June 21, 1960 E. R. HARMON 2,941,322

MACHINE FOR SUPPORTING AND ROTATING ELECTRIC SIGNS

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FIG. 1.

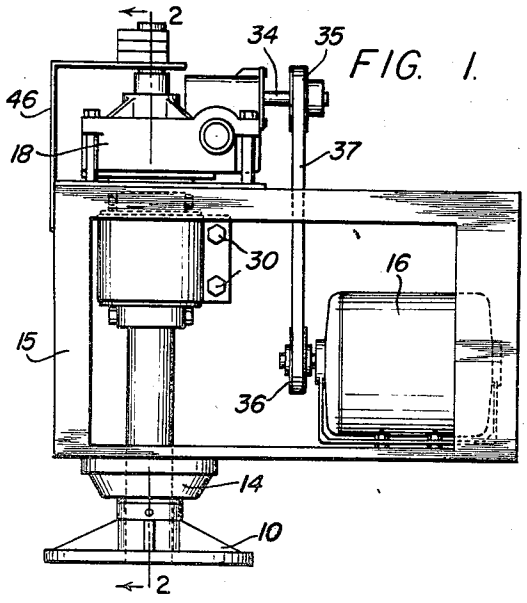


FIG. 2.

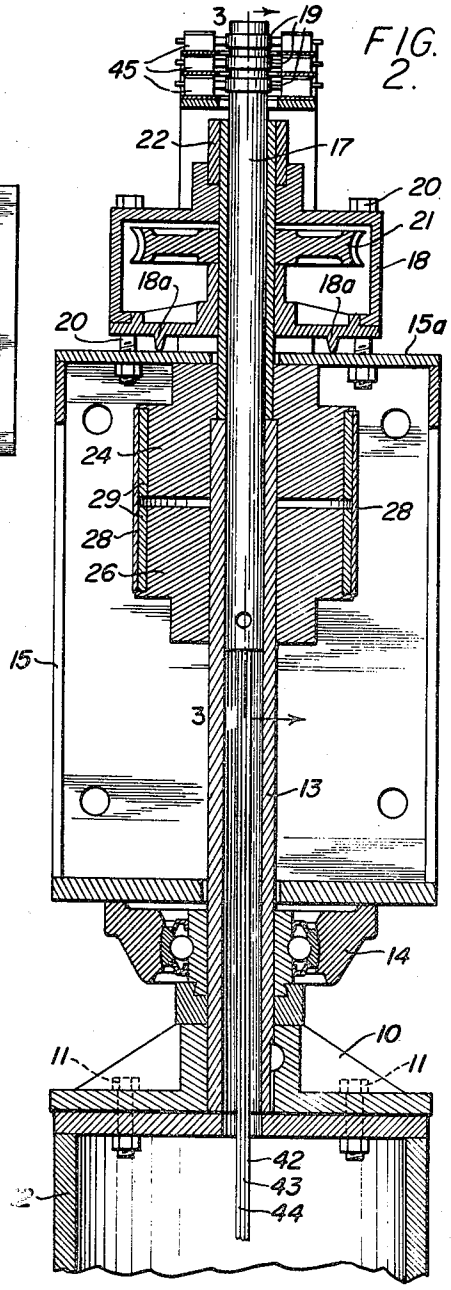
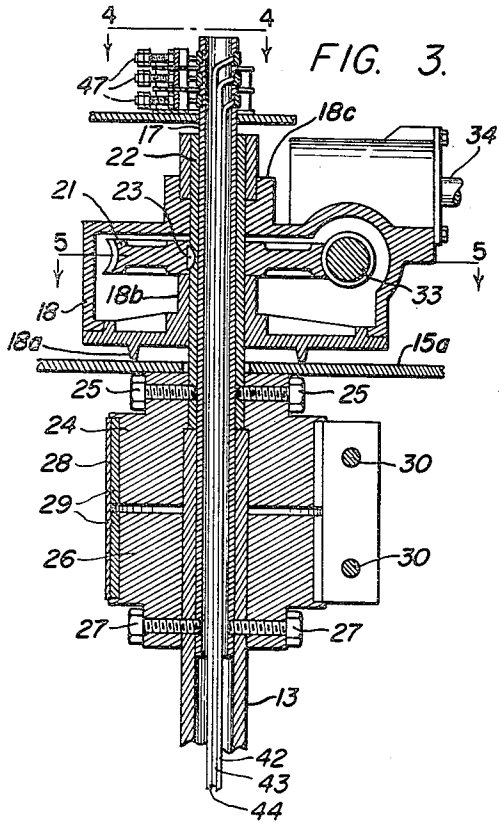


FIG. 3.



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FIG. 5.

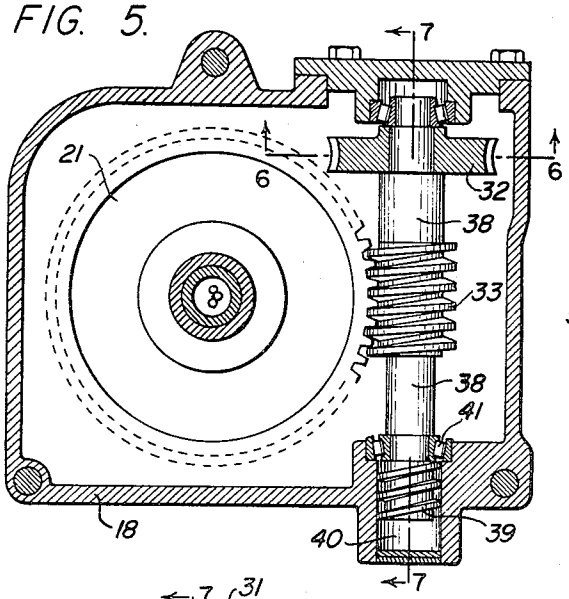


FIG. 8.

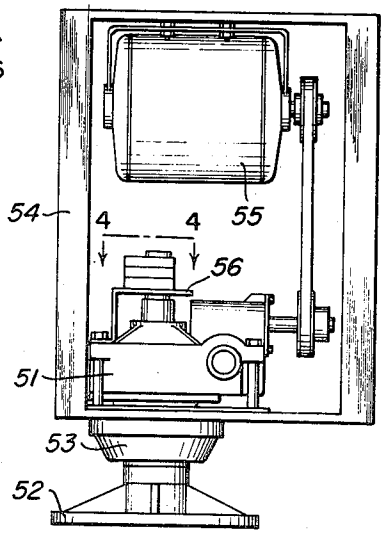


FIG. 6.

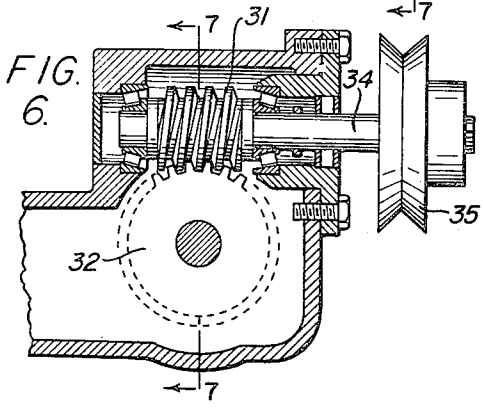


FIG. 4.

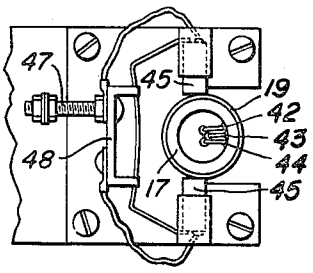
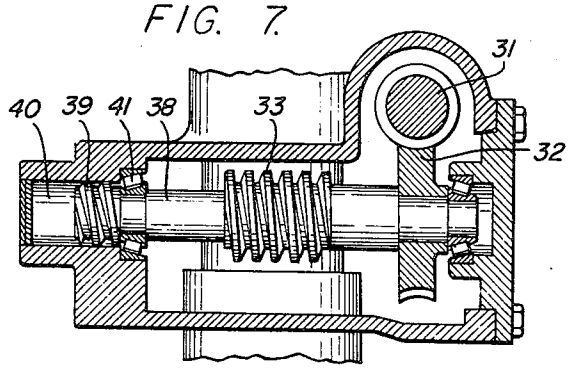


FIG. 7.



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2,941,322

MACHINE FOR SUPPORTING AND ROTATING ELECTRIC SIGNS

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4 Claims. (Cl. 40—33)

This invention relates to machines for rotating electrically lighted display signs, particularly the outdoor types of neon signs that are widely used for advertising display purposes.

Various forms of so-called "turning units" have been developed heretofore to meet demands for electric display signs that slowly and continuously rotate. However, these machines leave much to be desired. They are clumsy in construction and expensive to produce. Moreover, they require frequent repairs.

Principal objects of the present invention are to provide a machine of the type concerned which is relatively simple and compact in construction, comparatively inexpensive to produce, requires little attention and repair during use, is applicable to most of the usual sizes and styles of electrical display signs, effectively locks the sign against rotation in either direction when the motor is not running, may be provided easily and inexpensively with conveniently adjustable variable speed mechanism, directly supports as well as motivates the display sign, and provides simple and effective electrical connection for the motivated sign.

In the accomplishment of these objects, an important structural feature is the provision of a power transmission gear box that surrounds the standard or shaft upon which the sign is mounted for rotation and replaces one of the ordinarily required bearings therefor, the standard or shaft being hollow and open-ended so that the electric wiring for the sign passes therethrough and through the gear box, establishing electrical connection between the electrical supply lines and the usual commutator in a most effective, compact, and economical manner.

Important also is the power transmission arrangement, which employs both a pulley drive and a double worm type of gear train for transmitting rotation of the motor to the sign mount at suitable speed reduction ratio. The provision of a worm at both the power input and the power output ends of the gear train provides positive locking of the mechanism against motion in either direction when the motor is not running, thereby insuring stability of the sign when not rotating. The provision of a pulley drive as a component of the power transmission arrangement enables use of a conventional expansion pulley of Reeves type as a quickly and easily adjusted variable speed mechanism.

Another feature in instances where large signs are to be turned is the manner in which a clutch is provided on the hollow standard or shaft for protecting the mechanism against heavy wind loads exerted on the sign. For lighter signs, the pulley drive affords the use of a pulley clutch to accomplish the same thing.

Further objects and features of the invention will become apparent from the following detailed description of the particular preferred embodiments illustrated by way of example in the accompanying drawings.

In the drawings:

Fig. 1 represents a side elevation of one embodiment of the invention adapted for use with large signs;

Fig. 2, a vertical section taken along the line 2—2 of Fig. 1 and drawn to a considerably enlarged scale;

Fig. 3, a similar but fragmentary view taken along the line 3—3 of Fig. 2;

Fig. 4, a fragmentary top plan taken on the line 4—4 of Fig. 3 and corresponding to a similar view taken on the line 4—4 of Fig. 8;

Fig. 5, a horizontal section taken along the line 5—5 of Fig. 3;

Fig. 6, a fragmentary horizontal section taken along the line 6—6 of Fig. 5;

Fig. 7, a fragmentary vertical section taken along the line 7—7 of Fig. 6; and

Fig. 8, a view corresponding to that of Fig. 1, but illustrating a somewhat different embodiment of the invention adapted for use with small signs.

Referring to the drawings:

The embodiment of Figs. 1 through 7 is adapted to support and rotate relatively large and heavy signs which, by reason of their size, are subject to excessive countertorque stresses developed by wind loads exerted against the sign. As illustrated, the machine is arranged to be incorporated within the sign, although its position may be reversed so as to be surmounted by the sign.

In the form illustrated, the machine comprises a base **10** adapted for securement, as by means of bolts **11**, to a fixed support, for example a post **12**.

A hollow and open-ended standard or shaft **13** has its lower end extending through base **10** and rigidly affixed thereto.

Rotatably mounted on standard **13** by means of an antifriction thrust and radial bearing **14** is mounting means, here having the form of a largely open housing **15**. Securely attached to the floor of the housing is a motor **16**, preferably an electric motor.

The standard **13** has an upward extension **17** secured thereto (by means of set screws **27**, Fig. 3), and such extension extends upwardly beyond the housing and through a gear box **18** to a termination which projects above the gear box and carries thereon a series of electrical commutator rings **19**, there being three such rings in this instance.

The gear box **18** rests upon the top plate **15***a* of housing **15**, being provided with a pair of elongate and integrally formed feet **18***a* for the purpose, and is secured in place upon the housing by means of bolts **20**, Fig. 2.

Within gear box **18** is a train of power transmitting gears adapted to be driven by pulley drive connection with the motor **16** and to, in turn, drive the rotating components of the machine by worm and worm gear drive connection with the standard **13** and extension thereof **17**. Also carried by gear box **18**, preferably within and exteriorly thereof and formed integrally therewith, as shown, are bearing members **18***b* and **18***c*, respectively, for the sleeve **22** which is mounted on extension **17** of standard **13**.

In the present instance, a clutch arrangement serves to interconnect worm gear **21** of the gear train in gear box **18** with the composite standard **13**, **17**, thereby providing a safety factor in the event greater than a predetermined countertorque is effective on the drive gears by reason of excessive wind loads on the sign.

To provide the clutch interconnection, worm gear **21** is rigidly affixed to a sleeve **22**, as by means of a Woodruff key **23**, Fig. 3. Such sleeve is rotatable in bearing members **18***b* and **18***c* and on extension **17** of the standard, and has affixed to its lower end the upper drum section **24** of a drum clutch. Set screws **25**, Fig. 3, conveniently effect securement of such drum section to sleeve **22**.

The lower drum section **26** of the drum clutch is affixed to the upper end of standard proper **13** by simi-

lar set screws **27**, and the two drum sections are normally held tightly together by means of a clutch band **28** bearing against friction clutch facings **29** of the respective drum sections. The tightness of clutch band **28** may be adjusted by turning screws **30**, Fig. 1, to establish a desired stress point at which torque exerted counter to the direction of rotation of worm gear **21** will cause the clutch to slip and so relieve the countertorque stresses on the drive gears.

For the purpose of providing an efficient and positive lock for the sign against rotation in either direction when the motor **16** is idle, the gear train within gear box **18** comprises an input or driven worm **31**, Figs. 6 and 7, a driven worm gear **32** in mesh therewith, and an output or drive worm **33**, Figs. 3, 5, and 7, in mesh with worm gear **21**.

Input or driven worm **31** is rigidly affixed to a shaft **34** carrying driven pulley **35**, Fig. 1, of the pulley drive connection, drive pulley **36** of such pulley drive connection being rigidly affixed to the drive shaft **16***a* of motor **16** and the two pulleys **35** and **36** being interconnected by a drive belt **37**.

Output or drive worm **33** is rigidly affixed to a shaft **38**, Figs. 5 and 7, intermediate the length thereof, such shaft carrying at one of its ends driven worm gear **32** and at its opposite end a worm **39** operative in a grease or oil reservoir **40** to continually feed lubricant into the gear box through one of the shaft bearings **41**, see Figs. 5 and 7.

It can be seen that, by the provision of a double worm gear train, not only is power transmitted in an appropriate and highly effective manner, but positive locking of the sign against movement in either direction when the motor is idle is achieved without the need for expensive and cumbersome auxiliary mechanism.

The pulley drive connection between motor **16** and power input shaft **34** of the gear box makes for compactness of construction and is otherwise highly advantageous in that it makes possible the use of one or both pulleys of expansible Reeves type, so that the speed of rotation may be easily and quickly varied for any given installation without the provision of expensive and cumbersome variable speed mechanism.

Electrical power leads for both the motor and the sign itself, here the three wires **42**, **43**, and **44**, Figs. 2 and 3, are brought into the post **11** at any convenient location (not shown), and are conveniently passed upwardly through the open lower end and the hollow interior of standard proper **13** and of standard extension **17** to electrical connection with the respective commutator rings **19** at the upper end of the standard extension, the open upper end of such standard extension providing convenient access to the electrical connections.

It will be remembered that neither the standard proper nor its extension rotates in this arrangement of the machine. Since they remain stationary at all times, they provide a convenient conduit for any number of power leads required for the motor and the electric sign proper.

The commutator brushes **45** are advantageously stacked as illustrated, see Figs. 1–4, being supported by a bracket **46** secured to and extending upwardly from housing **15**. Binding posts **47**, Fig. 3 and 4, carried by a short standard **48**, which rises from bracket **46** coextensively with the assembly of stacked brushes **45**, are electrically connected with the respective brushes in more or less conventional manner, as indicated, and provide convenient electrical connections for the power supply leads going to the motor and the sign, respectively.

In operation, the housing **15**, gear box **18**, motor **16**, and pulley drive connection between motor and gear box rotate with the sign within which the machine is encased. Drive worm **33** travels around worm gear **21**, the latter acting as a reaction member.

It should be noted that the gear drive to the rotating components of the machine is direct, and that such drive furnishes, in effect, an upper bearing for the machine, making it unnecessary to supply more than the one antifriction bearing **14**.

The embodiment of Fig. 8 is even more compact in construction than that just described. It is designed for smaller and lighter signs, and is provided with a one-piece standard **50** of comparatively short length and uniform diameter.

Such standard extends through the gear box **51**, and directly carries the worm gear (not shown) corresponding to **21** of the first embodiment, it being understood that no clutch is incorporated with the standard in this embodiment. The base **52** and antifriction bearing **53** correspond to **10** and **14** of the first embodiment.

In this second embodiment, it is convenient to configurate the housing **54** to accommodate the motor **55** directly above the gear box and standard. Otherwise, the power transmission mechanism is the same as in the first embodiment, although one of the pulleys of the pulley drive connection may be constructed as a clutch if desired as a safety precaution.

In this second embodiment, it is convenient to mount the brush-supporting bracket **56** directly upon the gear box, as illustrated.

As mentioned previously, the machine may be used in reverse manner to that specifically shown and described, in which case the base **10** or **52** will be uppermost and will be surmounted by the sign. The housing **15** or **54** will be rigidly affixed to the post **11** or other stationary support, and the composite standard **13**, **17** or unitary standard **50** will become a rotating shaft. Power supply connections will be made with the brushes, which will remain stationary, while motor and sign electrical connections will be made with the commutator rings, which will rotate with the shaft, base, and sign. Gear box **18** or **51** will remain stationary along with the housing, and power output worm **33** will therefore not revolve around worm gear **21**, but will serve to impart rotational movement thereto in conventional manner.

Whereas this invention is here illustrated and described with respect to specific embodiments thereof, it should be realized that changes may be made within the scope of the following claims, without departing from the essential contributions to the art made by the teachings hereof.

I claim:

1. In a machine for supporting and rotating electric signs, which machine includes a hollow shaft, a housing accommodating at least part of said shaft, an electric motor within said housing, electric supply wiring extending through said shaft, commutator means carried by the shaft and interconnecting said supply wiring with electrical leads to the motor and the electric sign, respectively, and a thrust bearing for said shaft, the combination with said shaft of a speed reduction gear box through which the shaft extends and from opposite sides of which it projects, the said thrust bearing being associated with the portion of the shaft which extends from one side of the gear box and the said commutator means being associated with the portion of the shaft which extends from the opposite side of the gear box, and the gear box being supported by said housing; bearings for said shaft carried by the top and bottom sides, respectively, of said gear box; gearing within said gear box for driving said shaft, said gearing including a worm wheel affixed to said shaft, and drive gears including a worm meshing with said worm wheel; and drive means connecting said motor with said gearing.

2. The combination in claim 1, wherein the gearing further comprises a second worm wheel; a shaft mounting said worm and said second worm wheel in common; a second worm in mesh with said second worm wheel; and a power input shaft on which said second worm is mounted, the drive means being connected in drive relationship with said input shaft.

3. The combination in claim 1, wherein the hollow shaft comprises a hollow shaft member extending through the thrust bearing, a hollow shaft extension of said hollow shaft member fitted into the latter and rigidly secured thereto, and a sleeve member rotatably mounted on said hollow shaft extension, the gearing being connected in drive relationship with said sleeve member; and wherein there is additionally provided clutch means, comprising a clutch drum rigidly secured to said sleeve member, a second clutch drum rigidly secured to said hollow shaft member, and a clutch band hugging said clutch drums.

4. The combination in claim 1, wherein the hollow shaft comprises a hollow shaft member extending through the thrust bearing, a hollow shaft extension of said hollow shaft member fitted into the latter and rigidly secured thereto, and a sleeve member rotatably mounted on said hollow shaft extension, the worm wheel being

affixed to said sleeve member; and wherein there is additionally provided clutch means, comprising a clutch drum rigidly secured to said sleeve member, a second clutch drum rigidly secured to said hollow shaft member, and a clutch band hugging said clutch drums.

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