July 27, 1954 L. LEROY 2,684,816

TAGLINE DEVICE

Filed June 13, 1952

2 Sheets-Sheet 1

Fig. 1.

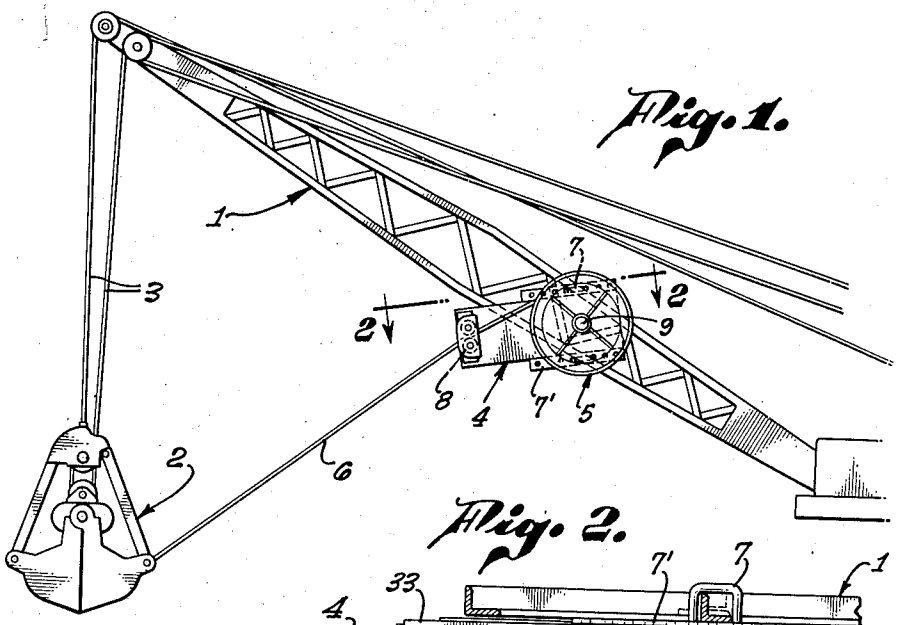


Fig. 2.

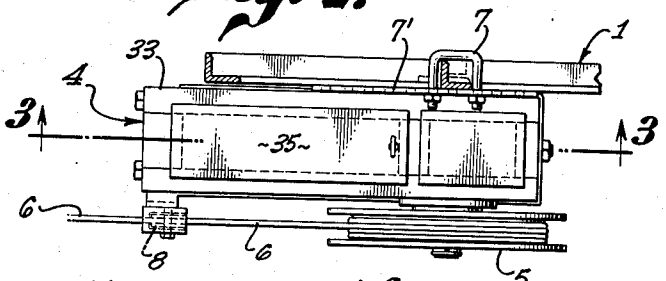
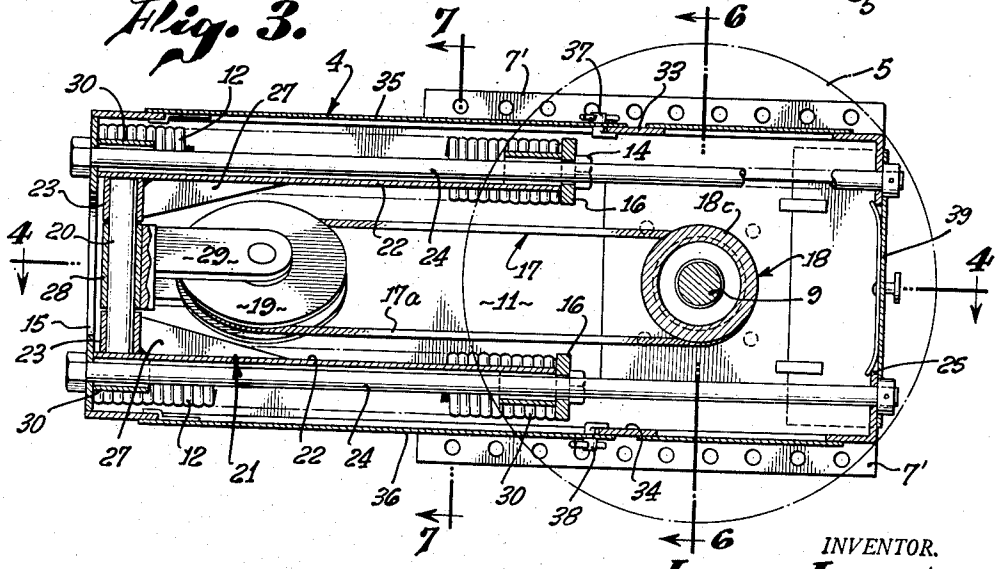


Fig. 3.



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Fig. 4.

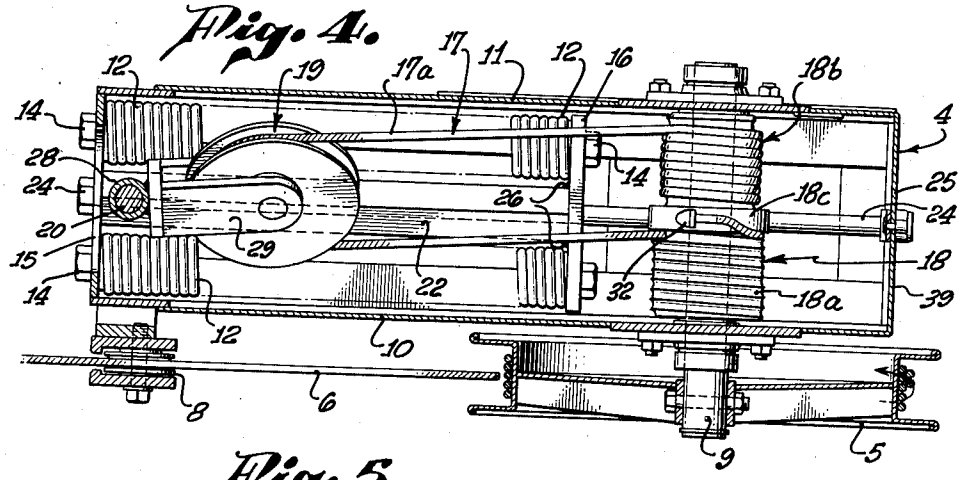


Fig. 5.

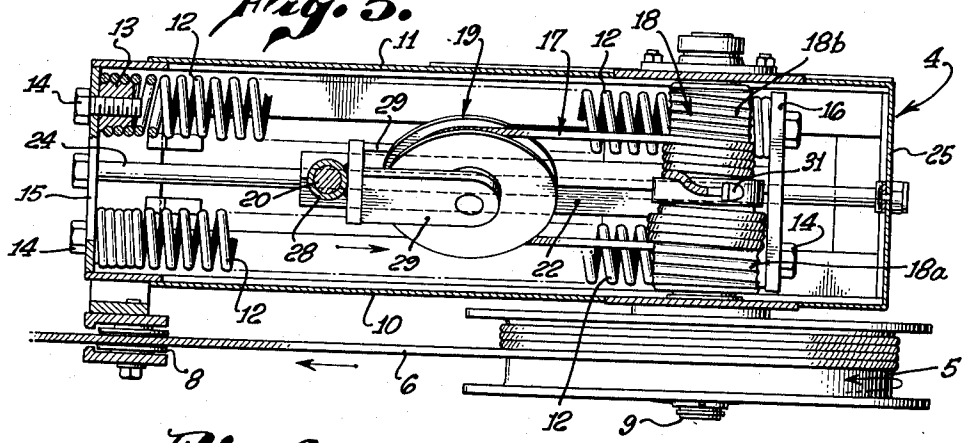


Fig. 6.

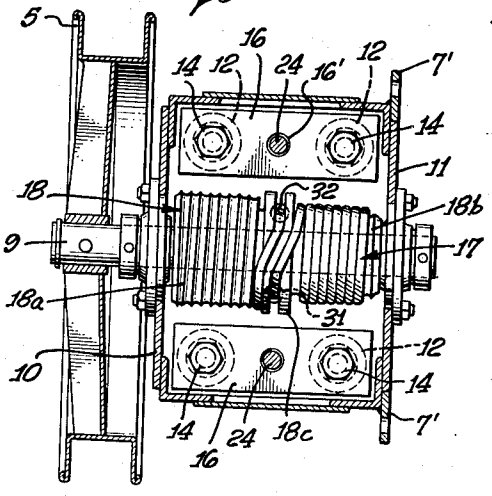
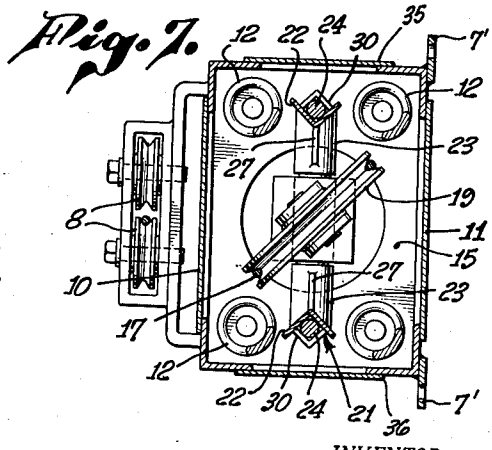


Fig. 7.



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TAGLINE DEVICE

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Application June 13, 1952, Serial No. 293,407

14 Claims. (Cl. 242—107)

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This invention relates to improvements in tagline devices of the type wherein a spring-loaded reel tensions the tagline employed to prevent spinning or turning of the bucket or implement suspended from the boom of a crane or the like.

It is an object of this invention to provide a tagline device of this character, wherein the improved spring loading means for the tagline reel maintains the desired tension in the tagline under all lengths of pay-out and take-in thereof without duly taxing or damaging the spring component of such means or necessitating the use of a long spring or springs and a consequently large and cumbersome tagline mechanism.

It is another object of this invention to provide a differential tagline device such as described, in which a plurality of tension springs may be employed to load the tagline reel, without appreciably increasing the length or bulk of the device and with the advantage of a more pronounced tensioning of the tagline, and a longer life of the springs.

It is another object of this invention to provide a tagline device such as described, wherein the spring loading means includes control means for causing the tensioning of the springs in such ratio to the pay-out of the tagline, that under a comparatively small tensioning movement of the spring component, there will be developed an adequate spring load for tensioning the tagline, thereby making it possible to use a plurality of comparatively short springs in a compact tagline device in which the likelihood of damaging the springs is minimized.

This invention possesses many other advantages and has other objects which may be made more easily apparent from a consideration of one embodiment of the invention. For this purpose there is shown one form in the drawing accompanying and forming part of the present specification. This form will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Fig. 1 is a side elevation of a tagline device embodying the present invention, as it would appear when mounted on the boom of a crane;

Fig. 2 is an enlarged sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a longitudinal sectional view, on a further enlarged scale, taken on the line 3—3 of Fig. 2;

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Fig. 4 is a longitudinal sectional view taken on the line 4—4 of Fig. 3;

Fig. 5 is a sectional view corresponding to Fig. 4, showing the parts in a different position;

Fig. 6 is a cross sectional view taken on the line 6—6 of Fig. 3; and

Fig. 7 is a cross sectional view taken on the line 7—7 of Fig. 3.

A tagline device embodying the present invention is shown in Fig. 1 as mounted on the boom 1 of a crane, for stabilizing the bucket 2 suspended and controlled by the line 3. Accordingly, the device generally includes a supporting means in the form of housing 4 suitably secured to the boom 1, and mounting a spring-loaded tagline reel 5 from which a tensioned tagline 6 is extended and connected with the bucket to prevent spinning or turning of the bucket. In this connection, it should be understood that the device may be applied to other forms of lifting or material handling apparatus wherein similar stabilization of a suspended implement is desired.

Referring to Figs. 2 and 3, it will be seen that the housing 4 is rectangular and adapted to be secured to one side of the boom 1 by means of U-bolts 7 passing through flanges 7′ on the housing. The reel 5 and a pair of fair-lead sheaves 8 for the tagline 6 are mounted on the side of the housing opposite the side secured to the boom. The reel 5 is fixed to a shaft 9 extending transversely through the housing 4 and journalled in the housing side walls 10 and 11.

In accordance with this invention, there is provided within the housing 4 a differential, spring-loading means for the reel 5. This means makes it possible to develop an adequate spring load for tensioning the tagline, without taxing or damaging the spring means, particularly when a considerable length of the tagline is payed out in the operation of the bucket or other implement to which the tagline is connected.

For this purpose, the spring loading means is constructed and arranged so that but a small amount of movement of the spring component thereof, in consideration of the length of tagline payed out from the reel, will develop the desired spring load on the reel 5 for tensioning the tagline.

As a result of these qualities of the spring loading means, breakage and replacement of the parts thereof is minimized, and a comparatively short tension spring, preferably a plurality of such springs, may be used. Tension

springs as here employed make it unnecessary to provide an overrunning clutch desirable where a torsion spring is used to load the reel. Moreover, the use of a plurality of short tension springs as here provided, assures a more effective loading of the reel and longer life of the springs, as well as the provision of a compact tagline unit which is not objectionable as to length or bulk.

Referring more specifically to the spring loading means for the reel 5, it is seen that the spring component thereof includes a plurality of tension springs 12, the normal position of which is shown in Fig. 4. In the present embodiment, four of these springs are arranged in pairs, with their ends fixed alike as shown in Figs. 4 and 5, by means of plugs 13 and bolts 14, to an end wall 15 of the housing 4 and to a pair of cross bars 16, respectively. The cross bars 16 are axially movable in the housing, for correspondingly tensioning the four springs to develop the desired spring load for application to the reel 5 in a manner which will be hereinafter fully described.

Included in the spring loading means is a control component embodying means operatively connecting the springs 12 with the reel 5 so that but a small tensioning movement of the springs is effected throughout the full range of pay-out and take-in of the tagline.

As here shown, this control means includes a flexible element 17 forming a loop 17*a* operatively connected with the springs 12 and having its ends fixed to drum means 18 which rotates with the reel 5. These ends of the flexible element 17 are fixed in such a manner that the flexible element 17 is simultaneously wound upon and unwound from the drum means responsive to paying-out of the tagline, thereby shortening the loop and adequately tensioning the springs 12 with but a small amount of movement. This small movement of the springs 12 and loop 17*a* will be apparent with reference to Figs. 4 and 5.

Referring more specifically to the operative connection of the loop 17*a* with the springs 12, it is seen with reference to Figs. 3, 4 and 7, that the loop passes freely around a sheave 19 swivelly supported on a pin 20 mounted on an elongated, slidable frame 21. This frame (see Fig. 4) forms a rigid connection between the sheave and comprises a pair of angle bars 22 joined by the pin 20, which latter is mounted in sockets 23 at the ends of the bars disposed adjacent the end wall 15 of the housing. The angle bars 22 are slidable on rods 24 supported by and between the end walls 15 and 25 of the housing 4, best as shown in Fig. 3. The other ends of the angle bars 22, as shown in Fig. 4, are welded as at 26 or otherwise fixed to the cross bars 16. The cross bars 16, as shown in Figs. 3 and 6, are also slidably supported on the rods 24, having openings 16' therein through which the rods extend. Short angle pieces 30 are welded to the bars 22 and cooperate therewith to form guide sleeves embracing the guide rods 24.

The frame 21 is reinforced by means of webs 27 welded to the angle bars 22 and to the sockets 23 as shown in Figs. 3 and 7. These sockets confine therebetween on the pin 20, a sleeve 28 which swivelly mounts the clevis 29 supporting the sheave 19. The axis of the sheave is inclined with respect to the axis of the shaft 9 so that the sheave is supported in an inclined position. This inclination and the swivel mounting of the sheave causes the flexible element 17 to be uniformly wound and unwound relative to the drum means 18.

The drum means 18, as here provided, is fixed on the shaft 5 for rotation therewith and in effect forms drums 18*a* and 18*b* of differential diameters, separated by a flange 18*c*. The drum 18*a* is of greater diameter than the drum 18*b* and both drums have helical grooves therein for effecting a helical winding and rewinding of the flexible element 17.

Portions of the element 17 are oppositely wound on the drums 18*a* and 18*b*, and at their ends, are fixed at opposite points on the periphery of flange 18*c* by means of suitable fastenings 31 and 32. With this arrangement, rotation of the reel 5 and the two drums, when the tagline is being payed out, causes the smaller drum 18*b* to unwind the element 17 at a slower rate than the larger drum 18*a* winds the element 17 thereon. This differential action causes the loop 17*a* to shorten and move the sheave 24 and frame 21 so as to stretch and tension the springs 12. The ratio of this movement of the springs to that of the pay out of the tagline is quite small, but sufficient to develop an adequate spring load for tensioning the tagline while payed out as well as for retrieving the tagline when slackened.

The housing 4 is fabricated to permit ready access to the interior thereof for assembling and disassembling the spring and control components of the device. For this purpose the top and bottom walls 33 and 34 of the housing are provided with removable panels 35 and 36 respectively, each panel being detachably held in place by means of catches 37 and 38. A similar detachable panel 39 is provided in the end wall 25.

It should be noted that one of the factors making possible the advantageous use of a plurality of short tensile springs and the novel control component in a housing which is not objectionable as to length or bulk, is that the pairs of springs 12 are located adjacent the top and bottom walls 33 and 34 respectively of the housing, with the springs of each pair laterally spaced to lie adjacent the side walls 10 and 11 of the housing. This not only lends desired balance to the device but provides adequate room for the mounting and the movement of the frame 21 and sheave 19 in a space of no greater length than that of the springs when fully tensioned. In other words, this makes it possible to apply the tensioning force from a point behind the movable ends of the springs through the cross bars 16. This arrangement of the springs and the construction of the frame 21 also make it possible to extend the movable ends of the springs and the cross bars 16 thereon past the drums 18*a* and 18*b*, in the maximum tensioning movement of the springs, as will be apparent with reference to Figs. 5 and 6, thereby making it unnecessary to provide a long housing.

It will now be apparent that the use of the plurality of comparatively short tension springs and the control means which causes the desired spring load to be developed with a short movement thereof responsive to the pay-out of the tagline, throughout the full range of pay-out, makes it possible to provide a compact and highly efficient tagline mechanism in which the spring component has a longer life than spring means heretofore used in tagline devices.

I claim:

1. In a tagline device, a tagline reel, a support

for said reel, spring means, and means operatively connecting said spring means with said reel for tensioning a tagline payed out from the reel including a flexible element, means connecting said element with said spring means whereby movement of said element tensions said spring means, and means operatively connecting said reel with said flexible element for simultaneously unwinding and winding said element to tension said spring means responsive to rotation of said reel.

2. In a tagline device, a reel for paying out and taking in a tagline, a support for said reel, spring means, and means operatively connecting said spring means with said reel and said support, operable for tensioning the tagline payed out from the reel including a flexible element, means connecting said element with said spring means for tensioning said spring means responsive to movement of said flexible element in one direction, and means forming a drum connected with said flexible element and said reel operable to simultaneously unwind and wind said element to move it in said one direction responsive to paying out the tagline from said reel.

3. In a tagline device, a tagline reel, a support therefor, means for tensioning a tagline payed out from said reel as well as for rotating the reel to take in said tagline including a flexible element forming a loop between its ends, means operatively connected with said reel for rotation therewith having both ends of said element connected thereto, said last named means being operable to shorten said loop upon paying out said tagline and lengthen the loop upon taking in the tagline; and spring means resisting the shortening of said loop.

4. In a tagline device, a support, a tagline reel thereon, a pair of drums of differential diameters mounted to rotate with said reel, a flexible element connected with said drums to unwind from one drum and wind upon the other responsive to rotation of said reel in paying out and taking in the tagline, and spring means resisting movement of said flexible element responsive to paying out the tagline.

5. In a tagline device, a tagline reel, a support for the reel, means for exerting a force through the reel for tensioning a tagline payed out therefrom as well as for rotating the reel to take in the tagline including spring means, a pair of drums mounted to rotate with said reel, one of said drums being of lesser diameter than the other, a sheave connected with said spring means movable in one direction for increasing the tension of said spring means and movable in the opposite direction responsive to said increased tension, and a flexible element extending around said sheave and connected with said drums to cause said one drum to unwind said element and said other drum to wind it thereon when paying out said tagline, said spring means operating through said sheave and said element to rotate said reel for taking in said tagline.

6. In a tagline device, a reel for paying out and taking in a tagline, a support for said reel, and spring loading means for tensioning the payed out tagline including a tension spring having one end fixedly connected with said support, a flexible element, means connecting said flexible element with the other end of said spring for increasing the tension of the spring on movement of said element in one direction, and drum means connected with the ends of said flexible element and said reel operable to move said element in said one direction responsive to paying out the tagline.

7. In a tagline device, a reel for paying out and taking in a tagline, a support for said reel, and means for spring-loading the reel to tension the tagline including, a plurality of tension springs each having an end fixedly connected with said support, means connected with the other ends of said springs movable in a direction for tensioning said springs, a flexible element forming a loop slidably connected with said second mentioned means, and drum means connected with said reel and said flexible element operable responsive to paying out the tagline for simultaneously unwinding and winding the flexible element to move the loop in said direction.

8. In a tagline device, a reel for paying out and taking in a tagline, a support for said reel, and means for spring-loading the reel to tension the tagline including a plurality of tension springs each having an end fixedly connected with said support, means forming a pair of drums of differential diameter mounted to rotate with said reel, means connected with the other ends of said springs movable toward said drums for increasing the tension of said springs including a sheave disposed between the ends of said springs, and a flexible element extending around said sheave and having end portions connected with said drums to simultaneously wind and unwind relative thereto, responsive to rotation of said reel.

9. In a tagline device, a reel for paying out and taking in a tagline, a support for said reel, and means for spring-loading the reel to tension the tagline including a plurality of tension springs each having an end fixedly connected with said support, means forming a slidable frame extending along said springs with its ends terminating adjacent the ends of said springs to one end of said frame, a sheave mounted on the other end of said frame, means forming a pair of drums of differential diameter mounted for rotation with said reel, and a flexible element forming a loop extending around said sheave and having its ends connected with said drums for simultaneous unwinding and winding of the flexible element responsive to paying out the tagline.

10. In a tagline device, a reel for paying out and taking in a tagline, a support for said reel, and means for spring-loading the reel to tension the tagline including a plurality of tension springs each having an end fixedly connected with said support, said springs being arranged in pairs, cross bars to which the other ends of the spring of said pairs are fixed movable to tension said springs, a movable frame fixed to said cross bars and extending therefrom toward the ends of the springs connected with said support, a sheave on said frame, means forming a pair of drums of differential diameters connected with said reel for rotation therewith, and a flexible element forming a loop extending around said sheave and having its ends connected to said drums.

11. In a tagline device, a reel for paying out and taking in a tagline, a support for said reel, and means for spring-loading the reel to tension the tagline including a tension spring connected at one end to said support, a frame connected with the other end of said spring, extending therefrom toward said one end of said spring, means forming a pair of drums of differential diameter connected with said reel to rotate therewith, a flexible element connected at its ends with said drums to be unwound from one drum

while being wound on the other drum, and a sheave swivelly mounted on said frame and having said flexible element looped therearound.

12. In a tagline device, a reel for paying out and taking in a tagline, a support for said reel, and means for spring-loading the reel to tension the tagline including a tension spring connected at one end to said support, a frame connected with the other end of said spring extending therefrom toward said one end of said spring, means forming a pair of drums of differential diameter connected with said reel to rotate therewith, a flexible element connected at its ends with said drums to be unwound from one drum while being wound on the other drum, a sheave around which said element is looped mounted on said frame with its axis inclined relative to the axis of the said drums for guiding said element relative to the respective drums.

13. In a tagline device, a support, a reel mounted thereon for paying out and taking in a tagline, a plurality of tension springs each fixed at one end to said support, members connected with the other ends of said springs movable to tension said springs, guide rods on said support slidably supporting said members, a frame slidable on said rods connected at one end with said cross bars and extending toward said fixed ends of said springs, a sheave mounted on the other end of said frame, a pair of axially spaced drums of different diameters mounted for rotation with said reel, and a flexible element looped around said sheave and having its ends mounted on said drums for simultaneous winding and unwinding with respect thereto responsive to paying out the tagline.

14. In a tagline device, a support, a reel mounted thereon for paying out and taking in a tagline, a plurality of tension springs each fixed at one end to said support, members connected with the other ends of said springs movable to tension said springs, guide rods on said support slidably supporting said members, bars slidably supported on said rods, connected with said members and extending toward said fixed ends of said springs, a sheave, means extending between and connecting said bars swivelly mounting said sheave, a flexible element extending around said sheave, means connected with said reel forming a pair of drums of differential diameter for rotation with the sheave, and means connecting the ends of said flexible element with said drums for unwinding the element from one drum and winding it on the other drum responsive to paying out the tagline.

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