United States Patent

[11] 3,613,104

[72] Inventor **Edward F. Bradshaw**
Agincourt, Ontario, Canada

[21] Appl. No. **43,694**
[22] Filed **June 5, 1970**
[45] Patented **Oct. 12, 1971**
[73] Assignee **Burndy Corporation**

[54] **SPACER DAMPER**
3 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **174/42,** 174/146
[51] **Int. Cl.** **H02g 7/14,** H02g 7/12
[50] **Field of Search** 174/42, 146

[56] **References Cited**

UNITED STATES PATENTS

3,475,544	10/1969	Reed	174/146 X

FOREIGN PATENTS

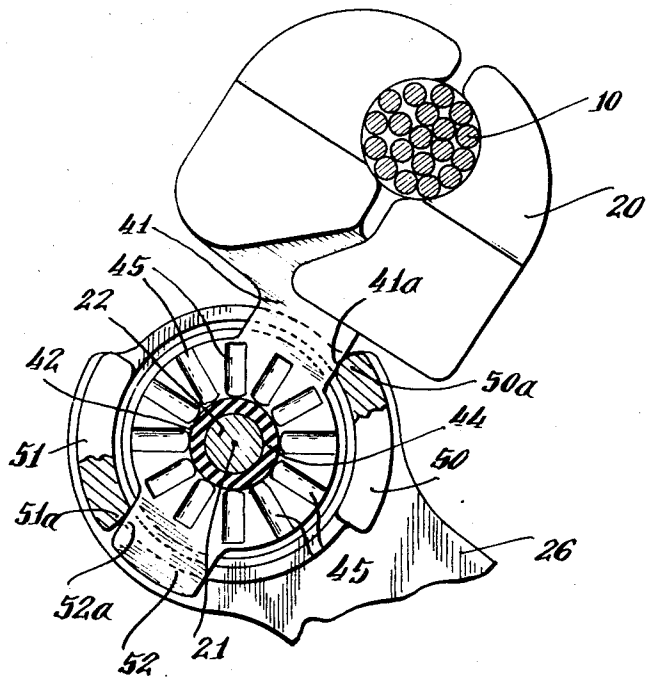
1,557,501	1/1969	France	174/146
1,098,813	1/1968	Great Britain	174/146

OTHER REFERENCES

Wigotsky, " Silicone-Rubber Washers Soothe Vibrating Transmission Lines," Design News, Aug. 18, 1965, pages 114 and 115. Copy in 174– 146.

Primary Examiner—Laramie E. Askin
Attorney—Howard S. Reiter

ABSTRACT: In a spacer damper, each wire is pivoted to the spacer damper body with a relatively delicate current conducting sleeve in the pivot axis in addition to one or more torsion devices resisting pivotal movement. Limit means for limiting pivotal movement prevent the application of radial compressive forces to said sleeve.



PATENTED OCT 12 1971

3,613,104

SHEET 1 OF 2

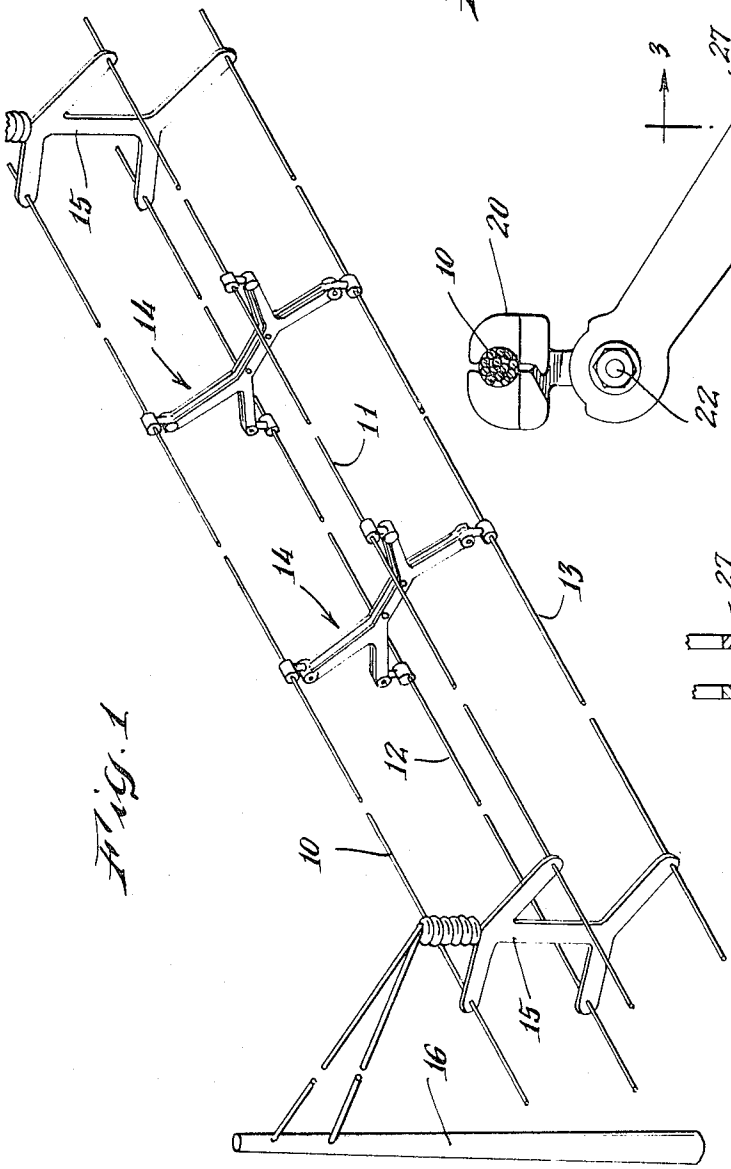


Fig. 1

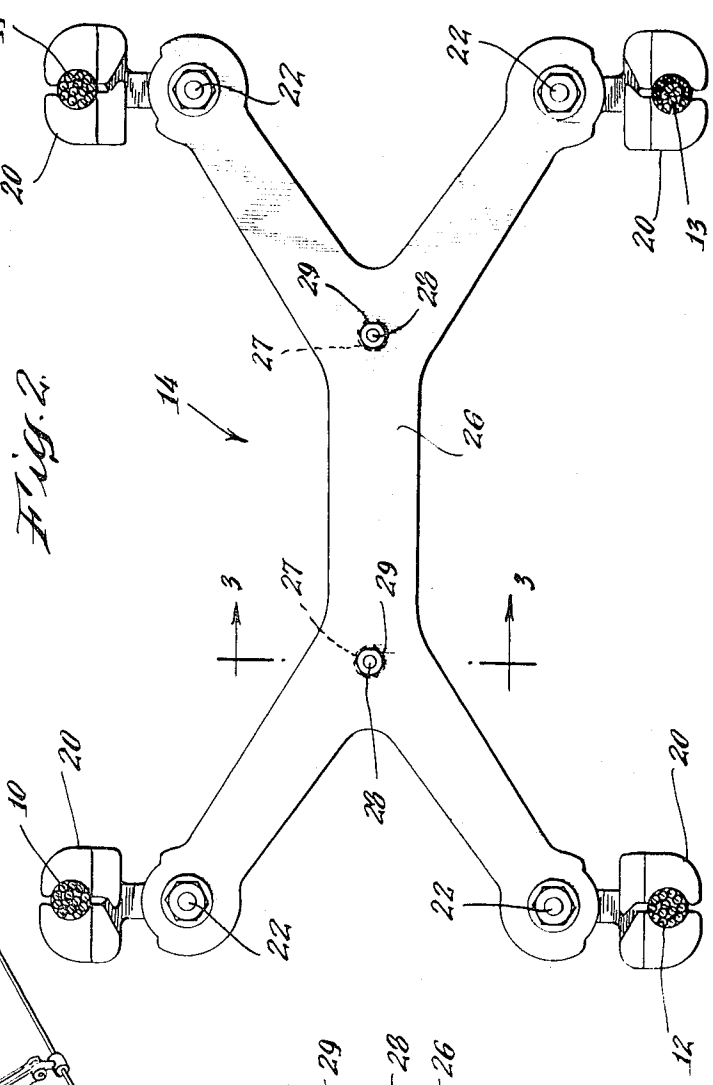


Fig. 2

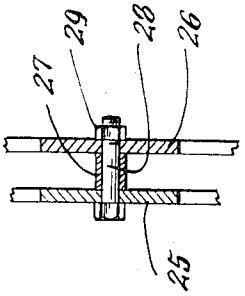


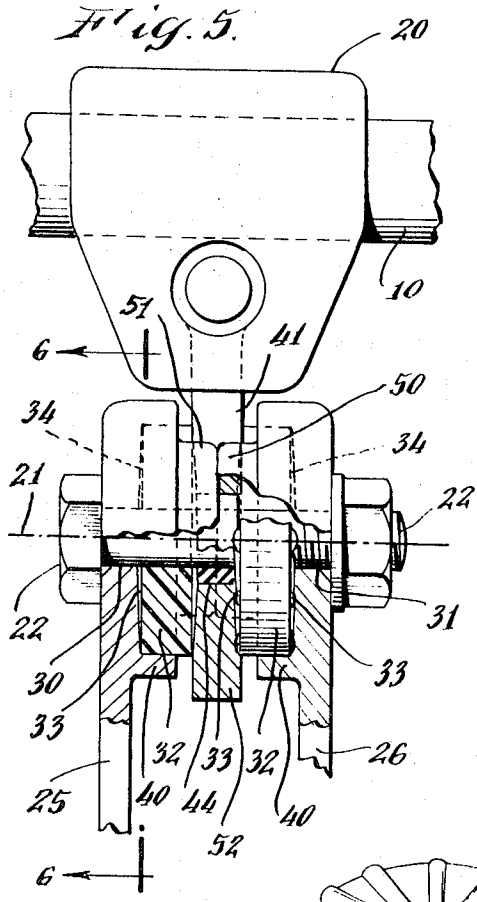
Fig. 3

INVENTOR.
EDWARD F. BRADSHAW

BY

Howard A. Peterson
ATTORNEY.

Fig. 5.



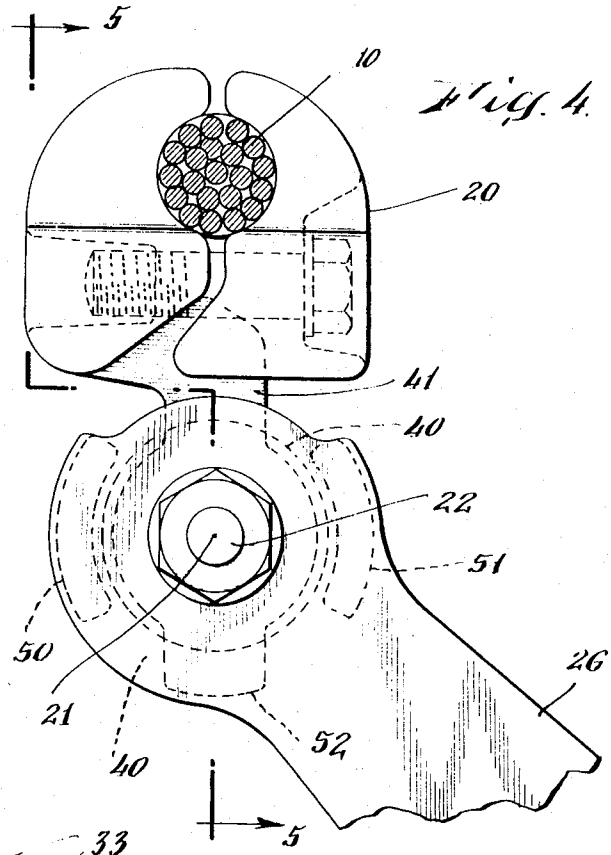


Fig. 4.

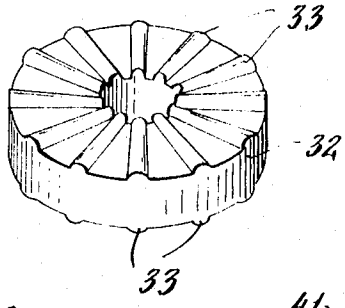


Fig. 7.

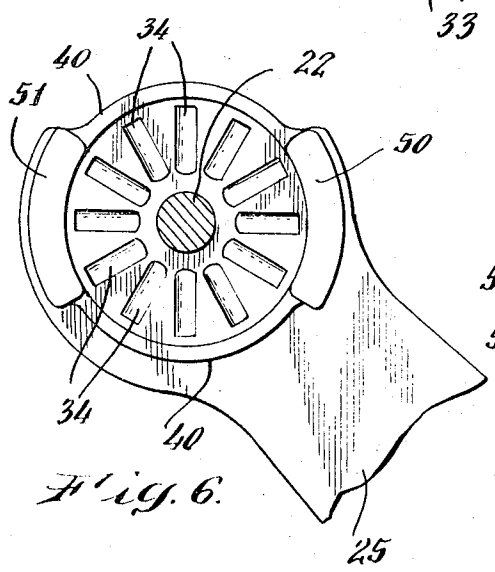


Fig. 6.

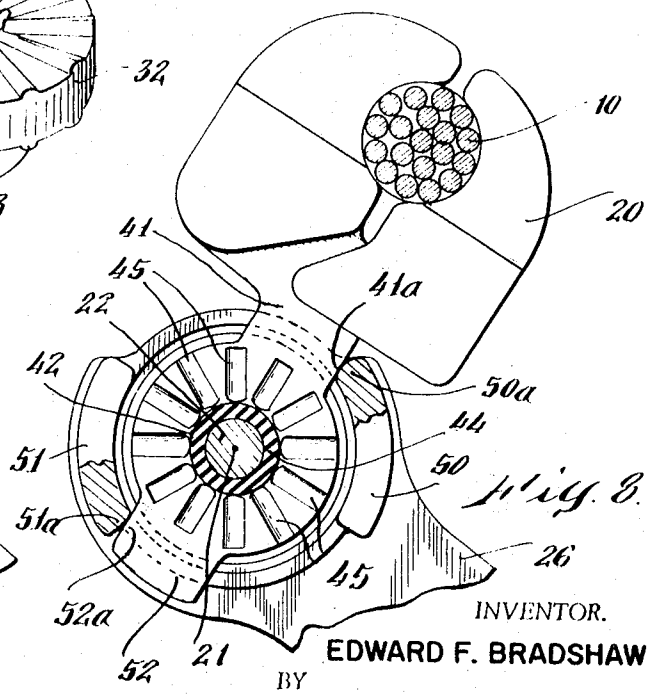


Fig. 8.

INVENTOR.
EDWARD F. BRADSHAW
BY
ATTORNEY.

SPACER DAMPER

FIELD OF INVENTION

This invention relates to a spacer damper of the type used for damping the vibrations and swinging movement of electric power transmission conductors.

DESCRIPTION OF PRIOR ART

There are many patents disclosing various types of spacer dampers. Devices of the particular class are utilized for holding a series of power transmitting wires, generally four, in spaced relation to one another, provisions being made so that each of the wires may move relatively to the spacer damper body, with its movement being damped by the spacer body, possibly aided by the other three wire conductors.

In spacer dampers of the particular class, it is customary to secure each wire conductor to an arm, with the arm in turn being pivoted to the spacer damper body. Pivotal movement of the arm is generally resisted by a torsion disk, and there may frequently be two torsion disks. These disks interlock the arm and the body, so that there can be no movement of the arm relatively to the body except through torsional twisting of the disks. In combinations of the particular class, it is quite desirable to have a means for conducting electricity from each wire of the conductors to the spacer body, so that in the event any one conductor is highly charged, as by lightning, there will be a drainage of the voltage of this conductor through the spacer body to another wire conductor. In other words, there will be an equalization of the voltages.

For this purpose, it is customary to mount about the pivot shaft through which each conductor carrying arm is pivoted to the spacer body, a conducting sleeve of some suitable material such as rubber. Actually, the torsion disks to which reference has been made, may be used for this purpose, through embedding carbon black in the plastic material of the torsion disks. However, the torsion disks, when impregnated with carbon black, lose their resiliency, and deteriorate with great speed. Therefore, a separate small current carrying sleeve has been developed for the particular purpose and is, as was indicated above, mounted about the pivot shaft.

Unfortunately, it has been found that because the rubber electricity conducting sleeve is mounted about the pivot shaft, it is subject to compressive forces upon rotation of the conductor carrying arm relatively to the spacer body. Thus, when the arm rotates to a particular limit position, compressive forces are applied to the rubber sleeve, and under certain conditions, and after a period of time, the rubber sleeve is destroyed and ceases to function effectively.

As a feature of this invention, means are provided for preventing the application of destructive forces, generally compressive, to the rubber sleeve, while also limiting the torsional twisting of the disks.

Particularly, the invention resides in the utilization of balanced limiting means that serve the purpose of limiting rotation of each conductor carrying arm relatively to the spacer damper body, while at the same time, preventing the application of compressive destructive forces to the rubber sleeve.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view in isometric showing a typical installation of long distance transmission conductor wires held in spaced relation by a series of spacer dampers utilizing the construction of this invention.

FIG. 2 is an elevation of one of the spacer dampers shown in FIG. 1.

FIG. 3 is a section taken along line 3—3 of FIG. 2.

FIG. 4 is an enlarged elevation of one of the extensions of the spacer damper shown in FIG. 2 illustrating portions of the invention.

FIG. 5 is a section taken along line 5—5 of FIG. 4.

FIG. 6 is a section taken along line 6—6 of FIG. 5.

FIG. 7 is a view in isometric showing a torsion disk that is utilized in the invention.

FIG. 8 is a composite view showing parts of FIGS. 4 and 6 with the transmission wire and its arm rotated to a stop position relatively to the spacer damper body.

DESCRIPTION OF A PREFERRED MODIFICATION OF THE INVENTION

Referring now to FIG. 1, there are shown four transmission wires designated by reference numerals 10, 11, 12 and 13, each adapted to be controlled in its vibrating and swinging movement by a series of spacer dampers designated by reference numerals 14. The wires are shown held in an elevated supported position by a standard type of support 15 that is in turn held in position by a tower 16 as is standard in the art. Each of the wires 10, 11, 12, 13 is secured to each spacer damper body 14 through means of a clamping mechanism 20 that is in turn pivoted to the spacer damper body about an axis designated 21, this being the longitudinal axis of a bolt 22 best illustrated in turn in FIG. 5.

The spacer damper body 14 used may assume various forms, but the form here illustrated is fabricated from two plates designated by reference numerals 25 and 26 in FIG. 3, the plates being there shown separated by a sleeve 27 and held assembled by a bolt 28 and a nut 29. Preferably there will be two of the bolts 28 as well shown in FIG. 2. The spacer damper plates 25 and 26 are further held assembled to one another through the intermediary of the four bolts 22, one of which has been referred to and is well shown in FIG. 5. The functioning of one of the bolts 22 will now be described, it being appreciated, that all of the bolts 22 function in exactly the same manner for mounting the several clamps 20.

It will be noted in FIG. 5 that the bolt 22 traverses an opening 30 in the part 25 of the spacer damper body 14. The bolt also traverses an opening 31 in the part 26 of the spacer damper body 14. It also traverses openings in two opposed torsion disks 32, one of the disks being well illustrated in FIG. 7. Each torsion disk 32 is formed with upstanding ribs 33 at each face thereof, and each of the parts 25 and 26, has a series of depressions 34 into which the ribs 33 are adapted to enter in order to lock each of the disks against rotation relatively to the parts 25 and 26. It will be noted also, that the plates 25 and 26 are each formed with a circular flange 40 outlining a circular depression into which the disks 32 are adapted to fit and to be housed.

The clamp 20 into which the transmission wire 10 is adapted to fit as well shown in the several figures, is typical of each of the clamps utilized in the invention. It has extending therefrom an arm 41 through which it is mounted about the bolt 22, and for the purpose of mounting the arm 41 about the axis 21 of the bolt 22, the arm is formed with a relatively large opening 42 into which is adapted to fit a rubber sleeve 44, the rubber sleeve in turn being formed with an opening that allows it to fit closely about the bolt 22 and to lie between the bolt 22 and the arm 41. This is all well illustrated in FIG. 5. The arm is also formed with a series of depressions 45 at each side thereof, these depressions being exactly the same form as the depressions 34 in the parts 25 and 26. The purpose of the depressions 45 is to house the ribs 33 of the faces of the two disks 32 lying against the opposed surfaces of arm 41, so as to lock the arm 41 against rotation relatively to the parts 25 and 26 of the spacer damper except through the torsional twisting of the two disks 32.

It is the function of the rubber sleeve 44 to conduct electricity from the clamp 20 to the bolt 22 and therefore to the parts 25, 26 of spacer damper 14, in order that extremely high voltages imposed on one of the wires 10–14 will be distributed to the other wires through the medium of the spacer damper. Obviously, it could be the function of the two disks 32 to so distribute an electric charge on one of the wires, but it has been found that no suitable current conducting torsion disk 32 may be economically fabricated for this purpose. Thus, it has been determined that a suitable disk formed of plastic or rubber and impregnated with carbon black for transmitting electric current will not well withstand the stresses of torsional twisting imposed on the disks 32.

It is for that reason, that the rubber sleeve **44** is utilized, this sleeve being suitably impregnated with sufficient carbon black to render it conductive. By this treatment, the sleeve is rendered relatively weak and easily damaged by extreme deflection. It has also been found that by undue movement of the clamp **20** and the arm **41** relatively to the plates **25** and **26**, through the twisting of the disks **32**, undue stresses may be imposed on the rubber sleeve **44** so as to damage it and render it ineffective. For this reason, the invention provides means for not only limiting the rotation of the arm **41** relatively to the spacer damper so as to protect the disks **32**, but also for preventing the transmission of compressive stresses to the sleeve **44**.

For the particular purpose, each of the parts **25** and **26** is formed with a pair of generally circular segmental lugs **50** and **51** best illustrated in FIG. **6**, but well shown also in FIGS. **4**, **5** and **8**. For cooperation with these lugs **50** and **51** the arm **41** is formed with an extension **52** as shown in FIGS. **4**, **5** and **8**. In FIG. **8** rotation of the clamp **20** and the arm **41** about axis **21** of bolt **22** is well illustrated. This is the rotation that will take place upon relatively forceful movement of the conductor wire **10** and its clamp **20** against the resistance of the two torsion disks **32**. In the position of FIG. **8** it will be noted that a portion of the arm **41** designated particularly by the reference numeral **41***a* has contacted the part **50***a* of the lug **50**. At the same time the part **52***a* of the extension **52** of arm **41** has contacted the surface **51***a* of the lug **51**.

It is rather obvious, that in this position of the parts, further rotation of the arm **41** about the axis **21** is impossible because of the functioning of the limit lugs **50** and **51**. It is further obvious, that in this position of the parts, there is no compressive force exerted against the rubber sleeve **44**, all such radial forces being accepted by portions of the limit lugs **50** and **51**. It will be further appreciated that the limiting mechanism not only prevents the exertion of compressive forces against the relatively delicate sleeve **44**, but also prevents the exertion of radial forces against the torsion disks **32**, whereby greatly to increase the life of the disks **32** and their functioning purely and simply as torsion devices. The balanced positioning of the limiting devices relatively to the disks **32** and their retaining surfaces is particularly important.

The invention has thus been described but it is desired to be understood that it is not confined to the particular forms or usages shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of the invention; therefore, the right is broadly claimed to employ all equivalent instrumentalities coming within the scope of the appendent claims, and by means of which objects of this invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to obtain these objects and accomplish these results.

I claim:

1. In a spacer damper; a spacer body member; an arm member for supporting a conductor; a pivot shaft extending through aligned openings in said members; a conducting sleeve fitted into an opening in one of said members and also on said shaft providing a path for the flow of electricity between said members through said shaft; torsion means yieldingly holding said body member and said arm member against relative rotation on the axis of said shaft; said body member and said arm member including first interacting limit means and second interacting limit means angularly spaced apart relative to said pivot shaft; each of said limit means resisting forces tending to rotate said arm about the other of said limit means relative to said body member, and preventing such forces from moving said arm in a direction generally radial to said shaft, whereby radial compression of said conducting sleeve against said shaft is precluded.

2. The spacer damper of claim **1** wherein each of said first and said second interacting limit means comprises a generally radial shoulder on said arm member and a mating abutment on said body member positioned to engage the said radial shoulder following a given angular displacement of said arm member about said pivot shaft.

3. The spacer damper of claim **1**, wherein said first and said second interacting limit means together include a pair of generally radial projections on said arm member and a pair of cooperating projections on said body member positioned so that one projection on said arm member will alternately engage one or the other of the projections on the said body member upon rotation of said arm member in different directions about said shaft, and the other of said projections on said arm member correspondingly will engage the remaining one of said projections on said body member.