

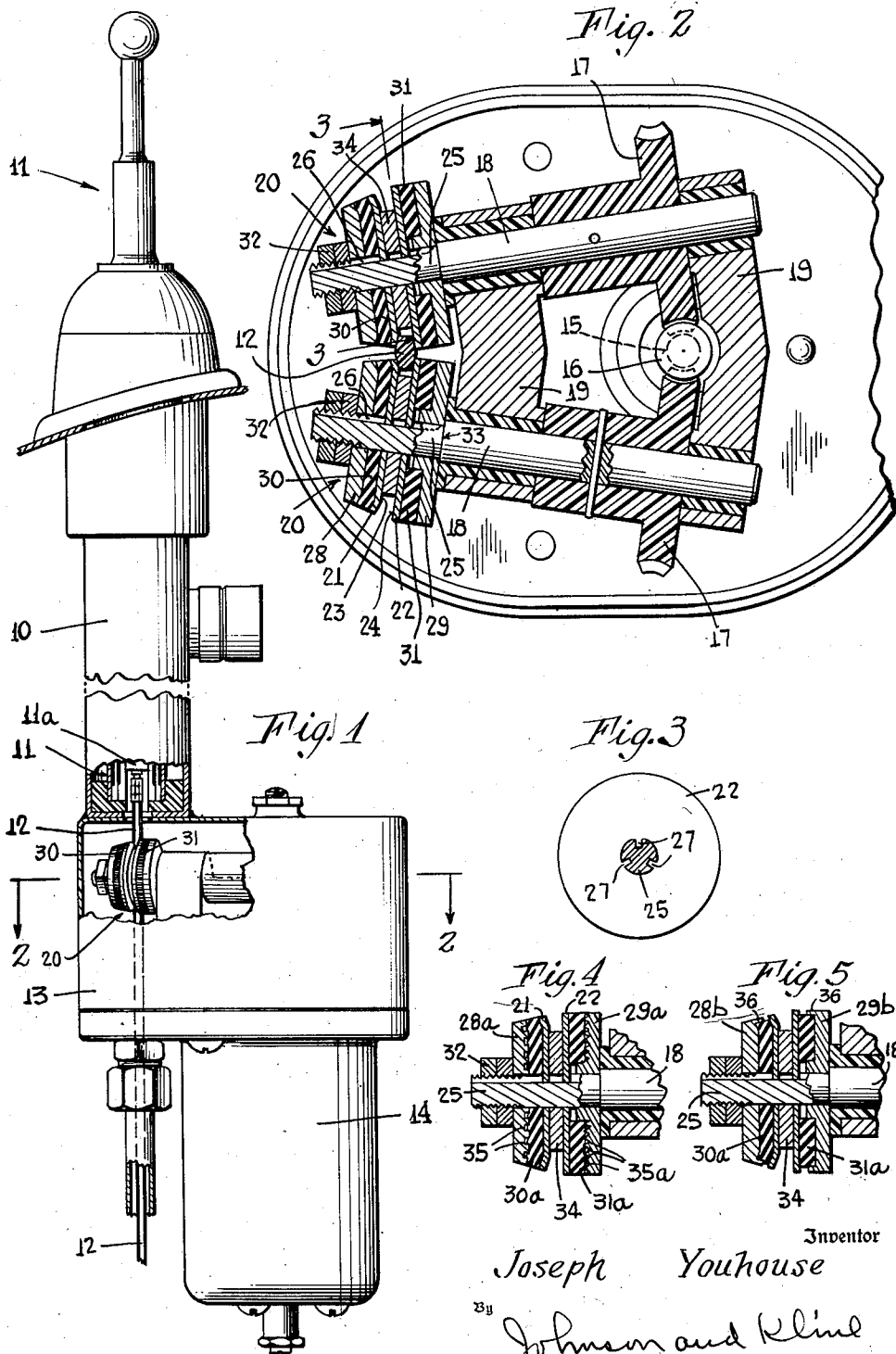
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J. YOUHOUSE

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DRIVE MECHANISM FOR EXTENDIBLE ANTENNAS

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DRIVE MECHANISM FOR EXTENDIBLE
ANTENNASJoseph Youhouse, Fairfield, Conn., assignor to
Casco Products Corporation, Bridgeport, Conn.,
a corporation of Connecticut

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This invention relates to retractable and extendable automobile radio antennas, and more particularly to a semi-automatic, power-operated antenna of this type, which has a friction driving strip actuating the antenna sections.

The invention is concerned with improvements in the projectable antenna described and claimed in the copending application of Joseph H. Cone, Serial No. 18,253, filed March 31, 1948, entitled Projectable Antenna.

In this copending application there is disclosed an antenna having a plurality of telescoping sections, one of which is connected to a non-metallic friction driving strip passing between motor-driven pulleys whereby turning of the latter will either raise or lower the antenna sections by causing axial movement of the friction driving strip. In this copending application metallic pulleys are provided, made of two halves having opposed faces for engaging different surfaces of the driving strip, the said pulley halves being yieldably maintained in continuous pressing engagement with the driving strip by a resilient metal washer operating on one of the halves.

In this type of antenna it is found desirable to make the pulley halves of metal or the frictional equivalent thereof so as to limit the friction existing between the pulley and the driving strip, for the reason that when the antenna is in use on a car, occasions arise where the sections are retracted by hand from the outside of the car, without operating the motor. For such operation a desirable slippage occurs between the pulley halves and the friction strip, normally preventing damage or breakage of the antenna components. Also, when the limits of movement of the antenna sections are reached, slippage of the pulley is desirable until the motor is deenergized.

However, the matter of properly adjusting the tension, friction and slippage between the pulley parts and the driving strip has presented difficulty in production of the antenna, and uniformity of tension and friction could not always be attained without resorting to time-consuming testing or checking operations involving this adjustment. It was found that without such checking operations the traction between the metal pulley parts and the nylon friction strip would not in production always be uniform and of the proper value to effectively operate the antenna and yet permit the desired slippage under the circumstances mentioned above.

The present invention overcomes this disadvantage in the driving mechanism of the prior antenna identified above, and an object of the invention is to provide an improved driving mechanism

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between the power-driven pulley shafts and the friction driving strip whereby, with usual manufacturing processes, uniform traction and friction of the proper values are had at all times without requiring costly checking operations, such friction permitting the necessary slippage when the antenna sections are at their limits of movement, or are hand operated, yet being adequate to raise and lower the antenna section without slippage when the driving motor is energized.

In accomplishing this, I provide improved pulley or sheave means for engagement with the push-pull friction strip, said means comprising pulleys each having two relatively axially movable halves presenting opposed faces for engagement with different surfaces of the strip, and also having means including members of resilient yieldable substance, such as rubber, engaging the back of at least one of said pulley halves and preferably both, for yieldably maintaining the halves in continuous pressing engagement with the driving strip during rotation of the pulley.

Another object of the invention is to provide an improved driving means according to the foregoing, which is simple and compact in construction, has relatively few parts, and is easy and economical to fabricate.

Yet another object of the invention is to provide an improved drive according to the foregoing, which is reliable in use at all times and which will not appreciably deteriorate over an extended period of time or use.

A feature of the invention is the provision of improved pulley means having backing members of yieldable substance engaging axially movable halves, wherein the yieldable substance may be of relatively high elasticity or low durometer reading to prevent the substance from becoming set, while at the same time undesired creeping of the substance when under pressure is prevented.

Other features and advantages will hereinafter appear.

In the accompanying drawings:

Figure 1 is a side elevational view of a power-driven antenna embodying the invention.

Fig. 2 is a horizontal section taken on line 2—2 of Fig. 1, showing the improved driving means for actuating the friction driving strip.

Fig. 3 is a fragmentary section taken on line 3—3 of Fig. 2.

Fig. 4 is a fragmentary axial sectional view of a driving pulley made in accordance with a modification of the invention; and

Fig. 5 is a sectional view of a driving pulley showing still another embodiment of the invention.

The present invention being directed to improvements in the driving mechanism associated with the friction drive strip of the antenna sections, details of such mechanism only are shown in the figures. For other details not shown or described herein, reference may be had to the copending application referred to above.

The antenna shown in Fig. 1 comprises an upright, tubular casing 10 in which are housed axially movable telescoping antenna sections 11 including an innermost section 11a connected at its lower end to a friction driving strip 12 preferably made of nylon (synthetic fiber-forming polymeric amide) which passes vertically through a housing 13. On the underside of the housing 13 a driving motor 14 is mounted, having a drive shaft 15 (Fig. 2) carrying a worm 16 engaging worm wheels 17 mounted on convergent shafts 18 which are rotatably carried by a bearing block 19.

In accordance with this invention, an improved and simplified friction driving means, including unique pulley assemblies, is provided between the shafts 18 and the friction strip 12, enabling a predetermined uniform traction to be obtained between the friction strip and the pulleys which it engages. In accomplishing this, novel pulleys 20 are provided, each pulley having two relatively axially movable halves 21 and 22 with opposed faces 23 and 24 respectively engaging different surfaces of the driving strip 12 as clearly shown in Fig. 2.

Preferably the pulley halves 21 and 22 are made in the form of sheet metal disks, which are carried on reduced end portions 25 of the shafts 18 and keyed thereto against relative turning. For such keying, the shaft portions 25 may be provided with keyways 26 to receive tongues 27, Fig. 3, provided on the disks 21 and 22.

A second pair of disks 28 and 29 is provided on each shaft 18, disposed respectively in back of the disks 21 and 22; interposed between the first and second disks are washers or disks 30 and 31 of yieldable substance such as rubber. These assemblies are retained on the reduced ends 25 of the shafts by lock nuts 32, the disks 29 being engageable with shoulders 33 of the shafts, as clearly shown.

Preferably the sheet metal disks 21 are crowned at their peripheral portions, as shown in Fig. 2, to enable the opposed faces 23 and 24 of the disks to more accurately fit the working surfaces of the nylon strip 12, which has a six-sided cross section as shown in Fig. 2.

I also provide spacing means in the form of washers 34, which are interposed between the pulley halves or disks 21 and 22 to maintain a predetermined minimum spacing.

In order to secure a uniform pressure between the nylon drive strip 12 and the pulley halves 21 and 22, I tighten the first of the lock nuts 32 with a torsion wrench to a given value, and then hold the first nut against turning and securely lock the second nut to it.

I have found that by the provision of the rubber backing washers 30 and 31 together with the backing disks 28 and 29 in the assembly shown, a very desirable and advantageous friction drive is provided between the shafts 18 and the driving strip 12, the said drive being extremely uniform and reliable in use, and effective to actuate the driving strip for extending and retracting the antenna sections, yet permitting the necessary slippage to occur when the antenna sections reach the limits of their movements, or are op-

erated by hand without the motor 14 being energized.

Fig. 4 shows a driving pulley illustrating a modification of the invention. In this figure, the driving pulley comprises halves 21 and 22 separated by a spacer 34 and backed up by washers 30a and 31a respectively, which may be of natural rubber or synthetic rubber such as neoprene. Engaging the washers 30a and 31a are backing disks 28a and 29a having circular concentric grooves 35 and 35a respectively in their faces. The grooves 35 are shown as rectangular in section, and the grooves 35a shown as V-grooves.

This assemblage may be carried on the shaft 18 and secured thereto by means of lock nuts 32 as previously explained.

I have found that, by the provision of the concentric grooves 35 and 35a in the faces of the backing disks 28a and 29a it is possible to use rubber backing washers of higher elasticity or lower durometer reading than is possible with the construction shown in Fig. 2. The grooves 35 prevent the rubber washers from creeping outward when they are under pressure, and by virtue of the washers having a lower durometer they are less likely to take a set.

Another modification of the invention is shown in Fig. 5, wherein parts similar to those described above have been given like characters. In Fig. 5 the rubber washers 30a and 31a are engaged by backing disks 28b and 29b which have peripheral flanges 36 overlying the peripheral edges of the backing washers. By this construction the washers 30a and 31a are prevented from creeping outward when under pressure, and may be made of a substance having a relatively low durometer reading.

I have found that neoprene having a durometer reading of 90 is satisfactory for the washers 30 and 31 shown in Fig. 2, and that neoprene having a durometer reading of 80 is satisfactory for the washers 30a and 31a shown in Figs. 4 and 5.

However, in the forms of the invention shown in Figs. 4 and 5, rubber backing washers of lower durometer reading than 80 may be employed, particularly if such washers are molded to have ribs adapted to enter the grooves 35 in the backing disks shown in Fig. 4.

Regardless of variations in the dimensions and tolerances of the combined parts which make up my improved friction drive, I can always quickly and easily obtain the necessary value of traction desired, and substantially maintain the said value throughout the operating life of the antenna by the simple initial torsion-wrench adjustment outlined above. Thus I am not required to establish and maintain critical tolerances of the parts and high standards of uniformity in metal springs or the like, as was heretofore necessary in the previous antenna construction referred to.

In addition, my improved drive assemblage is extremely simple, and consists of relatively few parts which are easily and quickly assembled whereby the entire organization may be economically manufactured and produced.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. In an antenna having an elongate, longitudinally extendable and retractable section and a friction driving strip connected to actuate said section, means for driving said friction strip

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comprising a pulley having two relatively axially movable halves presenting opposed faces for engagement with different surfaces of said strip; a rigid backing plate disposed at the rear of one pulley half; and means including a member of resilient, yieldable rubber-like substance, interposed between said backing plate and one pulley half for yieldably maintaining both said halves in continuous pressing engagement with the driving strip during rotation of the pulley, said plate and pulley half engaging directly opposite surfaces of the resilient member.

2. In an antenna having an elongate, longitudinally extendable and retractable section and a friction driving strip connected to actuate said section, means for driving said friction strip comprising a pulley having two relatively axially movable halves presenting opposed faces for engagement with different surfaces of said strip; and means including a pair of members of resilient, yieldable substance, engaging the backs of said pulley halves respectively, for yieldably maintaining both said halves in continuous pressing engagement with the driving strip during rotation of the pulley.

3. In an antenna having an elongate, longitudinally extendable and retractable section and a friction driving strip connected to actuate said section, means for driving said friction strip comprising a shaft; a pair of pulley halves on the shaft, having substantially opposed surfaces respectively, which are engageable with different surfaces of the strip, one of said pulley halves being mounted for axial movement on the shaft; means for keying said halves to each other against relative turning; a rigid backing plate disposed at the rear of said one pulley half; and means including a member of resilient yieldable rubber-like substance, interposed between said backing plate and said one pulley half, for yieldably maintaining both said halves in continuous pressing engagement with the driving strip during rotation of the pulley, said plate and pulley half engaging directly opposite surfaces of the resilient member.

4. In an antenna having an elongate, longitudinally extendable and retractable section and a friction driving strip connected to actuate said section, means for driving said friction strip comprising a shaft; a pair of pulley halves on the shaft, having substantially opposed surfaces respectively, which are engageable with different surfaces of the strip, one of said pulley halves being mounted for axial movement of the shaft; means spacing said pulley halves apart a predetermined minimum distance; means including a keyway in the shaft and a tongue on said one pulley half, extending into said keyway for keying said halves to each other against relative turning; a rigid backing plate disposed at the rear of said one pulley half; and means including a member of resilient yieldable rubber-like substance, interposed between said backing plate and said one pulley half, for yieldably maintaining both said halves in continuous pressing engagement with the driving strip during rotation of the pulley, said plate and pulley half engaging directly opposite surfaces of the resilient member.

5. In an antenna having an elongate, longitudinally extendable and retractable section and a friction driving strip connected to actuate said section, means for driving said friction strip comprising a shaft; a pair of pulley halves on the shaft, having substantially opposed surfaces re-

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spectively, which are engageable with different surfaces of the strip, said pulley halves comprising sheet metal disks mounted to be axially movable on the shaft; means keying said disks to each other against relative turning, said means including a keyway in the shaft and tongues on the disks, extending into said keyway; means spacing said disks apart a predetermined minimum distance; and means including a pair of rings of resilient yieldable substance, respectively engaging the backs of the disks for yieldably maintaining said disks in continuous pressing engagement with the driving strip during rotation of the shaft and disks.

6. In an antenna having an elongate, longitudinally extendable and retractable section and a friction driving strip connected to actuate said section, means for driving said friction strip comprising a shaft; a pair of pulley halves on the shaft, having substantially opposed surfaces respectively, which are engageable with different surfaces of the strip, said pulley halves comprising sheet metal disks mounted to be axially movable on the shaft; means keying said disks to each other against relative turning, said means including a keyway in the shaft and tongues on the disks, extending into said keyway; means spacing said disks apart a predetermined minimum distance; and means for yieldably maintaining both said disks in continuous pressing engagement with the driving strip during rotation of the shaft, said means including a second pair of disks on said shaft, disposed respectively in back of the first-mentioned disks, and including rings of resilient yieldable substance interposed between the second and first disks.

7. In an antenna having an elongate, longitudinally extendable and retractable section and a friction driving strip connected to actuate said section, means for driving said friction strip comprising a pulley having two relatively axially movable halves presenting opposed faces for engagement with different surfaces of said strip; and means including a member of resilient, yieldable rubber-like substance, engaging the back of one of said pulley halves, and including a nonyielding plate backing up said resilient member, for yieldably maintaining both said halves in continuous pressing engagement with the driving strip during rotation of the pulley, said plate and pulley half engaging directly opposite surfaces of the resilient member.

8. The invention as defined in claim 7 in which the nonyielding member has projections engaging the resilient member to limit creeping of the latter under pressure.

9. The invention as defined in claim 7 in which the nonyielding member is cup-shaped and contains the resilient member to limit creeping of the latter under pressure.

10. The invention as defined in claim 7 in which the nonyielding member has recesses in which the resilient member is received, to limit creeping of the latter under pressure.

JOSEPH YOUHOUSE.

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