C. B. GRAY.

POWER TRANSMITTING MECHANISM.

APPLICATION FILED FEB. 7, 1918.

1,314,867.

Patented Sept. 2, 1919.

2 SHEETS—SHEET 1.

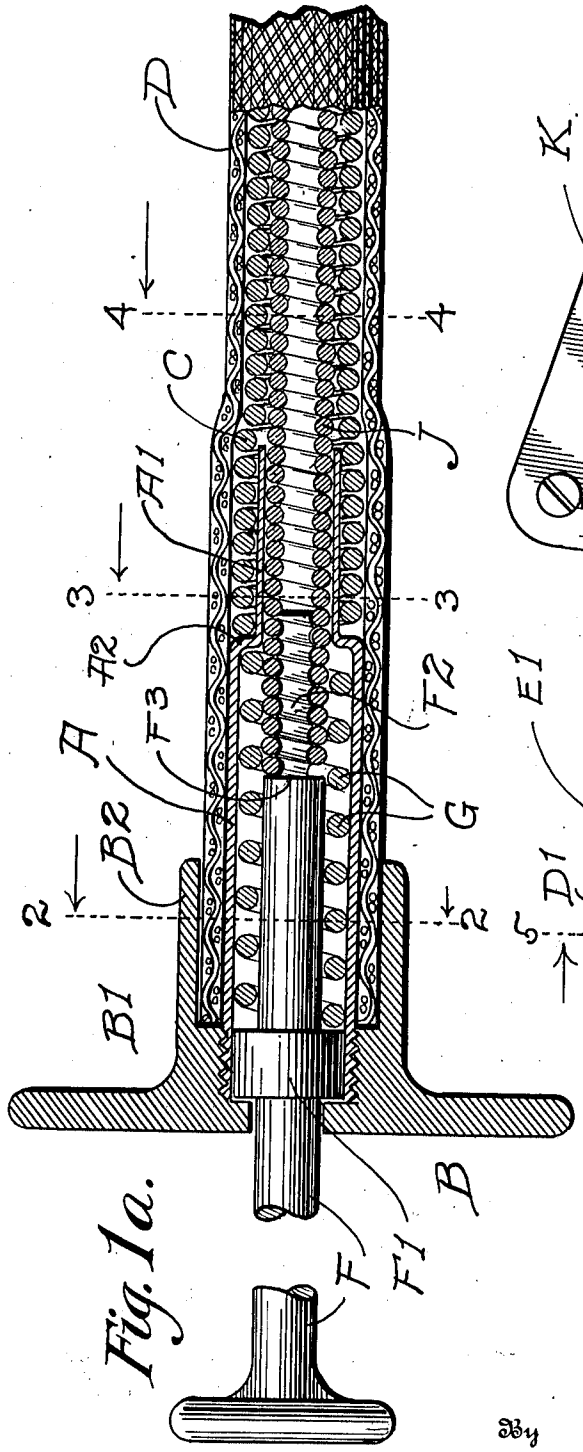


Fig. 1a.

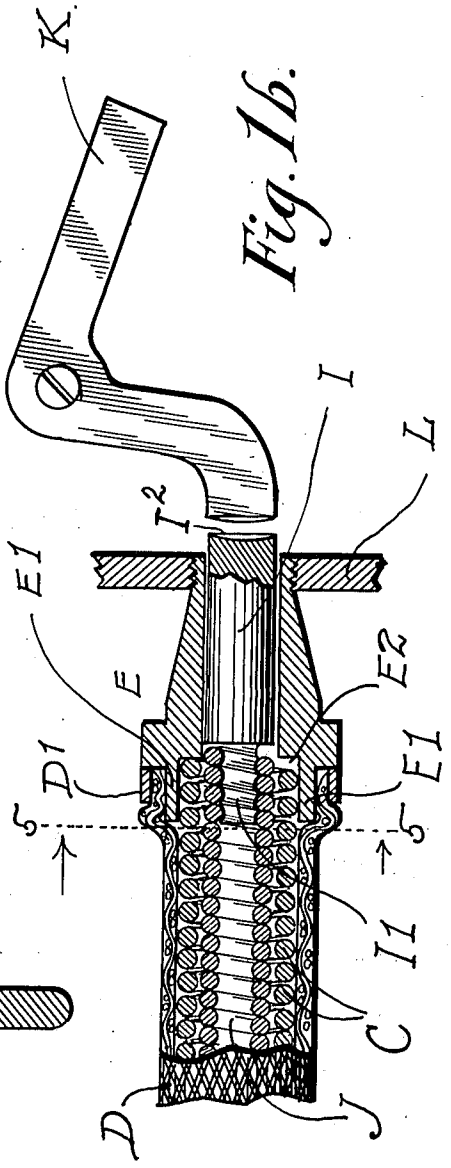


Fig. 1b.

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2 SHEETS—SHEET 2.

Fig. 3.

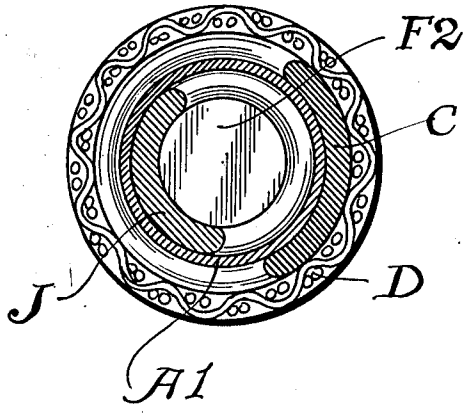


Fig. 4

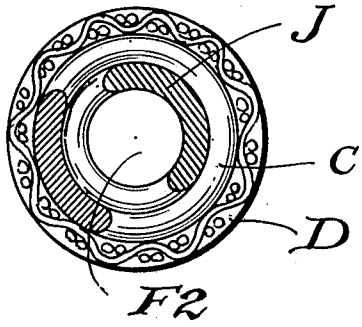


Fig. 5.

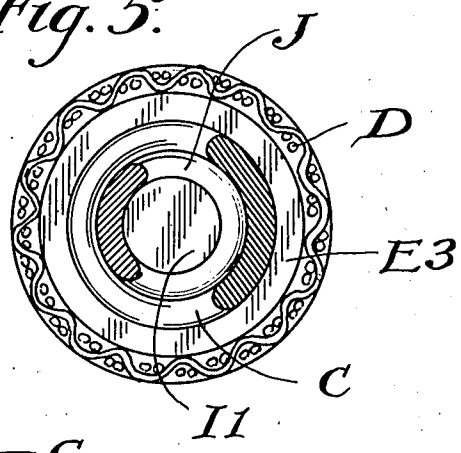
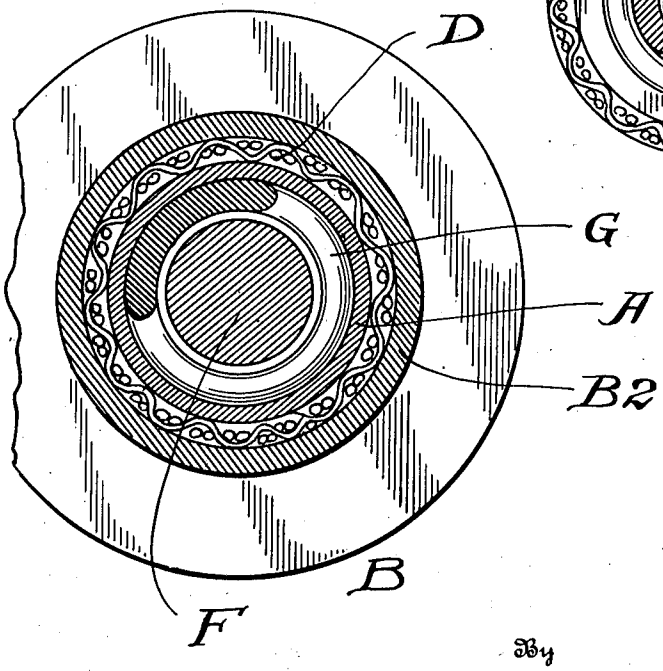


Fig. 2.



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UNITED STATES PATENT OFFICE.

CHARLES B. GRAY, OF KNOXVILLE, TENNESSEE.

POWER-TRANSMITTING MECHANISM.

1,314,867. Specification of Letters Patent. Patented Sept. 2, 1919.

Application filed February 7, 1918. Serial No. 215,885.

To all whom it may concern:

Be it known that I, CHARLES BAXTER GRAY, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented a new and useful Improvement in Power-Transmitting Mechanism, of which the following is a specification, reference being had to the accompanying drawing.

My improvement relates particularly to mechanism for transmitting power through endwise reciprocation of a member of the mechanism. The mechanism is applicable for use as actuating means for the shutters of cameras, and as an actuating or releasing means for various kinds of apparatus.

The object of the invention is to produce such a transmitting mechanism in flexible form permitting repeated bending without injury to the mechanism, and in a form permitting the attainment of precise movement.

In the accompanying drawings,

Figures 1ª and 1ᵇ together present a longitudinal view of a mechanism embodying my improvement, portions being in section;

Fig. 2 is a section on the line, 2—2, of Fig. 1, looking toward the left;

Fig. 3 is a section on the line, 3—3, of Fig. 1, looking toward the left;

Fig. 4 is a section on the line, 4—4, of Fig. 1, looking toward the left;

Fig. 5 is a section on the line, 5—5, of Fig. 1, looking toward the right.

Referring to said drawings, A is a metallic tube or barrel having its left hand end screw-threaded into the contracted portion, B^1, of the outer head, B, whereby said barrel and said head are firmly but detachably joined to each other. The opposite end of said barrel is contracted to form a neck, A^1. At the junction of said neck with the body of said barrel is a shoulder, A^2. A stem, F, extends slidably through the head, B.

Within said head, the stem has an annular rib, F^1, which limits the movement of said stem toward the left or away from the neck, A^1, of the barrel, A. Between said annular rib and the shoulder, A^2, the stem, F is surrounded by an expanding coiled spring, G. Said spring abuts against the shoulder, A^2, and against the rib, F^1, and tends to move the stem, F, toward the left or away from the neck, A^1, so that, when said stem is free from pressure on its outer end in the direction of the barrel, the stem is held outward with the rib, F^1, bearing against the inner face of the wall of the head, B.

The neck, A^1, is loosely surrounded by the left hand end of a coiled spring wire tube, C. The right hand or inner end of said spring extends into an inner head, E. Said inner head has a tubular neck, E^1, in which is an annular shoulder, E^2, against which said spring abuts. Said spring rests loosely within said head. The head, B, and the head, E, are joined by a fiber fabric tube, D. At its left hand end, said fabric tube surrounds the barrel, A, and the head, B, has a tubular extension, B^2, surrounding said fabric tube. The fabric is secured to the barrel, A, by means of a suitable adhesive. At the right hand end, the fabric tube surrounds the neck, E^1, on the head, E, and a band, D^1, surrounds the fabric tube and binds the latter to said neck.

The coiled spring wire tube, C, is so wound as to leave spaces between the coils, and said tube is made long enough to cause it to be under compression endwise when the fiber fabric tube is under tension. Thus the fiber fabric tube is normally held under tension and the coiled spring wire tube, C, is normally exerting endwise pressure. And the fiber fabric tube limits the endwise expansion of said wire tube. The length of the fiber fabric tube and the coiled wire tube, C, and the spacing between the coils of the tube are so proportioned as to still leave spaces between the coils of the tube, C, when the latter is held under restraint by the fiber fabric tube against full endwise expansion. The spaces thus left between the coils of the tube, C, are sufficient to allow approach of adjacent coils toward each other at the inner side of the curve while there is limited or substantially no expansion of the coils at the outer side of the curve when the tube is bent.

On the inner or right hand end of the stem, F, is a neck, F^2, at the base of which is an annular shoulder, F^3. Said neck is surrounded by one end of a coiled wire tube, J. The opposite or right hand end of said tube extends around a neck, I^1, on a slide member, I, which is slidable endwise in the

head, E. The engagement between the tube, J, and the necks, F^2 and I^1, may be frictional; but said necks are preferably screw-threaded to conform approximately to the coils of the tube, J, in order that said tube may be threaded to said necks. The tube, J, is preferably so formed as to cause its coils to normally press firmly against each other, in order that there may be no lost motion when the stem, F, is pressed inward, in the direction of the head, E, the stem, F, pushing the tube, J, and the tube, J, pushing the slide member.

The slide member, I, may be regarded as the final member in the transmission. In the particular form shown in the drawings the outer end of said member has a concave face, I^2, adapted to bear against a pivoted member, K, which is to be moved by the outward movement of the slide member, the head, E, being screwed into a relatively stationary wall, L, and thus held in relation to the member, K.

The coils of the tube, C, are wound in one direction while the coils of the tube, J, are preferably wound in the opposite direction.

As above described, the tube, J, is held to the neck, F^2, of the stem, F, and the slide member, I, is held to the tube, J, by means of the neck, I^1. After unscrewing the head, B, from the barrel, A, the stem, F, together with the spring tube, J, and the slide member, I, may be drawn out endwise, toward the left, through the barrel, A, the diameter of the tube, J, and the slide member being of less diameter than the interior diameter of the tube, C.

The fabric tube, D, may be detached by removing the band, D^1, and softening or dissolving the adhesive by which said fabric is secured to the barrel, A.

This mechanism comprises two important features. One of these is the closely-wound coiled wire transmission tube, J, connected with the stem, F, and the slide member, I, whereby there may be transmission without lost motion. The other of these features is the forming of the outer coiled wire tube, C, in such manner as to permit bending the tube without material separation of the coils at the outer side of the curve, the spacing between the coils permitting the coils to approach each other on the inner side of the curve while the tube is being bent. The member, I, being free to slide, the adjacent end of the inner wire tube, J, is free to move endwise when the mechanism is being bent. In this manner, the inner tube, although closely-wound, adapts itself to the bending without kinking.

Practice has shown that a mechanism of this construction may be bent an indefinite number of times without kinking or otherwise disabling the coiled wire tubes.

The reach of the slide member, I, may be adjusted by moving the tube, J, on both or either of the necks, F^2 and I^1. In this manner a very precise adjustment may be made.

The size of the mechanism is to be varied to conform to the amount of power to be transmitted and to the size of the apparatus with which the transmission mechanism is to be associated. For some purposes the mechanism may be as large or larger than shown by the drawings. For example, in power-driven vehicles, the mechanism may be made large and used for power transmission to some point distant from the driver, the stem, F, being used as a pedal.

I claim as my invention,

1. In a mechanism of the nature described, the combination of two heads, a barrel on the outer head, a coiled spring wire tube having spaced coils and being located between said heads and engaging said barrel, flexible means joining said heads and definitely holding them at a fixed distance from each other while said spring wire tube is partially compressed endwise, a stem extending slidably through one of said heads and having limited outward movement, a slide member in the other of said heads, and means intervening said stem and said slide member for the transmission of endwise motion from said stem to said slide member, substantially as described.

2. In a mechanism of the nature described, the combination of two heads, a barrel on the outer head, a coiled spring wire tube having spaced coils and being located between said heads and engaging said barrel, flexible means joining said heads and definitely holding them at a fixed distance from each other while said spring wire tube is partially compressed endwise, a stem extending slidably through one of said heads and having limited outward movement, yielding means for normally holding said stem at its outer limit, a slide member in the other of said heads, and means intervening and joined to said stem and said slide member for the transmission of endwise motion from said stem to said slide member, substantially as described.

3. In a mechanism of the nature described, the combination of two heads, a coiled spring wire tube having spaced coils and being located between said heads, flexible means joining said heads and definitely holding them at a fixed distance from each other while said spring wire tube is partially compressed endwise, a stem extending slidably through one of said heads and having limited outward movement, yielding means for normally holding said stem at its outer limit, a slide member in the other of said heads, and means intervening and adjustably surrounding said stem and said slide

member for the transmission of endwise motion from said stem to said slide member, substantially as described.

4. In a mechanism of the nature described, the combination of two heads, a coiled spring wire tube having spaced coils and being located between said heads, flexible means joining said heads and definitely holding them at a fixed distance from each other while said spring wire tube is partially compressed endwise, a stem extending slidably through one of said heads and having limited outward movement, a slide member in the other of said heads, and means intervening and joined to said stem and said slide member for the transmission of endwise motion from the stem toward and to the slide member, the inner head having an axial opening extending through said head and of sufficient diameter to allow the movement of the slide member through the head toward the outer head, and the inner diameter of the coiled spring wire tube being sufficient to allow the free passing of said slide member and said intervening means toward the outer head, whereby, after the detachment of the outer head, said intervening means and said slide member and said stem are together removable, substantially as described.

5. In a mechanism of the nature described, the combination of two heads, a coiled spring wire tube having spaced coils and being located between said heads, flexible means joining said heads and definitely holding them at a fixed distance from each other while said spring wire tube is partially compressed endwise, a stem extending slidably through one of said heads and having limited outward movement, a slide member in the other of said heads, and a coiled wire tube intervening and adjustably joined to said stem and said slide member for the transmission of endwise motion from said stem to said slide member, substantially as described.

6. In a mechanism of the nature described, the combination of two heads, a coiled spring wire tube having spaced coils and being located between said heads, flexible means joining said heads and definitely holding them at a fixed distance from each other while said spring wire tube is partially compressed endwise, a stem extending slidably through one of said heads and having limited outward movement, a slide member in the other of said heads, and a coiled wire tube intervening and threaded to said stem and said slide member for the transmission of endwise motion from said stem to said slide member, substantially as described.

In testimony whereof I have signed my name this 1st day of February, in the year one thousand nine hundred and eighteen.

CHARLES B. GRAY.