W. M. BROWN.

LOAD INDICATOR.

APPLICATION FILED APR. 3, 1913.

1,111,560.

Patented Sept. 22, 1914.

2 SHEETS—SHEET 1.

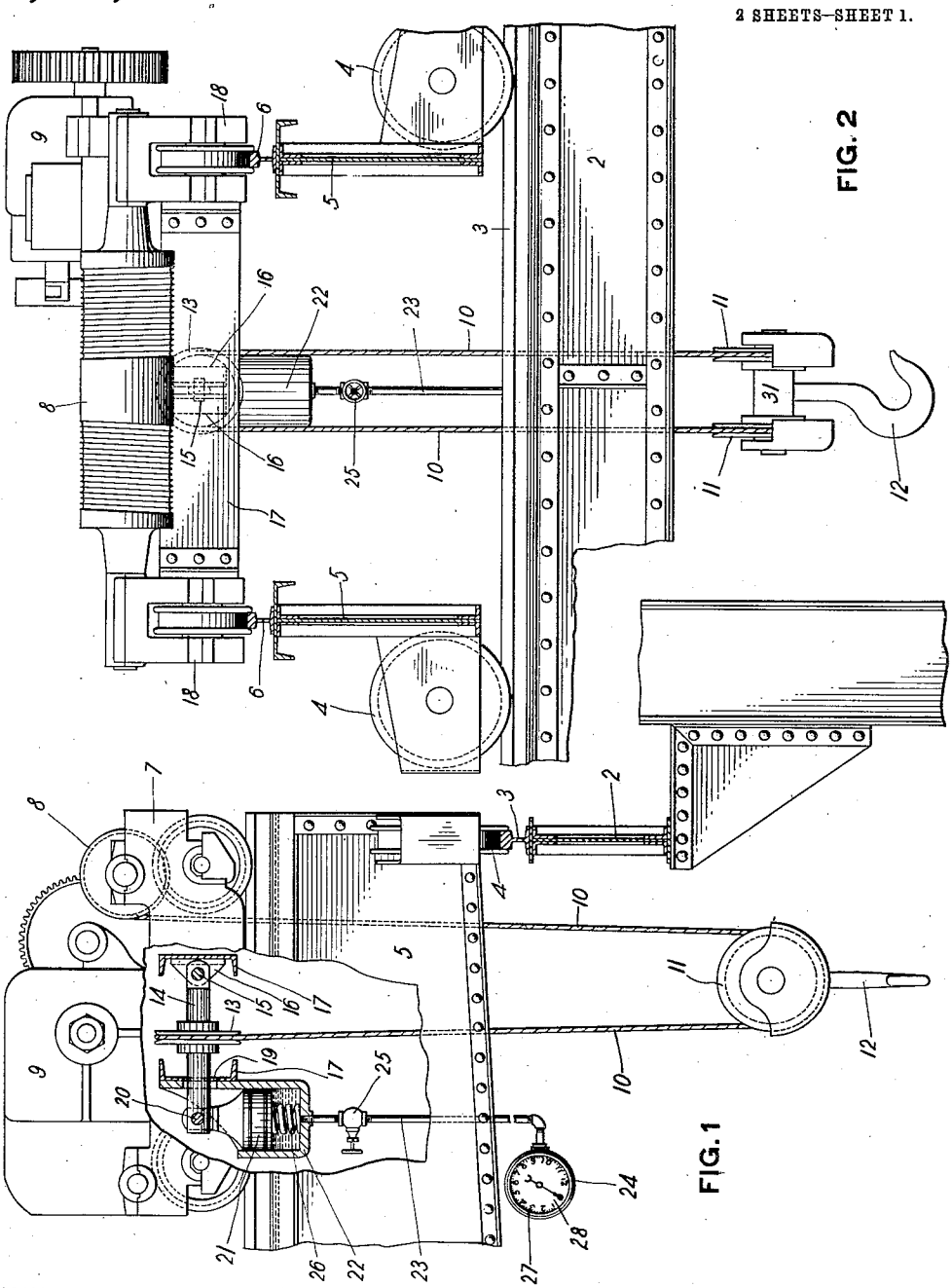


FIG. 2

FIG. 1

WITNESSES

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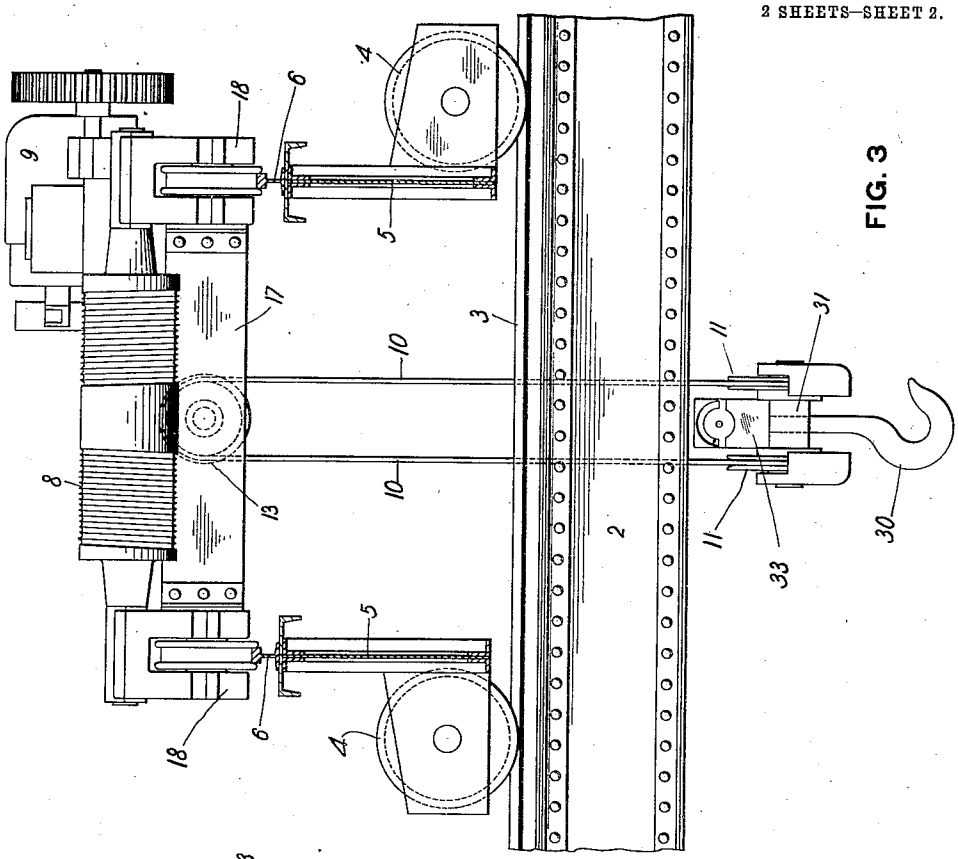


FIG. 3

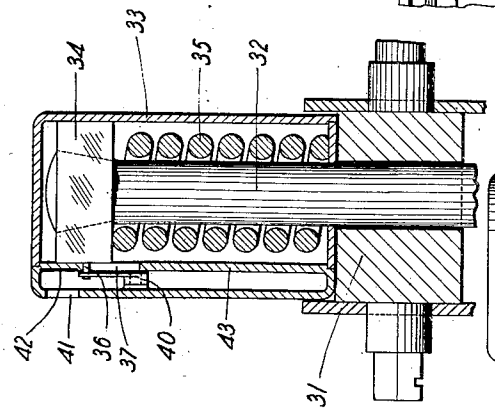


FIG. 4

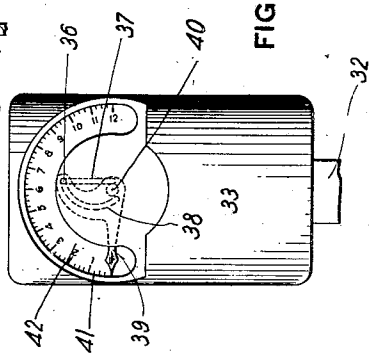


FIG. 5

WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM MILTON BROWN, OF JOHNSTOWN, PENNSYLVANIA.

LOAD-INDICATOR.

1,111,560. Specification of Letters Patent. Patented Sept. 22, 1914.

Application filed April 3, 1913. Serial No. 758,576.

To all whom it may concern:

Be it known that I, WILLIAM MILTON BROWN, a citizen of the United States, residing at Johnstown, in the county of Cambria and State of Pennsylvania, have invented a new and useful Load-Indicator, of which the following is a specification.

My invention has relation to an appliance for use with apparatus used in lifting or mechanically handling heavy materials, and while not limited to such use, more particularly relates to a load indicator or appliance for traveling cranes whereby the weight of loads lifted by the crane is indicated, breakage of the load lifting mechanism caused by overloads is avoided and prevented, and liability of accident is lessened and overcome.

Heretofore, although the maximum capacity of cranes or other lifting apparatus is generally known, the actual weight of successive loads lifted thereby is not usually known and is determined solely by the judgment of the operatives handling the lifting apparatus. As a result the capacity of the lifting apparatus is ofttimes greatly exceeded.

The application of frequent overloads (or of a single load of very excessive weight) has been found to be one cause of numerous accidents and frequent delays in the operation of the lifting apparatus, and to be the source of serious breakage and a large increase in the cost of maintaining the apparatus in operative condition.

One object of my invention is to provide novel means whereby approach to the maximum lifting capacity of traveling cranes or similar load lifting apparatus is indicated when the load is being engaged or applied, and liabilty of breakage or other serious damage to the lifting mechanism is thereby avoided and overcome.

Another object of the invention is to provide a load indicating appliance for lifting mechanism whereby the approximate weight of the load put upon the lifting mechanism is indicated.

A further object of the invention is to provide a load indicator of simple design and having novel features of construction which are more fully described and claimed hereinafter.

Referring to the accompanying drawings forming part of this specification, Figure 1 is a side elevation, partly in section, of one end of a traveling crane, showing the crane girders and the trolley mounted thereon with a load indicating appliance as applied thereto in accordance with my invention. Fig. 2 is a sectional end elevation of the apparatus shown in Fig. 1. Fig. 3 is a sectional end elevation similar to that shown in Fig. 2, showing a modified form of load indicator constructed in accordance with my invention. Fig. 4 is a sectional side elevation showing a detail of the indicator construction illustrated in Fig. 3. Fig. 5 is a side elevation in a vertical plane at right angles to that of Fig. 4 showing a detail of the load indicator of Figs. 3 and 4.

In the drawings, referring to Figs. 1 and 2, the numeral 2 designates one track girder of a crane runway having a track rail 3 mounted thereon on which the wheels 4, 4 of the crane girders 5, 5 are mounted. The crane girders 5 are of any usual known construction and have rails 6 mounted thereon in the usual manner forming a track for the crane trolley.

Mounted on the track rails 6 is a crane trolley 7 having a rope winding drum 8 thereon which is operatively connected by suitable slow-down gearing with a driving motor 9 mounted on the crane trolley.

In the particular crane trolley construction shown the hoisting rope 10 of the crane is connected at each end to the rope drum 8 and the rope passes around the wheels or rope pulleys 11, 11 on the ends of the crosshead 31 of the crane hook 12, and also extends around a pulley or wheel 13 which is mounted on the shaft 14 to equalize the tension put upon the rope when a load is being lifted thereby. The shaft 14 is pivoted at one end by a pin 15 to brackets 16 which are secured to one of the channels 17 forming the separators between the sides 18 of the crane trolley 7 at each end of the trolley. The opposite end of the shaft 15 extends through a slotted opening 19 in the web of a second channel 17 forming one of the two separators located at each end of the sides 18 of the crane trolley, and is pivotally connected by a pin 20 to the upper end of a vertically movable piston 21 which is mounted in a fluid pressure cylinder 22 fastened to the web of one of the channel separators 17.

The cylinder 22 is connected through an opening in its lower end by piping 23 with a pressure gage or load indicator 24,

and a valve 25 on the piping 23 enables the gage 24 to be shut off from the cylinder 22 when desired. A helical spring 26 mounted in the cylinder 22 preferably is employed to lift or move the piston 21 outwardly in the cylinder 22.

The dial 27 of the gage 24 is preferably located adjacent to the crane operator's cage so that the loads indicated by the hand 28 on the dial are readily noted, the face of the dial being provided with suitable graduations to show the extent of the load applied to the crane or being lifted thereby relative to the safe load applicable to the crane.

In the modified construction shown in Figs. 3, 4 and 5 the load indicator is applied directly to the crane chain hook 30. The construction of the crane track girders 2, bridge girders 5 and crane trolley 7 being the same as in the preceding figures like parts have the same reference numerals applied thereto.

As will be seen by reference to Fig. 4 the crosshead 31 for the hook 30 is provided with wheels or pulleys 11, 11 for the hoisting rope 10 and the shank 32 of the hook extends upwardly through the central opening in the crosshead 31 into a spring cage or housing 33, a head 34 being provided on the upper end of the shank 32 and a helical spring 35 is interposed between the head 34 and the top of the crosshead 31. The head 34 is preferably rectangular in cross section to prevent turning thereof with the crane hook 30.

Projecting outwardly from one side of the head 34 is a pin 36 which projects through a lengthwise vertical slot 37 in the side of the cage 33 into the curved slot 38 in the curved arm of the index lever 39 which is pivoted by a pin 40 to the side of the cage 33.

The outside of the cage 33 has a semicircular slot or opening 41 provided therein to show the dial 42 which is formed on or secured to the outer face of the inner wall 43 of the double walled face of the cage 33, the cage 33 being made in sections to permit the insertion of the shank or stem 32 and spring 35 therein.

While in the apparatus of Figs. 1 and 2 and also of Figs. 3, 4 and 5 the load indicator is shown operatively connected to the traveling crane at a point between the hoisting drum on the crane trolley and the crane hook, obviously the indicating mechanism may be applied at any point between the point of attachment of the load and the bridge on which the crane trolley is mounted.

In the operation of the apparatus of Figs. 1 and 2 the usual lifting chains (not shown) are secured to the crane hook 12 and the crane is actuated in the usual manner in lifting and transferring materials from one point to another within the space encompassed by the crane.

As the load is applied to the crane hook 12 its weight causes the rope equalizing shaft 14 to move the piston 21 downwardly within the fluid pressure cylinder 22 and the oil or other fluid within the cylinder is thereby displaced and caused to flow through the piping 23 into the gage 24. The movement of the fluid into the gage causes the hand or index finger on the gage to turn and indicate the extent or weight of the load being applied to the crane relative to the allowable load, so that when the finger approaches the end of its travel, the operator knows the load will be excessive and the load can then be lessened before its whole force becomes applied to the crane.

When the load is released from the crane, by the usual manipulation of the crane trolley the pressure within the cylinder 22 is relieved, so that the hand on the gage 24 returns to zero, or its non-registering position, the upward or outward movement of the piston 21 in the cylinder 22 being effected by the helical spring 26, which becomes compressed by downward movement of the piston, and upward movement of the tightly fitting piston 21 withdrawing fluid from the piping 23 into the cylinder 22.

With the apparatus shown in Figs. 3, 4 and 5, the crane is operated in the same manner as has been described, and as the load is applied to the crane hook 30 the spring 35 is compressed. The downward movement of the crane hook, which occurs when the spring is compressed, causes the pin 36 to move vertically in the slot 37, and by engagement with the sides of the curved slot 38 in the curved arm rotates or moves the index lever 39 so as to indicate on the dial 42 the weight of the load being lifted. When the crane is relieved of its load the spring 35 lengthens so as to lift the crane hook 30 relative to the crosshead and move the index lever 39 backwardly into its non-registering position. The above described operations are then repeated with successive loads in the continued operation of the crane or other hoisting apparatus.

The advantages of my invention will be apparent to those skilled in the art. By the application of the load indicator to the lifting mechanism the liability of breakage or serious damage to the lifting mechanism by reason of excessive loads is prevented and overcome and the cost of maintaining the apparatus in operative condition is very materially reduced.

Modifications in the construction and arrangement of the load indicator and its manner of application may be made without departing from my invention as defined in the appended claims. While the load indicator is shown applied to a traveling

crane, obviously it may be employed with any load lifting mechanism employing a rope or other flexible connection between the hoisting drum and the point of attachment of the load being lifted.

I believe myself to be the first to apply an indicator to a traveling crane or load lifting apparatus to indicate the weight of a load applied thereto, and intend to claim such construction broadly.

I claim:—

1. In a traveling crane, a trolley having a crane hook, a flexible connection between the crane hook and a hoisting drum on the crane trolley, and a load indicator operatively connected to the crane hook, said load indicator comprising a dial, a slotted arm having an index finger movable relatively to the dial, and means operating in the slot in said arm to actuate said finger when the load is lifted by the crane hook.

2. In a traveling crane, a trolley having a crane hook, a flexible connection between the crane hook and a hoisting drum on the crane trolley, and a load indicator operatively connected to the crane hook, said load indicator comprising a dial, a slotted arm having an index finger movable relatively to the dial, means operating in the slot in said arm to actuate said finger, said means moving the finger in one direction when a load is lifted by the crane hook, and a spring operatively engaging the crane hook and arranged to lift the hook and thereby move the finger in the opposite direction when the load is removed from the crane hook.

In testimony whereof, I have hereunto set my hand.

WILLIAM MILTON BROWN.

Witnesses:

AGNES M. BRUCE,

H. W. SMITH.