

Feb. 9, 1932.

J. R. McLAUGHLIN

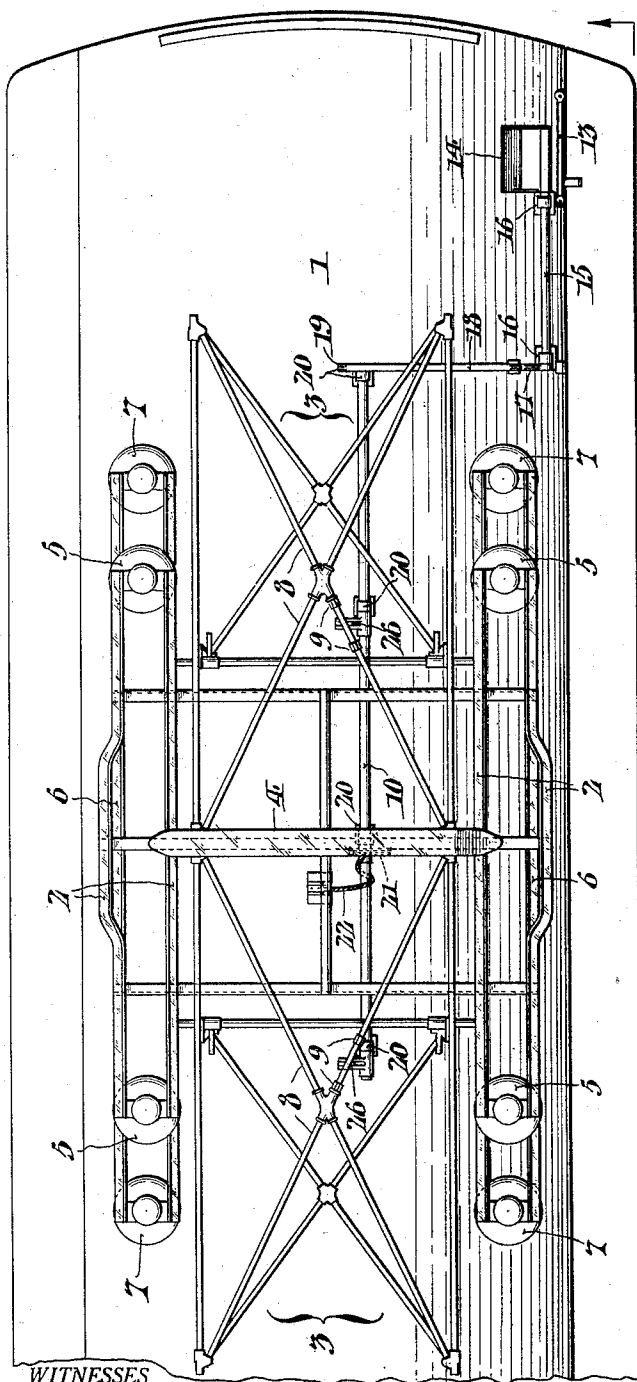
1,844,586

HOLDDOWN DEVICE FOR PANTOGRAPHS OR THE LIKE

Filed July 23, 1931

3 Sheets-Sheet 1

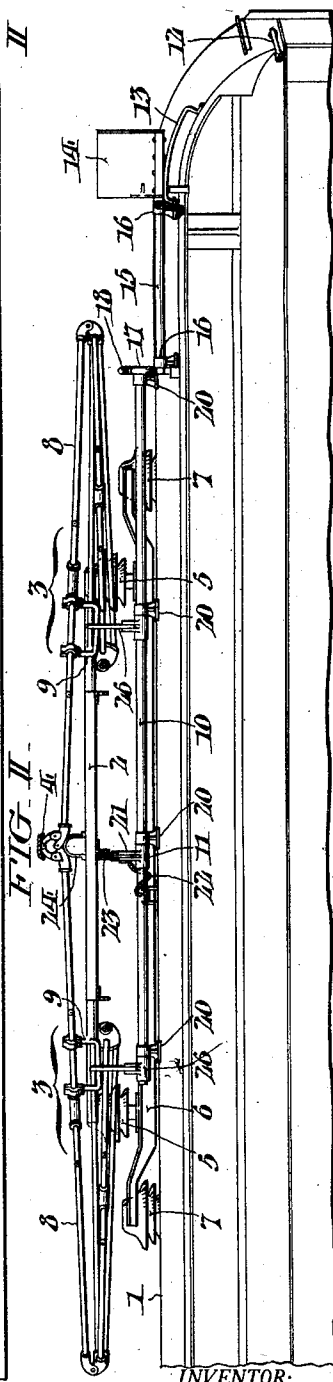
FIG. I.



WITNESSES

Thomas W. Kerr, Jr.
Hudson S. Sisson

FIG. II.



INVENTOR:

James Robert McLaughlin

BY Tracy Paul
ATTORNEYS.

Feb. 9, 1932.

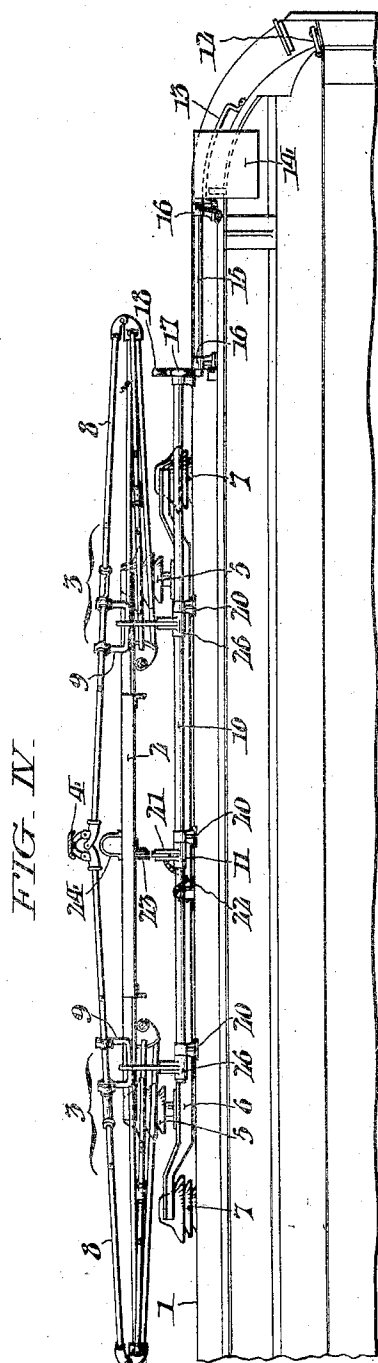
J. R. McLAUGHLIN

1,844,586

HOLDDOWN DEVICE FOR PANTOGRAPHS OR THE LIKE

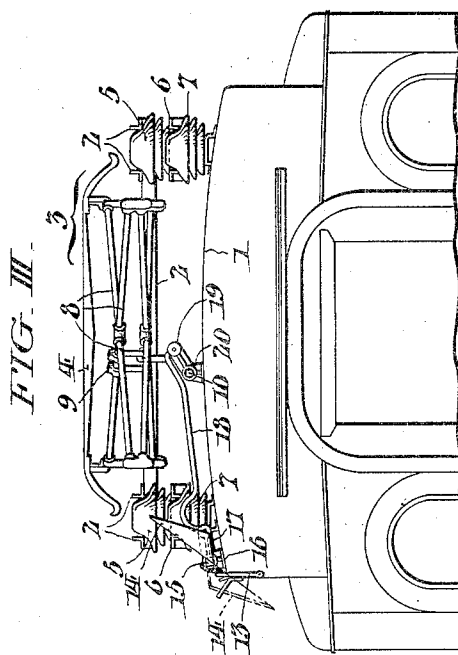
Filed July 23, 1931

3 Sheets-Sheet 2



WITNESSES

WITNESSES
Thomas W. Kerr, Jr.
Woodrow Stevenson



INVENTOR:

INVENTOR:
James Robert McLaughlin
BY *Frederick Paul*
ATTORNEYS.

Feb. 9, 1932.

J. R. McLAUGHLIN

1,844,586

HOLDDOWN DEVICE FOR PANTOGRAPHS OR THE LIKE

Filed July 23, 1931

3 Sheets-Sheet 3

FIG. V.

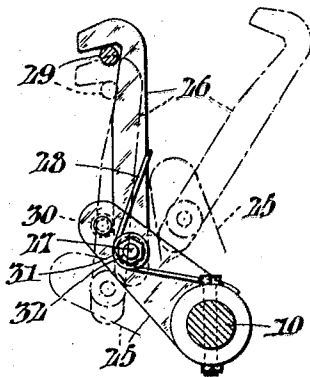


FIG. VI.

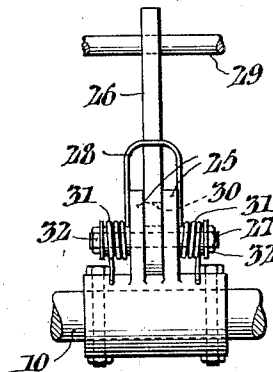


FIG. VIII.

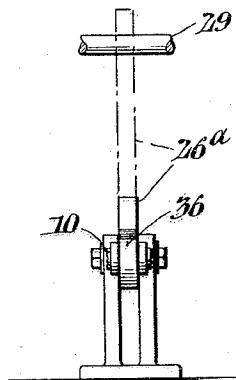


FIG. VII.

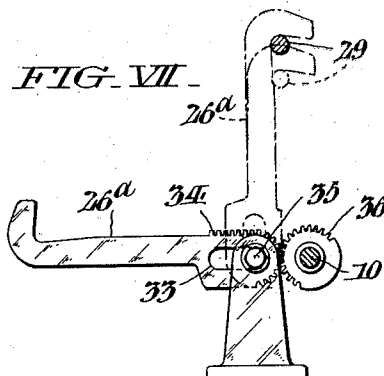


FIG. IX.

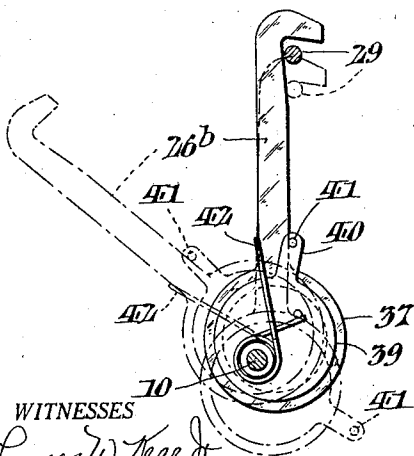
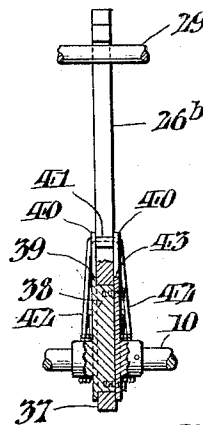


FIG. X.



WITNESSES
Thomas W. Kerr, Jr.
Woodrow Stevenson

INVENTOR:
James Robert McLaughlin
BY *Friley Paul*
ATTORNEYS.

UNITED STATES PATENT OFFICE

JAMES ROBERT McLAUGHLIN, OF NARBERTH, PENNSYLVANIA

HOLDDOWN DEVICE FOR PANTOGRAPHS OR THE LIKE

Application filed July 23, 1931. Serial No. 552,643.

The hold down device of this invention, while especially adapted for use with current collecting pantographs of the type employed on electric cars or locomotives, is also applicable to trolleys and to movable linkages of a variety of types. For the sake of brevity, however, the invention is described herein with reference solely to its preferred use with pantographs.

Pantographs such as are commonly used on railway vehicles comprise a stationary frame and a number of pivoted links adapted to elevate and depress a current collecting shoe to positions of engagement and non-engagement with an overhead conductor. The movable links may, for example, be extended to elevated position by means of springs or the like, and they may be depressed to collapsed position by means of compressed air cylinders or other suitable means. Whatever may be the nature of the apparatus for raising and lowering the pantograph, it is particularly desirable that this apparatus be supplemented by a safety device to prevent the accidental raising of the pantograph at times, for example, when men are working on the roof of the car, as the accidental release of the pantograph to engagement with the overhead conductor is likely to cause fatal injury to the workmen. It is also desirable that the device used for locking the pantograph in collapsed position should cause the linkage to be depressed to the extreme limit of its downward movement, so that the current collecting shoes will be positioned at a minimum height above the rails.

Accordingly, the object of the present invention is to provide a safety device supplementing the usual operating mechanism for raising and lowering a pantograph, and having not only the capacity to lock the pantograph when in collapsed position against upward movement, but also the capacity to draw down the movable links to a position of engagement with the stationary frame of the pantograph, this being the limit of their downward movement.

Other more specific objects and advantages characterizing the present invention will be-

come more fully apparent from the description hereinafter of examples of the practice of the invention, reference being had to the accompanying drawings, whereof:

Fig. I represents a plan view of one end of a railway vehicle equipped with a pantograph and a hold down device of this invention.

Fig. II represents a view of the same, partly in section and partly in side elevation, as indicated by the lines II—II of Fig. I, with the pantograph in fully depressed position.

Fig. III represents an end elevation of the same.

Fig. IV represents a view similar to that of Fig. II, but showing the pantograph with the top links thereof in a position not fully depressed.

Fig. V represents an end elevation of one type of hold down device contemplated by this invention.

Fig. VI represents a side elevation of the same.

Fig. VII represents an end elevation of a second type of hold down device contemplated by this invention.

Fig. VIII represents a side elevation of the same.

Fig. IX represents an end elevation of a third type of hold down device contemplated by this invention; and,

Fig. X represents a side elevation, partly in section, of the same.

In the drawings there is shown at 1 a portion of the roof of a railway car to which a standard form of pantograph has been attached. The pantograph comprises generally a stationary framework 2 and a movable linkage, comprehensively designated at 3, pivoted thereto. The top links 8 of the pantograph carry a current collecting shoe 4 which is elevated and depressed to positions of engagement and non-engagement with an overhead conductor. The stationary framework designated at 2 is supported through suitable insulators 5 upon subframes 6 which in turn are supported through additional insulators 7 upon the roof 1 of the car.

For the sake of clearness of illustration, the operating mechanism for raising and low-

er the movable links of the pantograph is omitted from the drawings, and it may be assumed that this mechanism is of a standard form comprising, for example, springs for elevating the pantograph links and air-operated mechanism for depressing the pantograph links. The particular operating mechanism or the particular pantograph linkage employed forms no part of the present invention which is directed to equipment supplemental or in addition to the pantograph itself and obviously adapted for use with a variety of types of current collecting trolleys.

In the pantograph selected for illustration in Figs. I, II, III and IV, there is shown attached to the upper links 8 depending stirrups 9 which afford points of engagement for the hold down device of this invention. The hold down device comprises generally an actuating shaft 10, shown in the present instance as extending longitudinally along the roof of the car, and hooks 26 designed to engage the stirrups 9 on the pantograph links 8. At the end of the car there is a grab iron shown at 12 and a second grab iron shown at 13. As a workman climbs to the roof 1 of the car on the steps provided for that purpose, he reaches first for the grab iron 12, and with further assent he reaches for the grab iron 13. The grab iron 13, however, is normally covered by a hood 14. The workman therefore instinctively removes the hood 14 to render the grab iron 13 accessible. As the hood 14 is raised by a swinging motion, a shaft 15 to which it is attached is rotated within bearings 16 mounted on the car roof. The rotary movement of the shaft 15 is transmitted to the actuating shaft 10 through a crank arm 17, fixed on the shaft 15, a connecting rod 18 and a second crank arm 19 fixed on the actuating shaft 10. The actuating shaft 10 is mounted in suitable bearings 20 secured to the roof 1 of the car. It will be observed that the movement of the hood 14, from the normal position which is shown in dotted lines in Fig. III to its elevated position shown in full lines, causes a rotation of the auxiliary shaft 15 through an angle of approximately one hundred and eighty degrees, and a similar movement is transmitted to the actuating shaft 10.

Centrally mounted on the actuating shaft 10 there is a sleeve 11 carrying a blade 21 which is connected to a ground wire 22. The rotary movement of the actuating shaft 10 effects an angular movement of the blade 21 to engagement with a socket 23 on the stationary frame 2. This engagement serves to ground the stationary framework 2 of the pantograph so that, if the movable linkage 3 should be accidentally released, all current carrying parts of the pantograph will be grounded.

In Fig. IV the ends of the upper links 8 of the pantograph are shown in a position

somewhat above the cross member 24 of the stationary framework 2. With pantographs such as are now commonly employed, and particularly after the parts have become worn in service, it frequently happens that the operating mechanism for collapsing the links will cause the depression of the upper links 8 to approximately the point shown in Fig. IV rather than to the limit of downward movement as shown in Fig. II. It being desirable to lower the current collecting shoe 4 to a minimum height above the rail, the hold down device of this invention is characterized by the provision of means for lowering the upper links 8 of the pantograph to a fully depressed position, that is, a position in which the links 8 rest upon the cross member 24 of the framework 2, as shown in Fig. II.

One type of hold down device contemplated by this invention is shown in Figs. V and VI, and comprises generally a crank arm 25, fixed on the actuating shaft 10, and a hook 26 pivotally mounted at a pin 27 on the crank arm 25. A spring 28 urges the hook 26 toward the stirrup 9 on the upper link 8 of the pantograph. In Fig. V a part of this stirrup is shown at 29. A pin 30 on the crank arm 25 serves to limit the relative swinging motion of the hook 26 on the crank arm 25 caused by the spring 28. The spring 28 may, as shown in Fig. VI, be in the form of a loop with a portion engaging the shank of the hook 26, and with coils 31 mounted on the pivot pin 27 and held in place by nuts 32. As indicated by the broken lines, rotation of the actuating shaft 10 in a counterclockwise direction causes the hook 26 to be swung into engagement with the part of the pantograph shown at 29. Further rotation of the actuating shaft 10 causes the crank arm 25 to continue its angular movement. The hook 26, which can not rotate further, will then move downward in a substantially vertical direction pivoting on the crank arm 25. Throughout its downward movement the hook 26 is continually spring-pressed against the part 29 so that there is no danger of the hook becoming disengaged from this part. From the above description it will be apparent that the actuating shaft 10 imparts both rotary and translatory motion to the hook and that the hold down device serves not only to lock a movable part of the pantograph in collapsed position, but serves also to depress the upper links 8 of the pantograph to the limit of their downward movement. Rotation of the actuating shaft 10 in a reverse direction, which occurs when the hood 14 is returned to normal position, moves the hook 26 upward and then swings it outward free from engagement with the part 29.

A second type of hold down device contemplated by this invention is shown in Figs. VII and VIII. The hook 26a in this instance

is substantially similar to the hook previously described, with the exception that the end of the shank includes a slot 33 and gear teeth 34 disposed on the face of the shank portion of the hook in the form of a rack and meshing with spur gear teeth disposed on the end of the shank along the arc of a circle, to which the shank portion of the hook is tangent. A pin 35 passing through the slot 33 affords a bearing for the hook 26a. The gear teeth 34 are adapted to mesh with the teeth of a pinion 36 mounted on the actuating shaft 10. In an obvious manner rotation of the actuating shaft in a counter-clockwise direction will impart swinging movement to the hook 26a, until the hook turns through an angle of approximately ninety degrees. Further rotation of the pinion 36 imparts a translatory movement to the hook 26a in a downward direction. When the actuating shaft is rotated in the opposite direction, the hook will return to its original position.

In Figs. IX and X there is shown a third type of hold down device contemplated by this invention. The device there shown comprises a hook 26b terminating at its lower end in a cylindrical strap 37. The strap 37 bears upon an annular disk 38 which is eccentrically mounted on the actuating shaft 10. The eccentric disk 38 is provided at one side with an annular flange 39 and at the other side with a plate 43 between which parts the strap portion 37 of the hook 26b is accommodated. The eccentric disk 38 and its plate 43 are also provided with arms 40 carrying a pin 41 which serves as a stop, limiting relative angular movement between the hook 26b and the eccentric disk 38. A spring 42 urges the hook 26b towards the stop 41. As indicated by the broken lines, rotation of the actuating shaft 10 in a clockwise direction causes, through the eccentric disk 38 and the strap portion 37 of the hook 26b, swinging movement of the hook from a substantially horizontal position to the vertical position shown in full lines. Further rotation of the actuating shaft 10 in a clockwise direction causes relative rotation between the eccentric disk 38 and the strap 37 of the hook 26b, and effects a downward vertical movement of the shank of the hook. During the downward movement of the hook, the spring 42 continually urges the hook towards the stop 41, and thus maintains engagement between the hook and the part 29 of the pantograph. Accordingly, the part 29 of the pantograph is lowered to the limit of its downward movement. To return the hook 26b to its original position the actuating shaft 10 is rotated in a counter-clockwise direction causing the hook to move upward until its end is free of the part 29 and subsequently to swing outward to its original position.

It will be noted that the hold down device described herein, irrespective of the particu-

lar type selected, supplements the usual operating mechanism for raising and lowering the pantograph, and performs first, the function of locking the pantograph in collapsed position against upward movement, and secondly, the function of drawing down the movable links of the pantograph to a position of engagement with the stationary frame, this being the limit of their downward movement. Furthermore, rotation of the actuating shaft 10 grounds all the current carrying parts of the pantograph. The hold down device is, therefore, a safeguard insuring the protection of men working in the vicinity of the pantograph.

While I have described my invention with reference to its adaptation to a common form of pantograph, it will be apparent that the hold down device herein described may be applied to a variety of forms of current collecting trolleys. It will be apparent also that the mechanism used for effecting rotary and translatory movement of the hook of the hold down device admits of considerable variation without departing from the scope of this invention as defined in the annexed claims.

Having thus described my invention, I claim:

1. The combination with the movable part of a pantograph or the like, of a hold down device comprising an actuating shaft, a member adapted to engage said movable part, and means whereby rotation of said shaft imparts rotary and translatory motion to said member.

2. The combination with the movable part of a pantograph or the like, of a hold down device comprising an actuating shaft, a hook adapted to engage said movable part, and means whereby rotation of said shaft causes rotation of the hook to engagement with said movable part, and whereby further rotation of said shaft causes the hook to move downward with said movable part.

3. The combination with a pantograph, including a stationary framework and a movable linkage adapted to assume a collapsed position adjacent to said stationary framework, of a hold down device comprising an actuating shaft, a member adapted to engage said movable linkage, and means whereby rotation of said shaft causes said member to swing into engagement with said linkage and to draw said linkage down upon said stationary framework.

4. The combination with the movable part of a pantograph or the like, of a hold down device comprising an actuating shaft, a member adapted to engage said movable part, a spring urging said member towards the movable part, and means whereby rotation of said shaft causes rotation of the hook to engagement with said movable part, and whereby further rotation of said shaft causes the

hook to move downward spring-pressed against said movable part.

5 5. The combination with the movable part of a pantograph or the like, of a hold down device comprising an actuating shaft, a crank thereon, a hook pivotally mounted on said crank, said hook being spring urged towards the movable part of the pantograph or the like, whereby rotation of said actuating shaft
10 causes the rotation of said hook to engagement with said movable part, and whereby further rotation of said shaft causes the hook to move downward spring-pressed against said movable part.

15 6. The combination with the movable part of a pantograph or the like, of a hold down device comprising an actuating shaft, a crank thereon, a hook pivotally mounted on said crank, a stop on said crank limiting the movement of said hook, and a spring urging said hook towards said stop, whereby rotation of said actuating shaft causes the rotation of said hook to engagement with said movable part, and whereby further rotation of said shaft causes the hook to move downward spring-pressed against said movable part.

7. The combination with the movable part of a pantograph or the like, of a hold down device comprising an actuating shaft, a hook adapted to engage said movable part, said hook having combined rack and spur gear teeth thereon, and a pinion on said actuating shaft meshing with the teeth on said hook, whereby rotation of said shaft imparts rotary and translatory motion to said hook.

8. The combination with the movable part of a pantograph or the like, of a hold down device comprising an actuating shaft, a hook adapted to engage said movable part, said hook having a slotted shank portion with teeth disposed on the face thereof along the arc of a circle and a line tangent thereto, a pin affording a bearing for said slotted shank portion, and a pinion on said actuating shaft meshing with the teeth on said hook, whereby rotation of said shaft imparts rotary and translatory motion to said hook.

9. The combination with the movable part of a pantograph or the like, of a hold down device comprising an actuating shaft, an eccentric disk thereon, and a hook adapted to engage the movable part of the pantograph or the like, said hook including a strap mounted on the eccentric disk aforesaid, whereby rotation of said actuating shaft imparts rotary and translatory motion to said hook.

10. The combination with the movable part of a pantograph or the like, of a hold down device comprising an actuating shaft, an eccentric disk thereon, a hook adapted to engage the movable part of the pantograph or the like, said hook including a strap mounted on the eccentric disk aforesaid, and a spring for maintaining firm engagement between

said hook and said movable member, whereby rotation of said actuating shaft causes rotation of the hook to engagement with said movable part, and whereby further rotation of said shaft causes the hook to move downward spring-pressed against said movable part.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this 17th day of July, 1931.

JAMES ROBERT McLAUGHLIN.