Jan. 6, 1948. C. S. ADAMS 2,434,138

LOAD INDICATOR FOR CRANES

Filed March 11, 1946 4 Sheets-Sheet 1

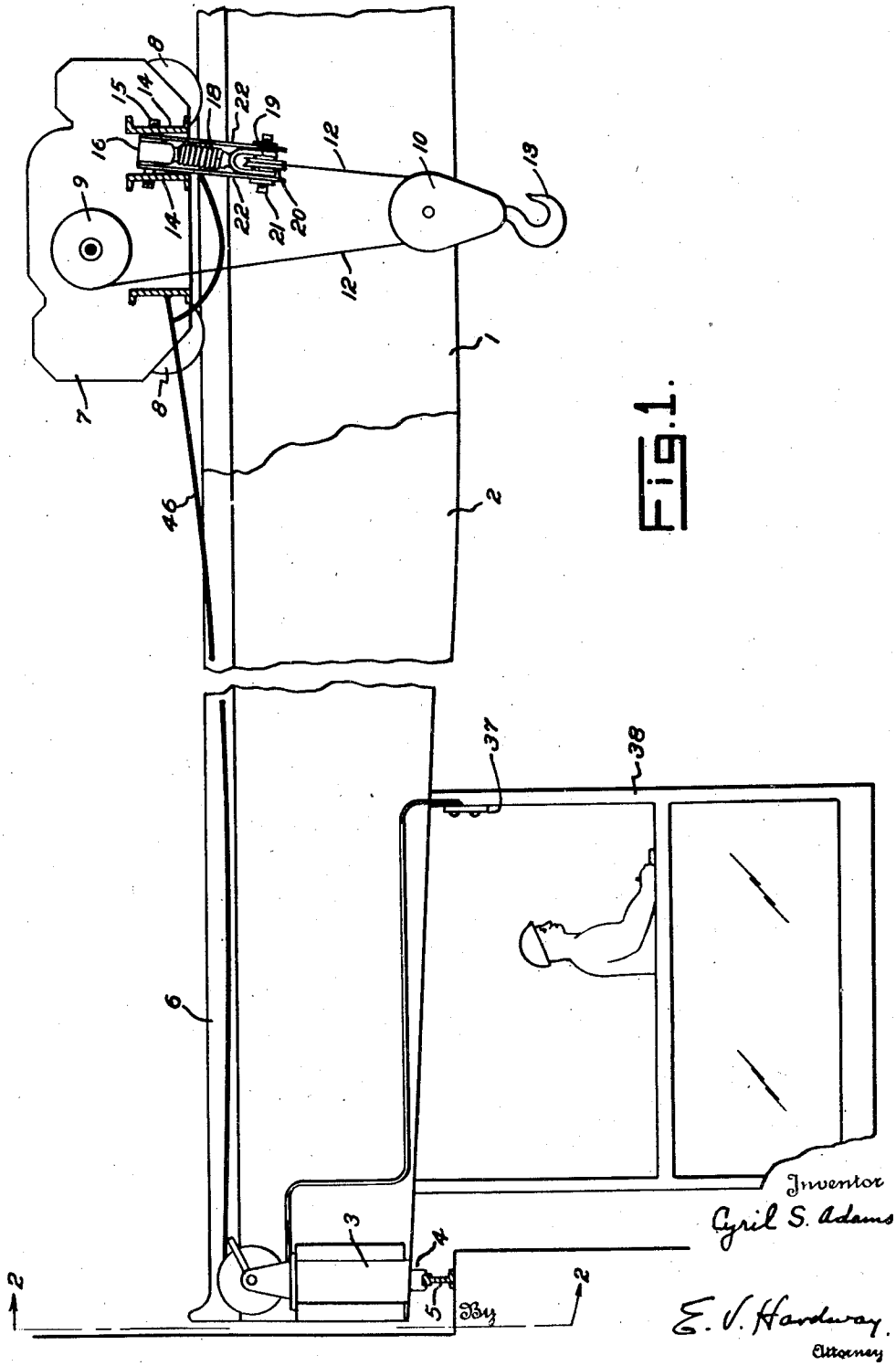



Fig. 1.

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Filed March 11, 1946 4 Sheets-Sheet 2

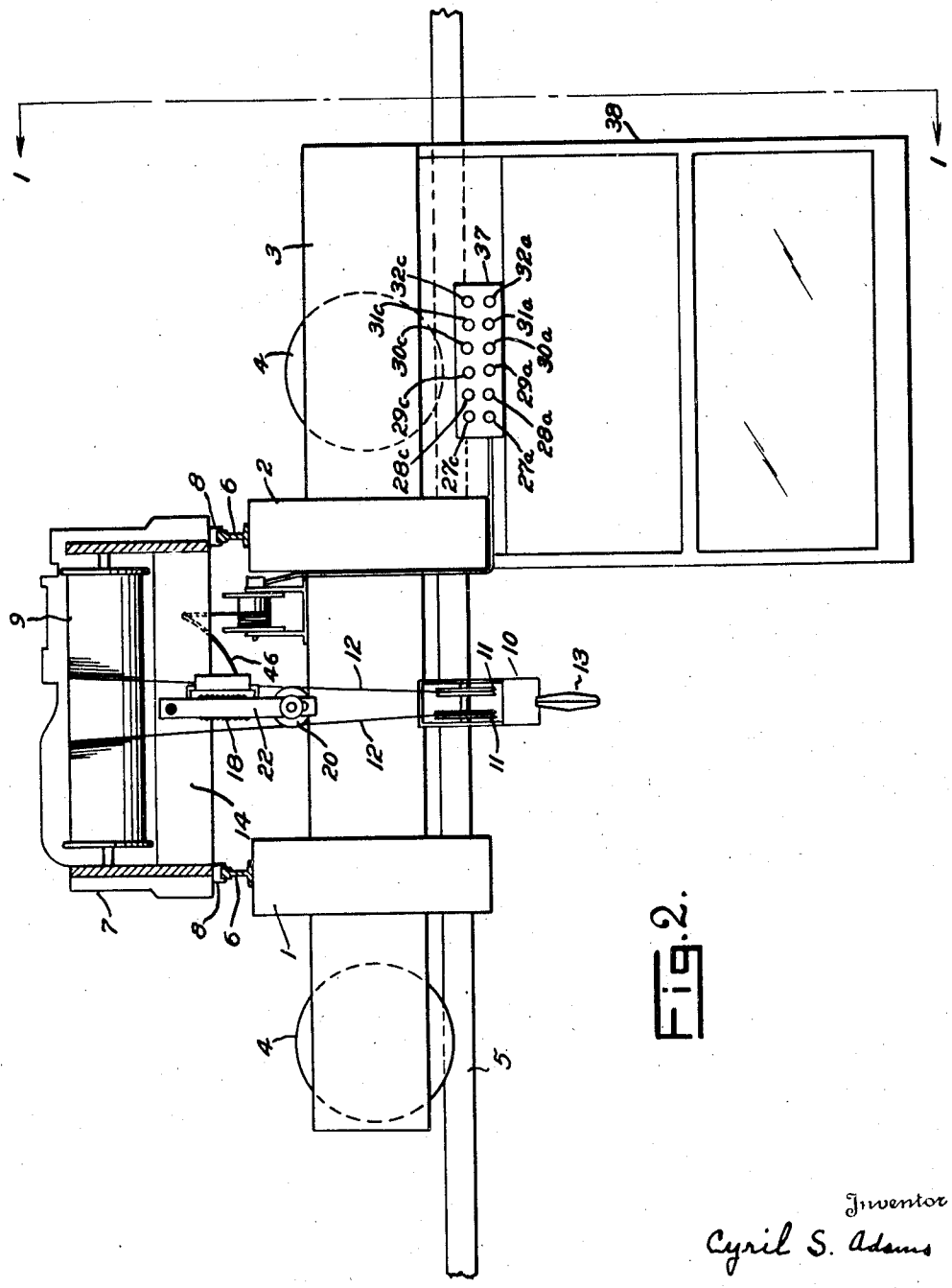



Fig. 2.

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LOAD INDICATOR FOR CRANES

Filed March 11, 1946 4 Sheets-Sheet 3

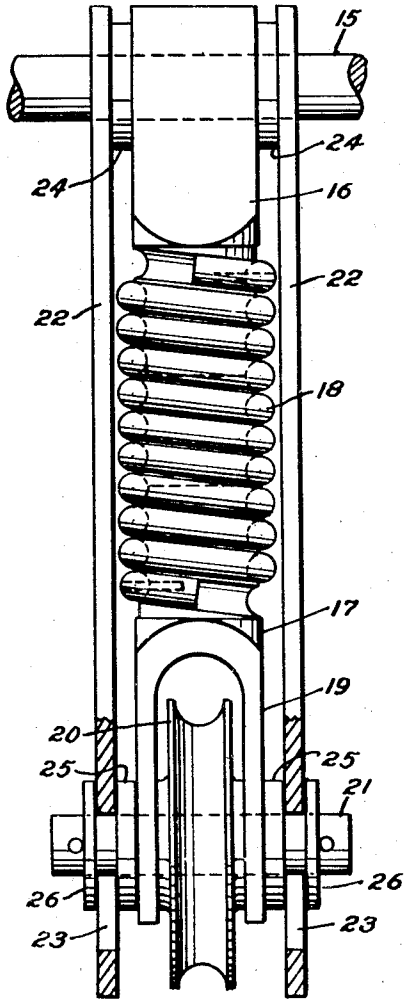



Fig. 3.

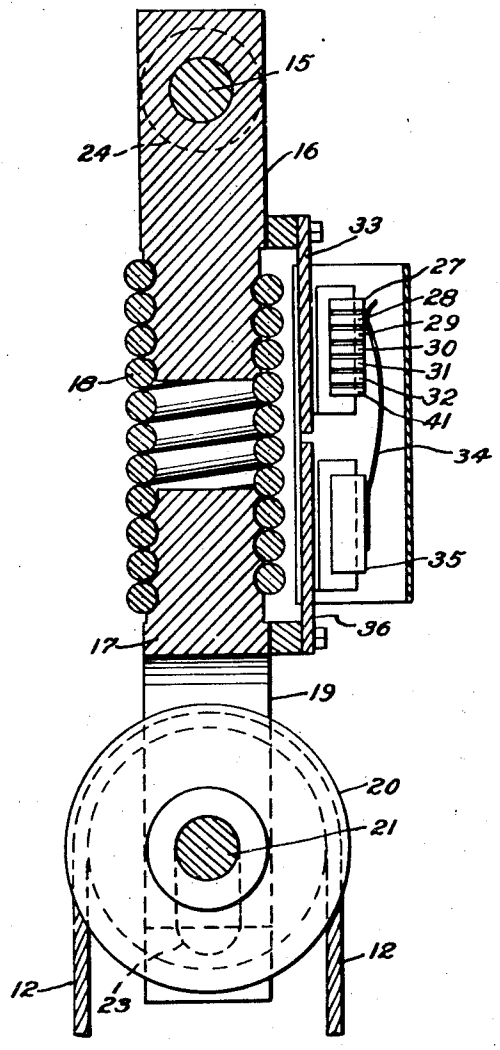



Fig. 4.

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LOAD INDICATOR FOR CRANES

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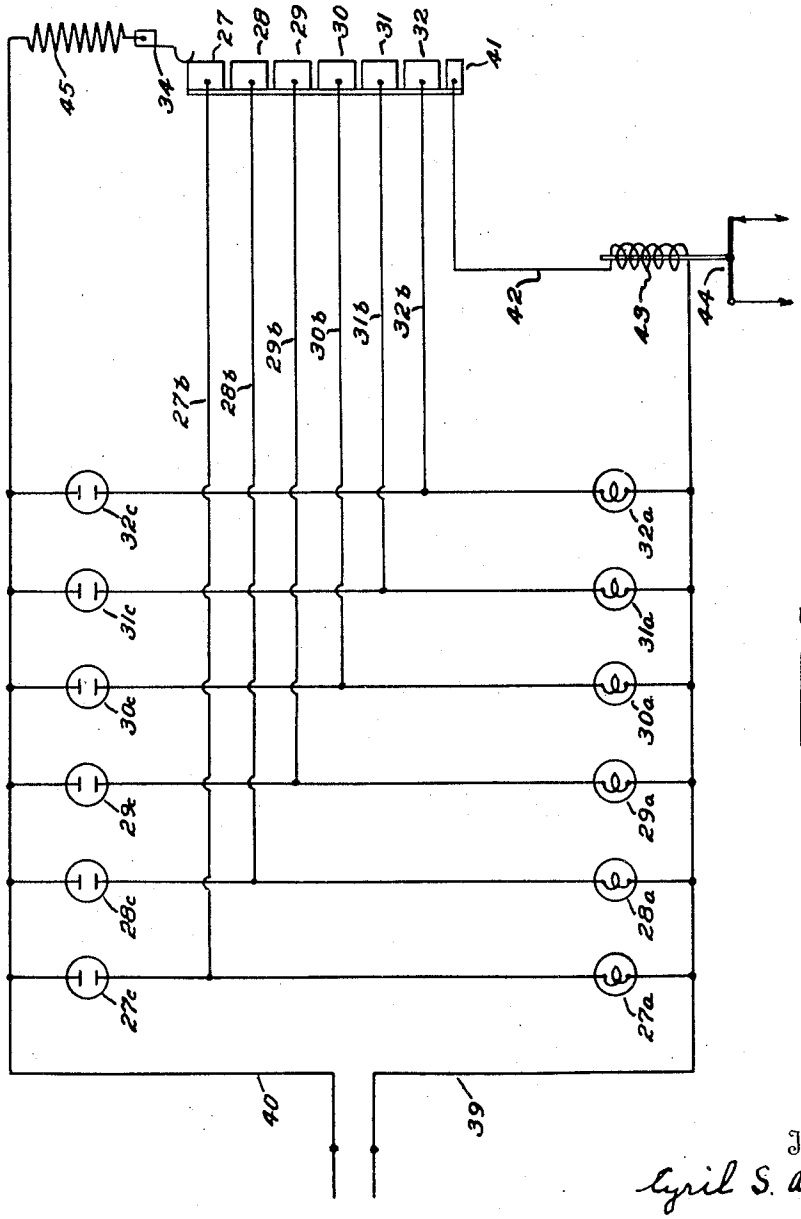



Fig. 5.

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# UNITED STATES PATENT OFFICE

2,434,138

## LOAD INDICATOR FOR CRANES

Cyril S. Adams, Houston, Tex.

Application March 11, 1946, Serial No. 653,671

8 Claims. (Cl. 177—311)

1

This invention relates to a load indicator and has particular relation to a load indicator for an overhead crane.

An object of the invention is to provide a safety device for indicating to the operator the weight of the load to which the crane is subjected so as to enable the operator to prevent overloading of the crane.

Another object of the invention is to provide in a device of the character described a series of electrical signaling devices located at a convenient place in view of the operator with means for actuating the signals successively, as the load is increased, to warn the operator when the load limit has been reached.

In the present illustration the signaling devices consist of electric lights although audible signals may be used.

The invention also comprehends means for electrically setting the brakes on the hoisting motor to prevent overloading of the crane.

Other objects and advantages will be apparent from the following specification which is illustrated in the accompanying drawings, wherein:

Figure 1 is a fragmentary, side view of an overhead crane, viewed as indicated by the line 1—1 of Figure 2 and showing the near bridge girder partly broken away.

Figure 2 is an end elevation viewed as indicated by the line 2—2 of Figure 1.

Figure 3 is an elevation, partly in section, of the tension spring employed and associated parts.

Figure 4 is a sectional view thereof taken at right angles to the view shown in Figure 4, and;

Figure 5 is a wiring diagram.

Referring now more particularly to the drawings wherein like numerals of reference designate the same parts in each of the figures, the numerals 1 and 2 designate similar spaced bridge girders which are supported at their respective ends on similar carriages, as 3. Each carriage is provided with the supporting wheels 4, 4 which travel on suitably supported rails 5.

Mounted on the bridge girders are the trolley rails 6, 6 provided to support the trolley 7. This trolley is provided with the supporting wheels 8, 8 which travel along the rails 6. Mounted on the trolley 7 there is a cable winding drum 9 which is operatively connected with a hoisting motor (not shown in the present drawings).

There is a traveling block 10 containing the sheaves 11, 11 over which the runs 12, 12 of the hoisting cable operate. The ends of this cable are wound about the drum 9 and the lifting and lowering of the block 10 may be controlled by

2

the operator. The block 10 is equipped with the usual depending hook 13 by means of which the load to be lifted may be attached to the block.

Mounted on the trolley 7 are the spaced brackets 14, 14 which are provided with suitable aligned bearings through which a supporting rod 15 extends. This rod also extends through, and supports, an upper connector 16. Spaced beneath the connector 16 is a lower connector 17. The adjacent ends of these connectors are threaded into, or otherwise fastened to, opposing ends of a strong coil spring 18 which links the connectors together. This spring 18 and connectors 16, 17 may be specifically designed for each size and type of overhead crane.

The lower end of the lower connector 17 is formed into a fork 19 and between the arms of this fork there is a sheave 20, over which the hoisting cable is looped (as shown in Figure 4) and which sheave is mounted to rotate on a spindle 21 whose ends have bearings in the arms of the fork 19.

There is a bridle formed of the side links 22, 22. The rod 15 passes through the upper ends of these side links so that they are suspended therefrom and the lower ends of the side links have aligned vertical slots 23, 23 through which the ends of the spindle 21 extend. The links 22, 22 are spaced from the upper connector by means of the spacers 24, 24 which are located between said links and said connector and through which the rod 15 extends and the lower ends of said links are spaced from the yoke 19 by the spacers 25, 25 which are located between said lower connector and said yoke and through which the spindle 21 extends. The lower ends of the links 22 are maintained against spreading and rotation by means of washers 26, 26 which are keyed on to their respective ends of the spindle 21.

The bridle above described limits the range of downward movement of the lower connector 17 relative to the upper connector 16 in the event of any structural failure of the spring 18 or the connectors 16 and 17, thus preventing an accident as a result of such failure.

As illustrated in Figures 4 and 5 there is a series of contacts 27, 28, 29, 30, 31 and 32, which are mounted on the supporting plate 33 fixed to the upper connector 16 and there is a flexible contact arm 34 one end of which is fixed to a suitable anchor 35 carried by the supporting plate 36 which is mounted on the lower connector 17. The other end of said arm 34 is adapted to suc-

cessively form electrical connections with the contacts 27 to 32, inclusive.

There is an indicator panel 37 in front of the operator stationed in the operator's cab 38 and on this panel are the weight-indicating electrical signal lights which indicate the load supported from the traveling block 10. As an illustration the light 27*a* may indicate a relatively light load, the light 28*a* may indicate a heavier load and so on with the lights 29*a*, 30*a*, 31*a* and 32*a* all as predetermined for each application. These lights are connected with the respective contacts 27 to 32, inclusive, by the wiring 27*b*, 28*b*, 29*b*, 30*b*, 31*b*, and 32*b*, which, in turn, are also connected into the main electrical conductors 39 and 40, the later of which is electrically connected with the contact arm 34.

There is also a shut-down contact 41 with which the contact arm forms an electrical connection when a predetermined load limit has been reached and which is connected into the main circuit through the wiring 42. A relay 43 is connected into the circuit 42 and is adapted to operate an audible alarm, or a brake mechanism, or both, designated generally by the numeral 44. The brake mechanism, if used, is provided to set the brakes on the hoisting motor to prevent excessive overloading of the crane and the audible alarm is arranged to operate immediately prior to the setting of the brakes.

Wired into the main electrical circuit are also a series of trouble lights 27*c*, 28*c*, 29*c*, 30*c*, 31*c* and 32*c*. These lights are arranged to correspond with the signal lights 27*a* to 32*a*, respectively. They are constantly illuminated except when the circuit through the corresponding signal light is out of order and are provided to indicate to the operator whether or not the signal lights are in working order. They are of high resistance and therefore will be constantly illuminated, when the signal lights are in order.

There is a resistor 45 connected to the conductor 40 and which is in series with the contact arm 34 so as to provide sufficient voltage across said resistor to illuminate the lights 27*c* to 32*c*, inclusive, while the contact arm 34 is in contact with any one of the contacts 27 to 32, inclusive, and at which time signal light, corresponding to the contact with which the contact arm 34 is in electrical connection, will be illuminated.

The electrical conductors 39 and 40 lead to the panel 37 from the source of electrical energy. From the panel to the contacts electrical conductor 40 and electrical conductors 27*b* through 32*b* and also electrical conductor 42 are enclosed within a suitable flexible cable, as 46, or they may be in the form of rigid conductors fastened directly to the crane.

It is, of course, obvious that the lower connector 17 may be supported directly from the crane and the upper connector may be mounted yieldingly on the spring 18 and the sheave 20 suspended from said upper connector. This would be merely a reversal of parts and the spring 18 would then be a compression spring. In this connection it is to be noted generally that the drawings and description disclose only what is now considered to be a preferred form of the invention by way of illustration, merely, while the broad principle of the invention will be defined by the appended claims.

What I claim is:

1. In a load indicator for overhead cranes, a line tension signal actuating unit comprising, an upper connector suspended from the crane trolley, a lower connector, a coil spring into whose ends the adjacent ends of the connectors are threaded, said spring linking the connectors together yieldingly, a series of electrical contacts stationary with respect to one connector, a contact member fixed relative to the other connector, said contact member and contacts being arranged to form successive electrical connections upon relative movement of said connectors.

2. In a load indicator for overhead cranes, a line tension signal actuating unit comprising, an upper connector suspended from the crane trolley, a lower connector, a coil spring into whose ends the adjacent ends of the connectors are threaded, said spring linking the connectors together yieldingly, a series of electrical contacts stationary with respect to one connector, a contact member fixed relative to the other connector, said contact member and contacts being arranged to form successive electrical connections upon relative movement of said connectors, and a series of electrical signals electrically connected with the series of electrical contacts.

3. In a load indicator for overhead cranes, a line tension signal actuating unit comprising, an upper connector, a lower connector, one of said connectors being attached to the crane, a helical spring directly linking the connectors together, a load supporting sheave mounted on the other connector, a bridle including side links whose upper ends are attached to the crane and with which the sheave has a limited, slidable, connection, a series of electrical contacts stationary with respect to one connector, a contact member stationary with respect to the other connector, said contact member and contacts being arranged to form successive electrical connections upon relative movement of said upper and lower connectors.

4. In a load indicator for overhead cranes, a line tension signal actuating unit comprising, an upper connector attached to the crane, a lower connector, a tension spring linking the connectors together, a load supporting sheave mounted on the lower connector, a bridle including side links whose upper ends are attached to the crane and with whose lower ends the sheave has a limited, slidable, connection, a series of electrical contacts stationary with respect to one connector, a contact member stationary with respect to the other connector, said contact member and contacts being arranged to form successive electrical connections upon relative movement of said upper and lower connectors, and a series of electrical signals which are electrically connected with the respective electrical contacts.

5. In a load indicator for overhead cranes, a line tension signal actuating unit comprising, an upper connector attached to the crane, a lower connector, a tension spring linking the connectors together, a bridle including side links whose upper ends are attached to the crane and whose lower ends are formed with oblong, vertical bearings, a sheave axle on the lower connector whose ends are slidable in said bearings, a load supporting sheave mounted on said axle and electrical contact members on said connectors relatively movable with said connectors to complete an electrical circuit to a signal device.

6. In a load indicator for overhead cranes, a line tension signal actuating unit comprising, an upper connector attached to the crane, a lower connector, a tension spring linking the connectors together, a bridle including side links whose upper ends are attached to the crane and

whose lower ends are formed with oblong, vertical bearings, a sheave axle on the lower connector whose ends are slidable in said bearings, a load supporting sheave mounted on said axle, a series of electrical contacts stationary with respect to one connector, a contact member stationary with respect to the other connector, said contact member and contacts being arranged to form successive electrical connections upon relative movement of said connectors.

7. In a load indicator for overhead cranes, a line tension signal actuating unit comprising, an upper connector, a lower connector, one of said connectors being attached to the crane, a helical spring yieldingly supporting the other connector and linking the connectors together, means for attaching a load to the yieldingly mounted connector, means for limiting the range of movement of one connector relative to the other connector, a series of electrical contacts stationary with respect to one connector, a contact member stationary with respect to the other connector, said contact member and contacts being arranged to form successive electrical connections upon relative movement of said connectors under the influence of said load and a series of electrical signals electrically connected with the series of electrical contacts.

8. In a load indicator for overhead cranes, a line tension signal actuating unit comprising, an upper connector, a lower connector, one of said connectors being attached to the crane, a helical spring connected to said connectors linking



the connectors together and yieldingly supporting the other connector, means for attaching a load to the yieldingly mounted connector, a series of electrical contacts stationary with respect to one connector, a contact member stationary with respect to the other connector, said contact member and contacts being arranged to form successive electrical connections upon relative movement of said connectors under the influence of said load, a series of electrical signals electrically connected with the series of electrical contacts and a series of trouble lights electrically connected with said contacts and signals.

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