two actuators by which its power is delivered, a driving connection between the motor and the first one of said actuators, a transmitter between the first and second of said actuators, a movable transmitter carrier, a tension motor for said carrier and a brake for said second actuator.

6. In combination, a motor, two actuators by which its power is delivered, a driving connection between the motor and the first one of said actuators, a transmitter between the first and second of said actuators, a movable transmitter carrier, a tension motor for said carrier and brakes for said carrier and said second actuator.

7. In combination, a motor, two actuators by which its power is delivered, a driving connection between the motor and the first one of said actuators, a transmitter between the first and second of said actuators, a movable transmitter carrier, a tension motor for said carrier and an independent brake for each of said actuators and said carrier.

8. In combination, a motor, two actuators by which its power is delivered, a driving connection between the motor and the first one of said actuators, a transmitter between the first and second of said actuators, a movable transmitter carrier, an independent brake for each of said actuators and a tension motor for said carrier.

9. In combination, a motor, two actuators by which its power is delivered, a driving connection between the motor and the first one of said actuators, a transmitter between the first and second of said actuators, a movable transmitter carrier, an independent brake for each of said actuators and said carrier and a motor for said carrier.

10. In combination, a driving shaft, two actuators respectively fast and loose thereon, a pinion carrier loose thereon, between said actuators, a pinion connection between

said actuators mounted upon said carrier and means whereby said pinion is held under uniform tension.

11. In combination, a driving shaft, two rope drums respectively fast and loose thereon, a pinion connection between said drums and a pinion carrier revolubly mounted on said shaft between said drums and means whereby said pinion is held under uniform tension.

12. In combination, two alined rope drums, means whereby the first one is driven, a pinion connection between them and a pinion carrier movable parallel with their planes of rotation and means whereby said pinion is held under uniform tension.

13. In combination, two alined rope drums, means whereby the first one is driven, a pinion connection between them, a pinion carrier movable parallel with their planes of rotation and a brake on the second rope drum and means for maintaining a uniform tension on said pinion carrier.

14. In combination, two alined rope drums, means whereby the first one is driven, a pinion connection between them, a pinion carrier movable parallel with their planes of rotation and brakes on said second rope drum and the pinion carrier and means for maintaining a uniform tension on said pinion carrier.

15. In combination, two alined rope ums, means whereby the first one is driven, a transmitter between them, a transmitter carrier movable parallel with their planes of rotation and a tension motor for said carrier.

16. In combination, two alined rope drums, means whereby the first one is driven, a transmitter between them, a transmitter carrier movable parallel with their planes of rotation, a tension motor for said carrier and a brake for said second rope drum.

17. In combination, two alined rope drums, means whereby the first one is driven, a transmitter between them, a transmitter carrier movable parallel with their planes of rotation, a tension motor for said carrier and brakes for said carrier and said second rope drum.

18. In combination, three rope drums, means for driving the first of said rope drums and a transmitter mounted upon the second of said rope drums forming a driving connection between the first and third of said rope drums.

19. In combination, three rope drums, means for driving the first of said rope drums and a transmitter mounted upon the second of said rope drums forming a driving connection between the first and third of said rope drums and a brake on the third of said rope drums.

20. In combination, three rope drums, means for driving the first of said rope drums and a transmitter mounted upon the second of said rope drums forming a driving connection between the first and third of said rope drums and a brake on the second of said rope drums.

21. In combination, three rope drums, means for driving the first of said rope drums and a transmitter mounted upon the second of said rope drums forming a driving connection between the first and third of said rope drums and brakes on the second and third of said rope drums.

22. In combination, three rope drums, means for driving the first of said rope drums and a transmitter mounted upon the second of said rope drums forming a driving connection between the first and third of said rope drums and independent brakes on the first and third of said rope drums.

23. In combination, a shaft, a motor one element of which is mounted upon said shaft, two rope drums respectively fast and loose on said shaft, a transmitter between said rope drums, a transmitter carrier revolubly mounted upon said shaft between said drums and means for maintaining a uniform tension on said transmitter.

24. In a conveying apparatus, in combination, two ropes, two rope drums therefor, a transmitter between said rope drums, a transmitter carrier and a motor for said carrier exerting a tension upon said ropes.

25. In a conveying apparatus, in combination, a loop of rope extending across the span, a load carriage secured thereto, a rope drum for each end thereof, a transmitter between said rope drums and a transmitter carrier by the movement of which an increment or decrement can be produced in the length of said loop.

26. In a conveying apparatus, in combination, a loop of rope extending across the span, a load carriage secured thereto, a rope drum for each end thereof, a transmitter between said rope drums and a transmitter carrier and a tension for said carrier tending to produce a decrement in said loop.

27. In combination, a cableway, relatively movable supports therefor, a load carriage, the traction rope therefor, two actuators whereby the inhaul and outhaul runs of said traction rope are respectively driven, a motor operatively connected with one of said actuators, a transmitter carrier between said actuators and a movable transmitter whereby the length of said traction rope on the span can be controlled.

28. In combination, a supporting cable, a tension therefor, relatively movable supports therefor, a load carriage running thereon, a carriage traction-rope, two actuators whereby the out-haul and in-haul runs of said ope are respectively driven, a motor operatively connected with one of said actuators, a transmitter between said actuators and a movable transmitter carrier whereby

the length of said traction rope on the span can be controlled.

29. In combination, a cableway, relatively movable supports therefor, a load carriage, the traction rope therefor, two actuators whereby the in-haul and out-haul runs of said traction rope are respectively driven, a motor operatively connected with one of said actuators, a transmitter between said actuators and a movable transmitter carrier, a motor therefor whereby the length of said traction rope on the span can be controlled.

30. In combination, a cableway, relatively movable supports therefor, a load carriage, the traction rope therefor, two actuators whereby the in-haul and out-haul runs of said traction rope are respectively driven, a motor operatively connected with one of said actuators, a transmitter between said actuators and a movable transmitter carrier, a tension motor therefor whereby the length of said traction rope on the span can be controlled.

31. In combination, a pulling boat, a pulled boat, a transit rope, a load support moved thereby, an actuator of said transit rope and a tension device acting upon said transit rope consisting of a second actuator and a tensioned transmitter between said two actuators.

32. In combination, a pulled boat, a pulling boat, a transit rope, a load support moved by said transit rope, a forward transit actuator, a backward transit actuator, and a transmitter between the two.

33. In combination, a pulled boat, a pulling boat, a transit rope, a load support moved by said transit rope, a forward transit actuator, a backward transit actuator and a tensioned transmitter between the two.

34. In combination, a pulled boat, a pulling boat, a transit rope, a load support moved by said transit rope, a forward transit actuator, a backward transit actuator, a tensioned transmitter between the two and a brake on said tensioned transmitter.

35. In combination, a pulled boat, a pulling boat, a transit rope, a load support moved by said transit rope, a forward transit actuator, a backward transit actuator, a tensioned transmitter between the two and a brake applied to one of said transit actuators.

36. In combination, a pulled boat, a pulling boat, a transit rope, a load support moved by said transit rope, a forward transit actuator, a backward transit actuator, a motor whereby the first of said transit actuators is driven and a transmitter whereby the second of said actuators is driven from the first.

37. In combination, a pulling boat, a pulled boat, a transit rope, a load support moved thereby, an actuator for said transit rope, a tension device acting upon said transit rope consisting of an antagonistic actuator and a tensioned transmitter between said actuators whereby one is urged to haul in faster than the other pays out.

38. In combination, a pulling boat, a pulled boat, a transit rope, a load support moved thereby, a rope drum connected with each end of said transit rope and a tensioned transmitter between said rope drums.

39. In combination, two relatively moving supports, a transit rope extending between the same, a forward transit actuator, a backward transit actuator acting upon said rope antagonistically and a tensioned transmitter between said actuators whereby power applied to one transit actuator is adapted to yield to the power of the other and thereby pay out the transit rope under tension.

40. In combination, a pulling boat, a pulled boat, a transit rope, a load support moved thereby, an actuator for said transit rope, a tension device acting upon said transit rope and consisting of an antagonistically operating actuator and a tensioned transmitter between said actuators, a supplemental supporting rope and a tension device acting upon said supplemental supporting rope.

41. In combination, a pulling boat, a pulled boat, a transit rope extending from one boat to the other and back again, a load carriage running upon one branch of said transit rope and moved by the other branch thereof, an actuator of said transit rope connected with one end thereof and a tension device consisting of a second actuator upon the other end of said transit rope and a tension transmitter between said actuators.

42. In combination, a pulling boat, a pulled boat, a transit rope extending from one boat to the other and back again, a load carriage running upon one branch of said transit rope and moved by the other branch thereof, a supplemental supporting rope, a tension device acting upon said supporting rope, an actuator connected with one end of said transit rope, a tension device consisting of a counteractuator acting upon the other end of said transit rope and a tensioned transmitter between said actuators.

43. In combination, a pulling boat, a pulled boat, a trackway cable extending from the pulling boat over and to the rear of the pulled boat, guiding supports for the trackway cable upon the pulled boat, a sea anchor on the rear of the trackway cable, a transit rope, a drum connected with each end of said transit rope and a tensioned transmitter between said drums.

44. In combination, a towing boat, a towed boat, a traveling rope between them, a yielding mechanism whereby a strain is exerted upon said traveling rope in opposition to the pull of said towed boat; said yielding mechanism consisting of two antagonistically moving drums and a tension transmitter between the same.

45. In combination, two relatively moving supports, a transit rope, a load support moved by said transit rope, a forward transit actuator, a backward transit actuator, a tensioned transmitter between said actuators, means whereby said transit rope is lowered at a point intermediate said supports.

46. In combination, a ropeway extended across a gap, supports therefor on opposite sides of said gap elevated above the bottom thereof, a load rest on one side of said gap, a load carriage, a traction rope engaging said carriage, a drum connected with each end of said traction rope, means engaging the ropeway exterior to the carriage whereby the ropeway is deflected toward said load rest and a tensioned transmitter between said drums.

47. In combination, a driving motor, a tension motor, two rope drums, means whereby both of said rope drums are operatively connected with said driving motor and means whereby said tension motor controls the distribution of said driving power to said drums.

48. In a cableway, in combination, a motor, two rope-drums by which its power is delivered, a driving connection between the motor and one of said drums, a tensioned transmitter between said drums, a transit rope actuated by the coaction of said drums, and means whereby said transit rope is deflected in antagonism to the tension on said transmitter.

49. In a cableway, in combination, a transit rope, a tail sheave for the same, a rope whereby said tail sheave is supported, a load rest and means whereby said tail sheave is deflected toward said load rest.

50. In a cableway, in combination, a transit rope, a tail sheave for the same, a rope whereby said tail sheave is supported, a pennant whereby said sheave is connected with the tail support, a load rest and means whereby the tail sheave is deflected toward said load rest.

51. In combination, two supports, a transit rope extending from one support to the other and back again, a load carriage upon one branch of said transit rope and moved by the other branch thereof, an actuator of said transit rope connected with one end thereof, a tension means at the other end of the transit rope.

In testimony whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

THOMAS SPENCER MILLER.

Witnesses:
ERNEST PULSFORD,
H. G. BARRINGTON.

Correction in Letters Patent No. 915,458.

It is hereby certified that in Letters Patent No. 915,458, granted March 16, 1909, upon the application of Thomas Spencer Miller, of South Orange, New Jersey, for an improvement in "Power Transmitters and Controllers," an error appears in the printed specification requiring correction, as follows: In line 118, page 4, the word "carrier" should be stricken out and inserted after the word "transmitter" in line 119, same page; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of April, A. D., 1909.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.