PATENT SPECIFICATION

Application Date: Apr. 12, 1921. No. 10,705/21. 182,584

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COMPLETE SPECIFICATION.

Trolley Pole Safety Appliance for Electric Trams and the like.

I, PERCY MARKHAM DE COURCY IRELAND, of "Amberley", Plenty Road, Heidelberg, in the State of Victoria, Commonwealth of Australia, British subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to that class of spring controlled trolley pole for electric trams and the like in which safety means is employed designed to prevent the trolley pole from continuing to be kept in an upright or in such a position that it will foul the overhead wire system, after the trolley wheel has accidentally broken away or become disengaged from the trolley wire.

According to the present invention the controlling pressure is transmitted to the pivotal pole carrier from spring means located in the space between such carrier and a reaction member movably mounted, at a point remote from the carrier, upon a support, the characteristic feature consisting in effecting the operative connection and disconnection between the pivoted pole carried and the spring means by a form of toggle located at the reaction member that is to say at the end of the spring arrangement remote from the carrier, and actuated by a rod arrangement in accordance with movement of the trolley pole.

The form of toggle embodied in the connection and disconnection means is *per se* known, but all the parts are assembled closely adjacent to or compactly at the side of the spring arrangement in lieu of beyond one end of such latter as heretofore.

Referring to the accompanying drawings wherein like reference numerals and letters denote corresponding parts in the specification:—

Fig. 1 is a side elevation of one form of the appliance and

Fig. 2 represents a plan of Fig. 1.

Fig. 3 shows the appliance in elevation when the trolley pole is being pulled down to re-set the rocking frame.

Figs. 4 and 5 are elevation and plan views respectively of a modified form of the appliance, and

Fig. 6 is a part sectional view of the modified form of the appliance.

Figs. 7 and 8 illustrate in plan an alternative form of the appliance wherein tension springs are employed, and

Figs. 9 and 10 represent in elevation and plan a modified form of the appliance employing tension springs.

In the construction shown in Figs. 1, 2 and 3 of the accompanying drawings, the numeral 1 represents a cylindrical member adapted to rotate about its vertical axis or fixed pin 1^a and formed with either a rectangular or circular base or bed plate 1^b which is bolted to the roof of the car or vehicle.

The rotatable member 1 supports an oscillating trolley pole frame 2, the side cheeks of which receive the ends of a spindle 3 working in integral transverse bearings 1^c of the member 1, the frame 2 thus being able to oscillate or swing forwards and rearwards about each side of the member 1. A rigidly mounted cross shaft may be employed instead of the rotatable spindle 3, in which case the pole frame would be loosely mounted on said shaft and free to rotate about same. The pole frame is provided with the usual cover and socket plates 51 which when bolted together support the lower end of

the trolley pole 52 which carries the trolley wheel 53 to engage the overhead trolley wire (not shown).

The member 1 is cast with a socket 15 which supports the rear end of a horizontally projecting guide rod 23 receiving a concentrically mounted coiled spring 24 and a slidably mounted collar or sleeve 14 which is adapted to strike or bear against nuts 24^a mounted on the screw threaded front portion 23^a of the said rod by the recoil of the guide rod spring when the trolley wheel breaks away from the overhead wire.

The side cheeks of the said frame 2 are each cast with an outer holed lug or —L— shaped bearing 2^b for the reception of cross pins 2^c each of which pass into the cheeks of the pole frame and pivotally support the rear apertured ends of a pair of draw bars 16. The front threaded portions of the draw bars are slidably supported in the bearings or side lugs 20^b formed integral with the arms of a —U— shaped rocking frame 20 and are threaded to receive two pairs of nuts 16^a and 18 respectively, the rear pair 16^a being positioned some little distance at the back of the bearing 20^b leaving a space or clearance 17.

The rocking or relasing frame 20 consists of a —U— shaped member formed with two arms and having an integral bridging piece 21 which straddles the spring guide sleeve 14. The bridging piece 21 is holed to take two vertical adjustable screws 22 which are adapted to limit the forward movement of the rocking frame by bearing on the upper surface of the sleeve 14. In order that it can pivot about its axis the side arms of the frame are holed to receive pins 19 which are screwed into integral lugs 14^a of the slidable sleeve 14.

The side cheeks of the oscillating frame 2 project upwardly and obliquely forming two integral extension arms 2^a, the upper extremities of the latter being apertured for the reception of a transverse slidably mounted member or cross bar 4 provided with outer eyes to form guides for two longitudinally disposed rods 7, the lower ends of which latter terminate in hollow bosses or eyes 7^b to receive threaded bolts or pins 7^a which take into two internally threaded side lugs 20^a of the rocking frame 20.

The rods 7 are also connected by a bridging strap or bar 13 of rectangular cross section and which is rigidly secured to the levers by nuts 13^a.

A —T— piece 5 is pivotally and centrally mounted on the member 4 its free end having a portion of its under surface cut away to leave a vertical face or stop 6 which is adapted to be engaged by the cross bar 13.

The said —T— piece 5 also has a depending stop 5^a which is adapted to contact against the vertical face 26^b of a slotted —L— shaped catch or plate 26, when the pole frame and cross piece oscillate rearwards. The slot 26^a is formed in the plate to receive a set screw 27 which takes into an internally threaded vertical lug 27^a cast integral with the guide rod socket 15. By these means the —L— plate can be slidably adjusted at any desired position relatively to the slidable member 4.

Each upper or rear half of the rods 7 is threaded and takes a nut 12 which is positioned flush up against the front face of the member 4 so that when the trolley wheel 53 leaves the trolley wire the nut limits the forward movement of said member 4. The threaded portion of the rod 7 also receives another nut 11 positioned directly up against the rear apertured base 8^a of a tubular casing or sleeve 8 to hold or retain one end of a sleeve 10, the other end of the latter bearing against the rear face of the nut 12.

The sleeve 10 takes a coiled spring 9 which is adapted when compresed to its fullest extent to recede within and be suitably housed in the tubular casing as shown in Fig. 3.

When the trolley wheel 53 is in engagement with the trolley wire and the appliance is in its normal working condition the pole 52 is kept at a tension by the influence of the recoiling spring 24, the disposition of the parts when in such position being shown in Figs. 1 and 2.

If the trolley wheel, accidentally or otherwise, breaks away from the trolley wire, the trolley pole 52 is jerked upwards with considerable force, and the frame 2 swings or oscillates forward causing the coiled spring 24 to expand and force the sleeve 14 against the adjacent nut 24^a, rendering the said sleeve temporarily immovable. The member 4, through the medium of the nuts 12, communicates the motion of the pole frame to the rods 7 which are thrust downwards and bearing on the arms of the —U— shaped rocking frame 20 tilt or rock the latter about its pivot pins 19 into an approximately vertical position thus temporarily disconnecting the pole and its frame from the influence of the spring 24.

After the forward rotation of the rocking frame 20, the pole frame 2 swings back until the arms 2^a assume an approxi-

mately vertical position, governed by the gradual compression of the springs 9 and further back until the stop 6 of the pivoted —T— piece 5 engages the bridging strap 13 and thus the pole which has fallen beneath the trolley wire is steadied or prevented from vibrating.

The pole can now be conveniently pulled down to a horizontal position in order to re-set the rocking frame 20 and so bring the slidable guide rod sleeve 14, the rods 7, the draw bars 16 and the pole frame 2 under the influence of the spring 24 to give the necessary tension to the pole and enable its trolley wheel 53 to re-engage the trolley wire.

The pole 52 is provided with the usual pull cord (not shown) and which, when drawn down, lowers the pole to a horizontal position during which operation the front and lower ends of the draw bars 16 and rods 7 describe arcs bearing on the upper and lower portions respectively of the rocking frame 20, and rotate same counterclockwise until it assumes a horizontal position.

On releasing the cord the recoiling action of the spring 24 forces the sleeve 14 towards the guide rod nuts 24^a and the pole frame 2 swings forward to its normal and working position, the stop 26^b when the pole is in a horizontal position, having contacted with the depending stop 5^a tilts or raises the —T— piece 5, and its stop 6 is thus disengaged from the bridging strap 13 enabling the trolley wheel to again engage the overhead wire.

When the trolley wire is engaged by the trolley wheel the rocking frame cannot accidentally pivot forwards or be released from the influence of the spring 24 as the axis of the rocking frame pivot pin 19 is positioned above the axis or middle point of the bearing 20^b and hence the rocking frame owing to the arrangement of the pivot points mentioned is subjected at 20^b to a force which tends to rotate it counter clockwise and prevents it from becoming released from the influence of the spring, and which force is only overcome and the rocking frame rotated in the opposite direction when the rods 7 are thrust forward.

In a modified form of the appliance as illustrated in Figs. 4, 5 and 6, two arms or uprights 28 are employed in lieu of the pole frame extensions 2^a, the arms 28 being loosely mounted on the shaft 3 which also support the side cheeks of the pole frame 2. 29 is a cross bar which passes through the upper eyes of and is supported by the arms 28 and has end holes for the reception of the rods 7 which are held rigidly to same by nuts 36 and 37, the lower threaded ends of said rods being pivotally connected to the rocking frame 20 as hereinbefore described, but said levers in this construction are not provided with a sleeve and coiled spring. The cross bar is provided with rings or collars 31^a and the arms 28 carry a cross strap 30 which, after the trolley wheel has accidentally broken away from the trolley wire, and the pole frame swings rearwards, is engaged by the stop 6 of the pivoted —T— piece 5 which latter is secured on a cross pin 33 freely mounted in the integral bearing 32 of the pole frame 2.

The inner faces of the frame 2 are provided with integral projecting studs 35 which are adapted to contact against the back edges of the arms 28 and force same forwards causing the rods 7 to tilt or rotate the rocking frame and release same from the influence of the spring 24 when the trolley leaves the wire and the pole rises or swings forwards.

The pole frame is also formed with two legs or members having short inwardly projecting ends 34 which are adapted to bear against the front edges of the arm 28 to re-set the rocking frame when the pole is pulled down to a horizontal position.

Should the trolley break away from the trolley wire, the pole frame momentarily ascends and through the medium of the studs 35 forces the loosely mounted arms 28 forwards, the rods 7 of which are thrust downwards and turn the rocking frame 20 after the sleeve 14 has struck the stop 24^a due to the recoil of the spring 24. When the arms 28 fall on the front projecting ends 34 of the pole frame, the latter has swung rearwards and when in such position its stop 6 engages the cross bar 30 and holds the pole against vibration.

When the pole is being pulled down for re-setting it describes an arc and its pivoted piece 5 falls on a nut 1^a of the member 1. This nut 1^a tilts the piece 5 upwards and brings its stop 6 away from the cross bar 30 when the pole frame is about half way between its fallen and its horizontal position. The arms 28 are also pushed rearwards by the pole frame projecting ends 34 and the cross bar is brought underneath the piece 5, the latter gradually assuming a horizontal position over the bar 30 as the trolley pole is being raised for engagement with the trolley wire.

The principle underlying this invention and which briefly consists of the auto-

matic release in the manner described of the pole frame and trolley pole from the action of the spring when the trolley wheel leaves its wire is shown in Figs. 7 and 8 applied to a form of the appliance wherein two tension springs 43 are employed. In this construction the central guide rod spring 24 and guide rod 23 are dispensed with and the two coiled springs 43 are employed positioned parallel to, and on the inside of, two compression rods 38, having the nuts 40 on their threaded front portions 41. The nuts 40, when the trolley engages the trolley wire, are positioned close to but do not contact with the front apertured lugs or eyes 39^a of pins 39 rotatably secured in openings in the side edges 42 of the rocking frame 20 by split pins 42^a which bear against their grooved or concaved ends.

Another pair of transversely mounted pins 39 are similarly secured in the lateral extensions 50 of the pole frame 2. The front and rear pairs of pins 39 receive the front and rear ends 43^a respectively of the springs 43, the rear pair having heads 39^b which hold the eyes 38^a of the rods 38 securely in position and enable the said rods to freely pivot about the pins.

The rotatable member 1 is provided with an integral longitudinally disposed tube or rod 46 which is adapted to be slidably adjusted in a sleeve 47 by a set screw or threaded bolt 48 which passes through the front face of the sleeve 47, and bears against the front end of the rod 46 and is secured in position by a nut 49. The said tube or bar 46 has ridges or keys formed on its surface to take into similar longitudinal recesses or keyways in the sleeve 47 and thus prevent these parts from rotating or turning. If desired the bar 46 can be made rectangular in cross section and adapted to take into a sleeve of similar cross section. The said sleeve 47 is provided with an integral upper transverse bearing 45 extending on both sides of the same and which bearing receives a pin 44 provided with end nuts 44^a and about which the pin the frame 20 is free to rotate or tilt when the rods 7 are forced downwards and which latter, in this form of construction, are positioned on the inside of the compression rods 38. The tube 46 and sleeve 47 are designed to enable the tension of the springs 43 to be suitably adjusted.

The rods 7 and their parts are the same as those hereinbefore described and shown in Figs. 1 and 2 and are connected by the bridging strap 13, the cross piece 4 with the pivoted —T— piece 5 and depending stop 5^a and which latter is adapted to be engaged by the face 26^a of the —L— plate 26, the functions of all of which parts have been hereinbefore described.

The appliance as illustrated in Figs. 7 and 8 is shown in its normal or working condition, the trolley wheel being in engagement with the trolley wire (not shown) and is kept into such engagement by the tension of the springs 43. After the trolley wheel has accidentally disengaged itself from the trolley wire, the pole rises, and the pole frame swings forward and through the medium of the cross piece 4 which being integral with the pole frame arms describes an arc similar to that of the pole frame and bears against the nut 12 and thus the pole frame, cross piece and the rods 7 move as one piece and the said rods thus actuated tilt or turn the rocking frame about its pin or axis 45. The said rocking frame is rotated after the rods 38 thrust their nuts 40 against the lugs 39^a which latter act as stops and perform the same function as the nuts 24^a on the guide 23, shown in Figs. 1, 2 and 3. After the rotation of the rocking frame the springs 43 become inoperative and thus the pole frame is released from their influence or tension and is free to oscillate or pivot rearwards and brought again under the tension of the springs 43 when the pole frame is pulled down.

If desired, more than one pair of springs can be employed such as a pair on each side of and between the connecting rods and levers.

The appliance illustrated in Figs. 9 and 10 is practically the same as that just described except that the pole frame and independent arms 28 the subject matter of that illustrated in Figs. 4, 5 and 6 are employed in conjunction with the tension springs 43. The action of the said appliance is similar in all respects to that herein described and the rocking frame 20 is re-set or re-adjusted in exactly the same manner as that hereinbefore described and as illustrated in Figs. 4, 5, 6, 7 and 8 of the accompanying drawings.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A trolley-pole safety appliance for electric trams and the like, in which the controlling pressure is transmitted to the pivotal pole carrier from spring means located in the space between such carrier and a reaction member movably mounted at a point remote from the carrier, upon

a support, the characteristic feature consisting in effecting operative connection and disconnection between the pivoted pole carrier and the spring means by a form of toggle located at the reaction member, that is to say the end of the spring arrangement remote from the carrier, and actuated by a rod arrangement in accordance with movement of the trolley pole, substantially as described.

2. In a trolley-pole safety appliance according to the preceding claim, a pole frame adapted to oscillate or pivot about a rotatable member and connected to a rocking frame by two rods and two draw bars, said rods being functioned to rotate the rocking frame and free the pole from the spring tension after the trolley has broken away from the trolley wire, as described and shown in Figs. 1, 2 and 3.

3. In a trolley-pole safety appliance as claimed in Claim 1 or 2, means for resetting the trolley pole as described and shown in Figs. 1, 2 and 3.

4. In a trolley-pole safety appliance as claimed in Claim 1 or 2, means for holding the trolley-pole against vibration after the trolley has broken away from the trolley wire, as described and shown in Figes. 1, 2 and 3.

5. In a trolley-pole safety appliance according to Claim 1, a rocking frame connected to a trolley-pole frame and mounted on a slidable sleeve under spring tension and adapted to be rocked rearwardly by two pole frame rods after the sleeve has struck a nut on the end of its guide rod due to the recoil of a spring for the purpose described and as shown in Fig. 3.

6. In a trolley-pole safety appliance according to Claim 1, a slidable sleeve mounted on a guide rod and under the tension of a coiled spring, said sleeve carrying a rocking frame which is rocked into an inoperative position by two pole frame rods after the trolley has broken away from the trolley wire, as described and shown in Figs. 1, 2 and 3.

7. The trolley-pole safety appliance constructed and operating as described and shown in Figs. 1, 2 and 3.

8. In a trolley-pole safety appliance according to Claim 1, a trolley-pole frame normally held under spring tension but adapted, when the trolley breaks away from the trolley wire, to release the pole from the tension of a spring, allowing the pole to descend beneath the trolley wire by the means described and shown in Figs. 4, 5 and 6.

9. In a trolley-pole safety appliance as claimed in Claim 8, means for holding the pole against vibration after the trolley wheel has broken away from the trolley wire, as described and shown in Figs. 4, 5 and 6.

10. In a trolley-pole safety appliance as claimed in Claim 8, means for resetting the pole, as described and shown in Figs. 4, 5 and 6.

11. A trolley-pole safety appliance constructed and operating as described and shown in Figs. 4, 5 and 6.

12. In a trolley-pole safety appliance according to Claim 1, an oscillating trolley-pole frame normally held under spring tension but adapted to release itself from said spring tension when the trolley wheel leaves the trolley wire by the means described and shown in Figs. 7 and 8.

13. In a trolley-pole safety appliance as claimed in Claim 12, means for adjusting the tension of two coiled springs, as described and shown in Figs. 7 and 8.

14. A trolley-pole safety appliance constructed and operating as described and shown in Figs. 9 and 10.

Dated this 12th day of April, 1921.

For the Applicant,
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Chartered Patent Agents.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1922.

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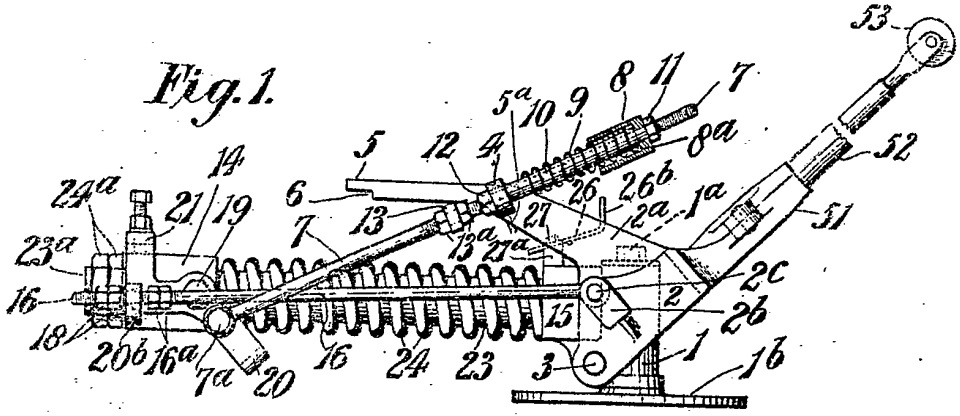
Fig. 1.



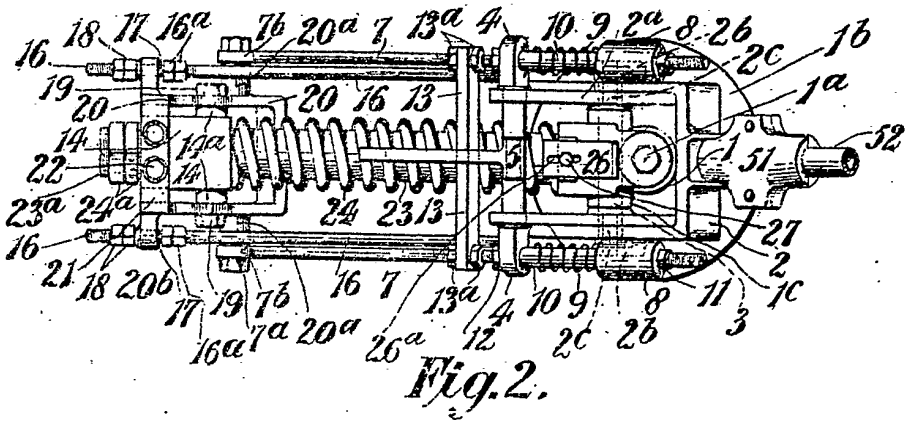
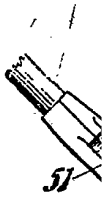


Fig. 2.



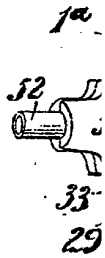


Fig. 3.

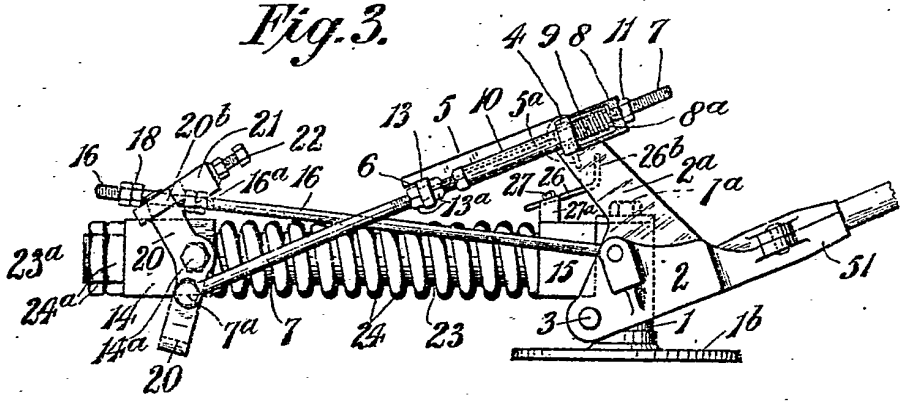
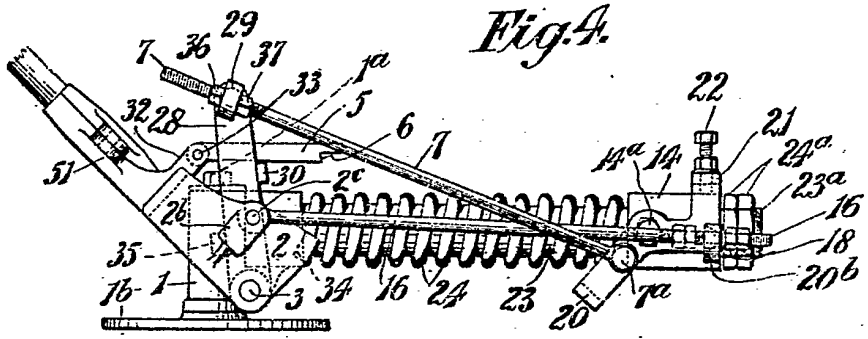


Fig. 4.



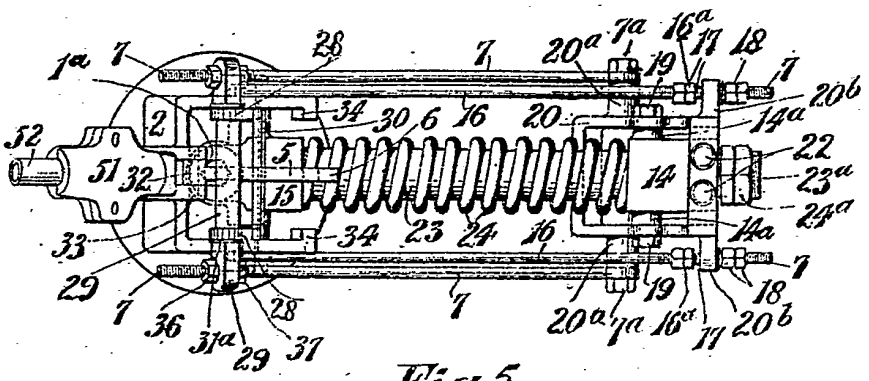


Fig. 5.

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Fig. 1.

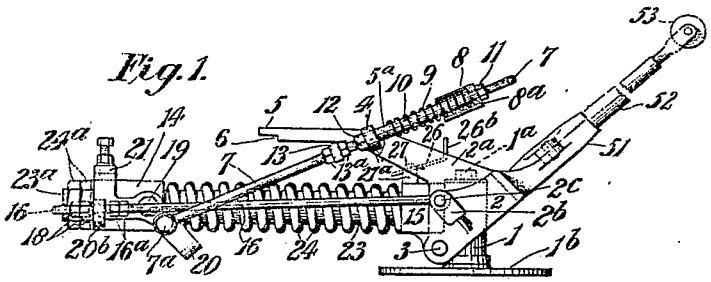


Fig. 2.

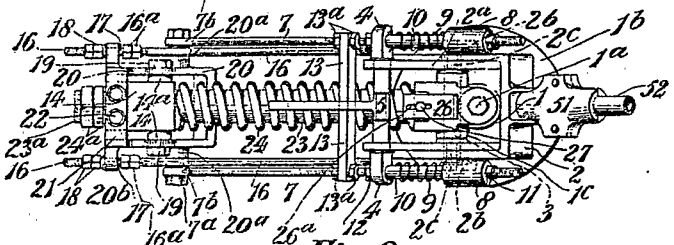


Fig. 3.

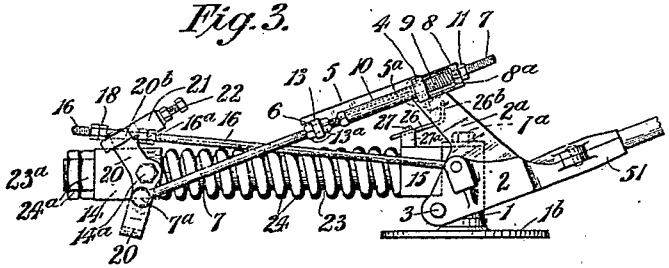


Fig. 4.

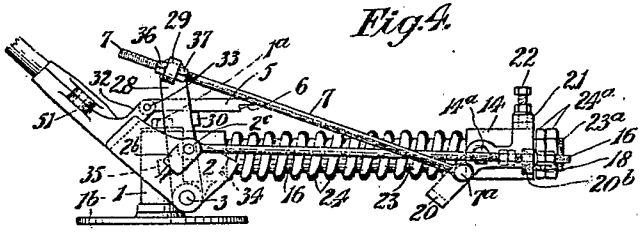
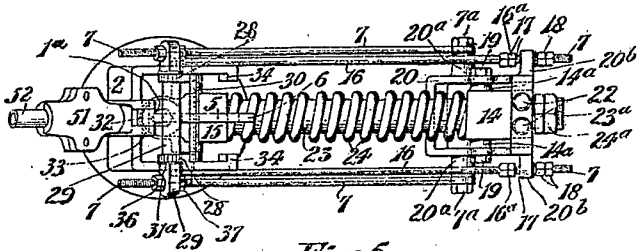


Fig. 5.



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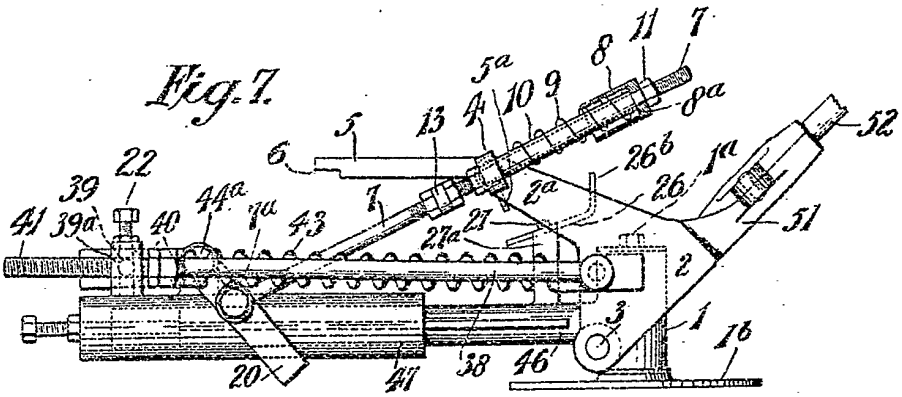

Fig. 7.

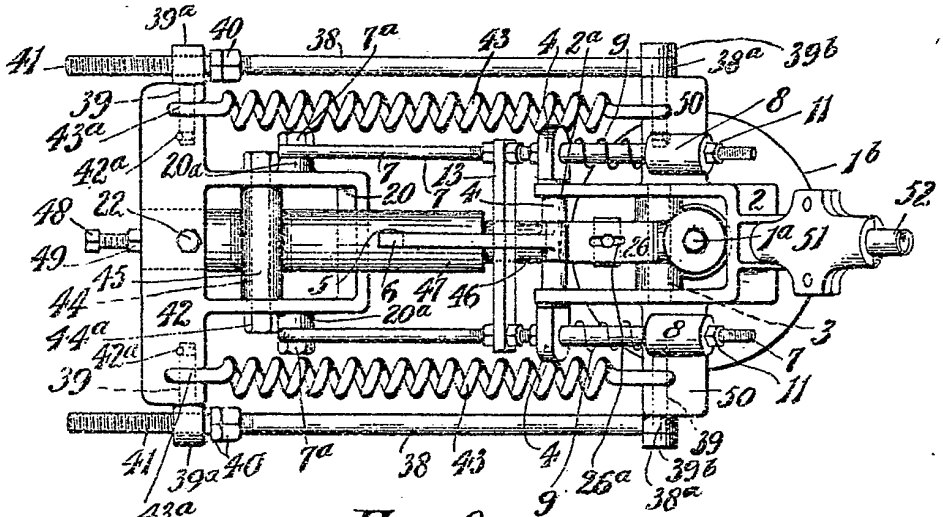

Fig. 8.

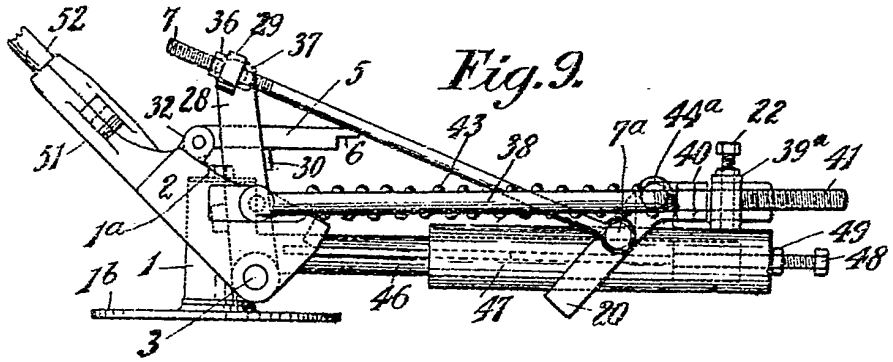

Fig. 9.

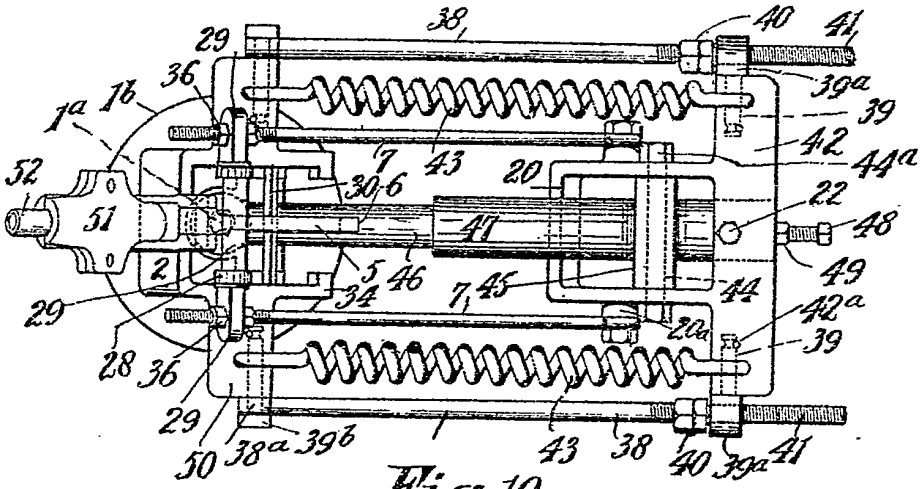

Fig. 10.

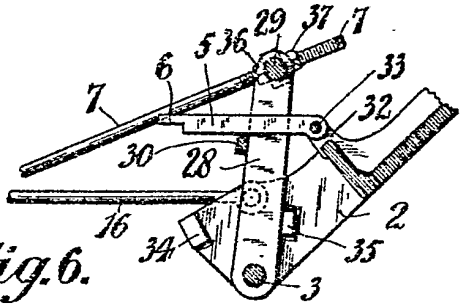

Fig. 6.

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SHEET 3

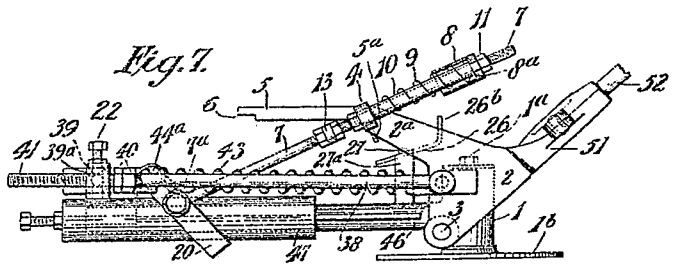

Fig.7.

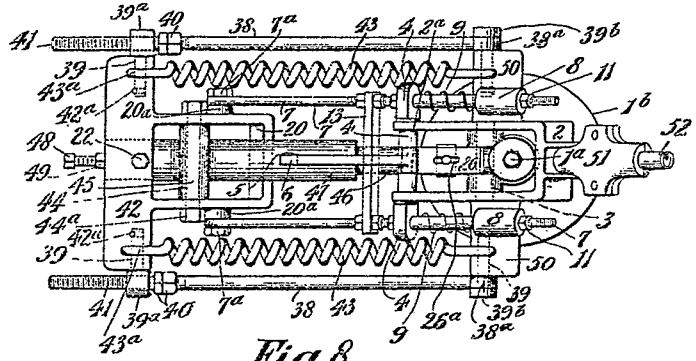

Fig.8.

SHEET 4

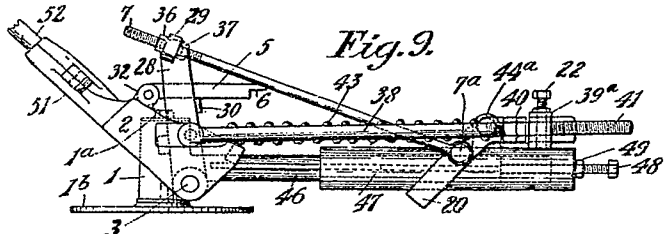

Fig.9.

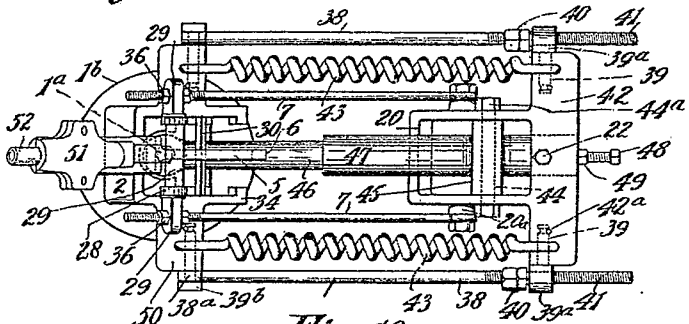

Fig.10.

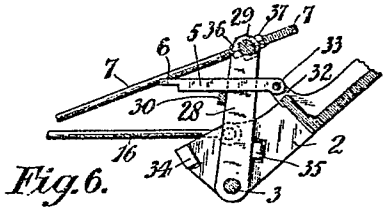

Fig.6.

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