No. 780,201. PATENTED JAN. 17, 1905.

S. L. G. KNOX.

JACK ARM.

APPLICATION FILED MAY 23, 1904.

2 SHEETS—SHEET 1.

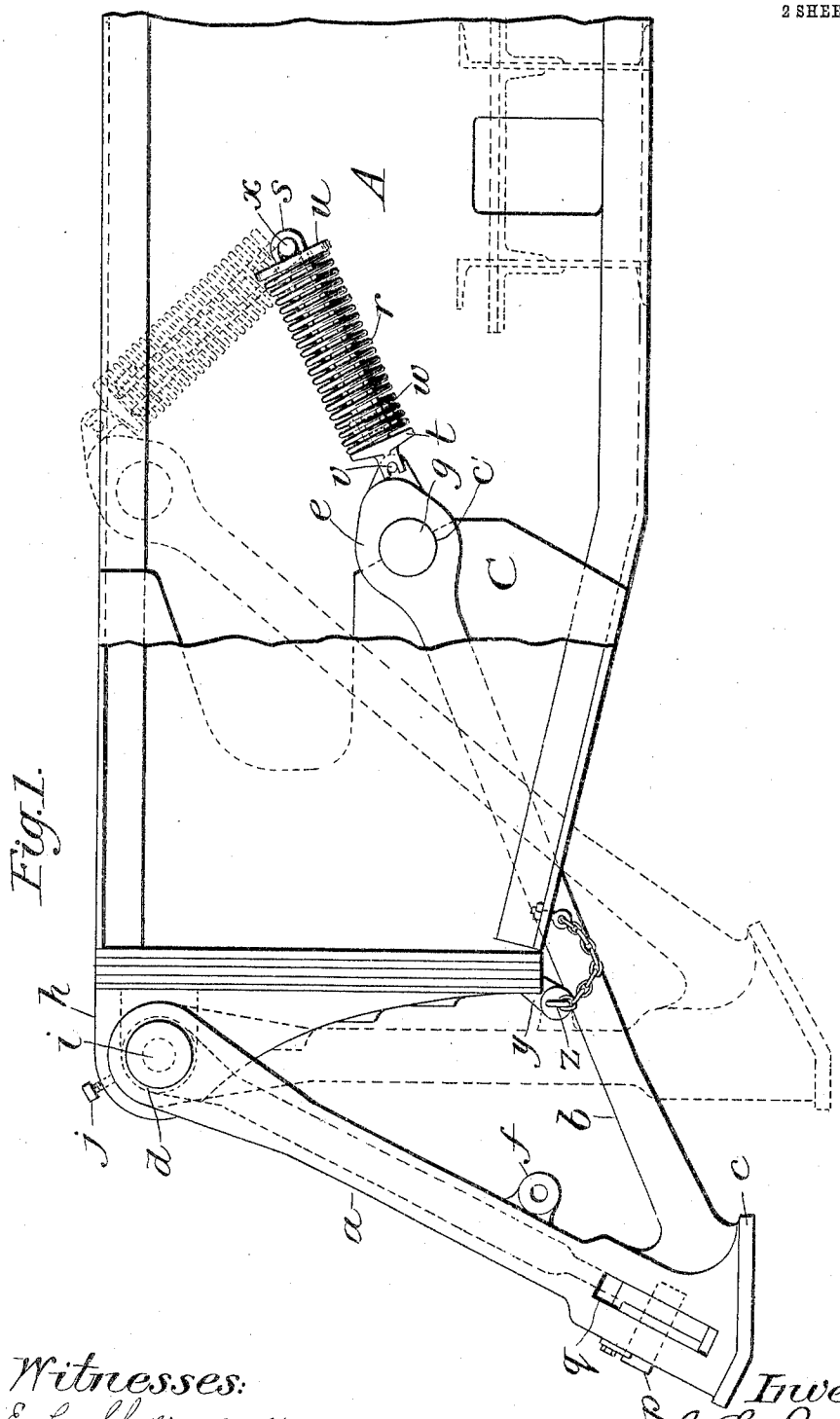


Fig. 1.

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J. E. Hutchinson Jr.

Inventor:
S. L. G. Knox
By his attys.
Pennie & Goodrich

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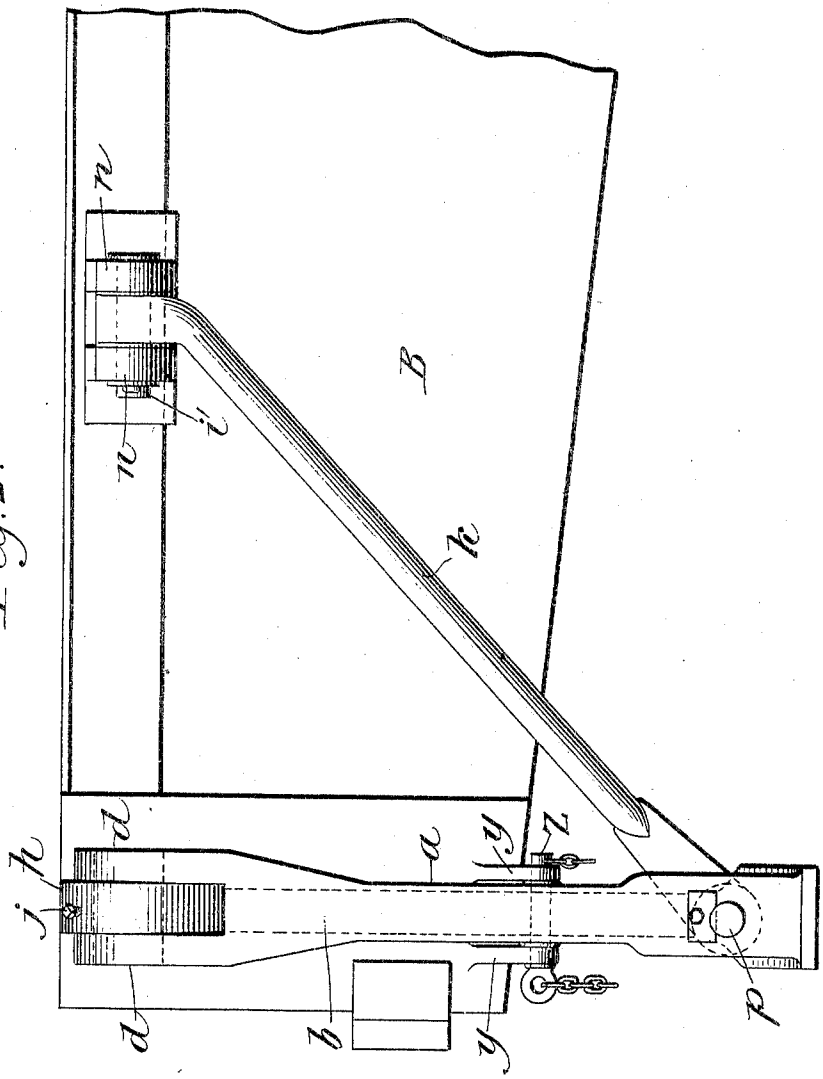
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2 SHEETS—SHEET 2.

Fig. 2.



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No. 780,201. Patented January 17, 1905.

UNITED STATES PATENT OFFICE.

SAMUEL LIPPINCOTT GRISWOLD KNOX, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO BUCYRUS COMPANY, OF SOUTH MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

JACK-ARM.

SPECIFICATION forming part of Letters Patent No. 780,201, dated January 17, 1905.

Application filed May 23, 1904. Serial No. 209,296.

To all whom it may concern:

Be it known that I, SAMUEL LIPPINCOTT GRISWOLD KNOX, a citizen of the United States, residing in the city and county of Milwaukee, State of Wisconsin, have invented certain new and useful Improvements in Jack-Arms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The purpose of my invention is to provide a jack-arm for railway wrecking-cranes, excavators, and the like that is adapted to be applied to the car as a permanent part of the equipment and that shall combine the requisite strength and stability under the heaviest loads with a relative lightness and simplicity of structure so related to the car-body that the said jack-arm may be easily and quickly handled and adjusted, that it may have a stable balance for both its extreme positions, that it shall not render a material reduction of the maximum width of the car-body with regard to railway clearance necessary, and that is readily removable from the car-body should removal be found necessary, due to an abnormally low clearance or to any other unusual working conditions on the road.

To this end the invention comprises a jack-arm having two divergent legs, preferably formed as an integral V-shaped casting pivoted at one end to the car-body to swing in a vertical plane, the free end of the other leg finding a bearing to take the lateral thrust in an abutment on the car-body, and a strut pivoted to the car-body and connected to the jack-arm to stiffen the latter in a direction normal to its swinging plane, together with means, preferably in the form of a helical spring, interposed between the inboard end of the jack-arm and the car-body to counterbalance the free end of the arm and hold said arm in its inner and outer positions.

Referring to the accompanying drawings, Figure 1 is a side elevation of my improved jack-arm applied to the side of a car-body, near one corner thereof. Fig. 2 is an end elevation thereof.

In the drawings, *a* indicates the main leg of the jack-arm, from which projects a lateral leg *b*, having at the point of juncture which constitutes the free end of the jack-arm a bearing-surface *c*, under which the blocking or other supporting means is applied. The legs *a* and *b* are preferably formed as an integral V-shaped casting provided with a fork or clevis *d* at the upper end of the main leg, by which the jack-arm is journaled on a removable pintle *i*, carried by a lug *h* on the side of the car-body, so that said arm swings in a vertical plane, preferably normal to the side of the car. The pintle *i* is held in position in the lug *h* by a set-screw *j*, which may be quickly removed to allow the pintle to be withdrawn.

The lateral leg *b* is so disposed as to swing in the same plane as leg *a*, and movement of the inner end of said leg *b* is preferably confined to a path inclosed within the frame of the car-body side A and end B. Secured in the inner end of leg *b* is a pin *g*, which projects laterally on both sides of said leg and is adapted to engage semicircular recesses *c'* in abutment-plates C C, secured within the car-body when the jack-arm is swung to its outward or operative position, as shown in Fig. 1, so that the movement of the arm is properly limited by said abutment, and the latter takes up the lateral thrust on the arm due to the load.

In order to stiffen the jack-arm in a direction normal to its swinging plane and to prevent undue lateral strain on the pintle *i*, a brace or strut *k* is pivoted to the car-body at one end and connected to the lower end of the jack-arm at the other, so that said strut partakes of the vertical-swinging movement of said arm. The pivot *i'*, by which the strut is connected to the car-body, is mounted in brackets *n n*, so that the axis of said pivot *i'* coincides with that of pintle *i*. The other end of the strut *k* engages a socket *q* in the lower end of the leg *a* and is secured thereto by a

cross pin or bolt *p*. The strut and the jack-arm are thus rigidly connected and swing as a unitary structure throughout the range of movement of said arm, and any tendency of the arm to yield laterally of its swinging plane is effectively resisted.

The two positions of the jack-arm, which characterize its operative adjustment in supporting a load and its folded or retracted relation with respect to the car-body during transportation, are indicated in the full and dotted lines, respectively, in Fig. 1. It is desirable that the jack-arm be retained in either of these positions without the interposition of extraneous auxiliary support. More especially should the arm be automatically counterbalanced in its outer or operative position, so that once it has been adjusted the blocking or other supporting means can be applied beneath the bearing-face *c* without requiring the arm to be held in position by the workmen. This counterbalancing of the arm is accomplished in the present instance by means of a helical spring *r*, which bears at one end against an abutment *x* on the car-body and against a cross-pin *v* on the inner end of leg *b* at the other end. Said spring being under compression at all times produces a thrust against said arm, and in order to deliver the thrust in a direction to hold the jack-arm in both of its extreme positions the pin *x* is mounted on the car-body at a point so that in the operative position of the jack-arm the angle formed by the center line through spring *r* and a line through pivot *i* and pin *x* is approximately equal to the angle formed by the center line and the line connecting pivot *i* and pin *x* when the jack-arm is in its folded position, and the strength of the spring is preferably so adjusted as to counteract the turning movement of said jack-arm about its pivot at *i*, due to the weight of the arm. It will be seen also that one effect of the spring is to assist in the movement of the arm in either direction beyond its middle position.

The spring-counterbalance device consists of the helical spring *r*, above referred to, which is mounted upon a guide formed as a U-shaped frame S, secured by a bolt *w* to a cap *t*, which is provided with a fork or yoke engaging pin *v* on leg *b*. A washer *u*, slidably mounted on frame S, abuts against pin *x* on the car-body and serves to hold the spring against the cap *t* as the frame is reciprocated on pin *x* as a guide. As the jack-arm is swung from its extreme positions the spring *r* is compressed during the first half of the movement and the frame S is moved forward on pin *x*, and during the latter half of the arm's movement the spring expands and assists in moving the arm and finally retains it in its ultimate position with force sufficient to counterbalance the weight of the arm.

To prevent swinging of the jack-arm from its folded position during transportation, leg *a* is provided with a lug *f* on its rear side, which lug registers with a pair of lugs *y y* on the car-body, and a pin *z*, passed through the orifices in lugs *f* and *y*, serves to lock the jack-arm to the car-body.

Having thus described my invention, what I claim is—

1. A jack-arm for railway-cars, comprising a main leg pivoted to the car-body and swinging in a vertical plane, a lateral leg connected to said main leg, and an abutment on the car engaging said lateral leg in the outer position of the jack-arm to take up the lateral thrust of said arm.

2. A jack-arm for railway-cars, comprising a V-shaped member pivoted at one end to the car-body to swing in a vertical plane, and an abutment on the car engaging the other end of the V-shaped member to limit the outward movement of said arm and take up the lateral thrust thereof.

3. A jack-arm for railway-cars, comprising a main leg pivoted to the car-body and swinging in a vertical plane, a lateral leg connected to said main leg, an abutment on the car engaging said lateral leg in the outer position of the jack-arm to take up the lateral thrust of said arm, and a strut connected to the lower portion of the arm at one end and to the car-body at the other end to stiffen said arm in a direction normal to its swinging plane.

4. A jack-arm for railway-cars, comprising a V-shaped member pivoted at one end to the car-body to swing in a vertical plane, an abutment on the car engaging the other end of the V-shaped member to limit the outward movement of said arm and take up the lateral thrust thereof, and a strut connected at one end to the lower portion of the V-shaped member and pivoted to the car-body at the other end to stiffen said jack-arm in a direction normal to its swinging plane.

5. A jack-arm for railway-cars, comprising two angularly-disposed legs having a bearing-face at the point of juncture, a pivotal support on the car-body for the free end of one of said legs to permit said legs to swing in a vertical plane, and an abutment on the car in the path of movement of the free end of the other leg to limit the outward movement of said legs and take up the lateral thrust thereof.

6. A jack-arm for railway-cars, comprising a V-shaped member pivoted at one end to the car-body to swing in a vertical plane, an abutment on the car engaging the other end of said V-shaped member at the limit of its outer movement, and means connected to the latter-mentioned end of the V-shaped member and the car-body, respectively, to counterbalance the free end of the jack-arm and hold the jack-arm in its inner and outer positions.

7. A jack-arm for railway-cars, comprising

a V-shaped member pivoted at one end to the car-body to swing in a vertical plane, an abutment on the car engaging the other end of said V-shaped member at the limit of its outer movement, and a spring connected to the latter-mentioned end of the V-shaped member and the car-body, respectively, to counterbalance the free end of the jack-arm and hold the jack-arm in its inner and outer positions.

8. A jack-arm for railway-cars, comprising a V-shaped member pivoted at one end to the car-body to swing in a vertical plane, an abutment on the car engaging the other end of said V-shaped member at the limit of its outer movement, a spring connected to the latter-mentioned end of the V-shaped member and the car-body respectively, to counterbalance the free end of the jack-arm and hold the jack-arm in its inner and outer positions, and a strut connected at one end to the lower portion of the V-shaped member and pivoted to the car-body at the other end to stiffen said jack-arm in a direction normal to its swinging plane.

9. A jack-arm for railway-cars, comprising a V-shaped member pivoted by one leg to the car-body and swinging in a vertical plane, the other leg extending inside of the car-body, and means for limiting the outward movement of said jack-arm.

10. A jack-arm for railway-cars, comprising a V-shaped member pivoted by one leg to the car-body and swinging in a vertical plane, the other leg extending inside of the car-body, means for limiting the outward movement of said jack-arm, and means for locking the arm to the car-body in its inward position.

11. A jack-arm for railway-cars, comprising a V-shaped casting pivoted at one end to the car-body and swinging in a vertical plane, and a spring connected to the other end of the casting and to the car-body to counterbalance the free end of the jack-arm and hold the latter in its inner and outer positions.

12. A jack-arm for railway-cars, comprising a V-shaped casting pivoted at its outer end to the car-body and swinging in a vertical plane, an abutment on the car-body engaging the inner end of said casting to limit the outward movement of the arm, and a helical spring connected to the said inner end and to the car-body at a point in line with the middle position of the inner end and the pivot, to counterbalance the free end of the jack-arm.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL LIPPINCOTT GRISWOLD KNOX.

Witnesses:

PAUL C. BODE,

HARRY B. HAYDEN.