No. 819,445. PATENTED MAY 1, 1906.

C. A. MORRIS.

HOISTING AND TRANSFERRING APPARATUS.

APPLICATION FILED DEC. 19, 1904.

3 SHEETS—SHEET 1.

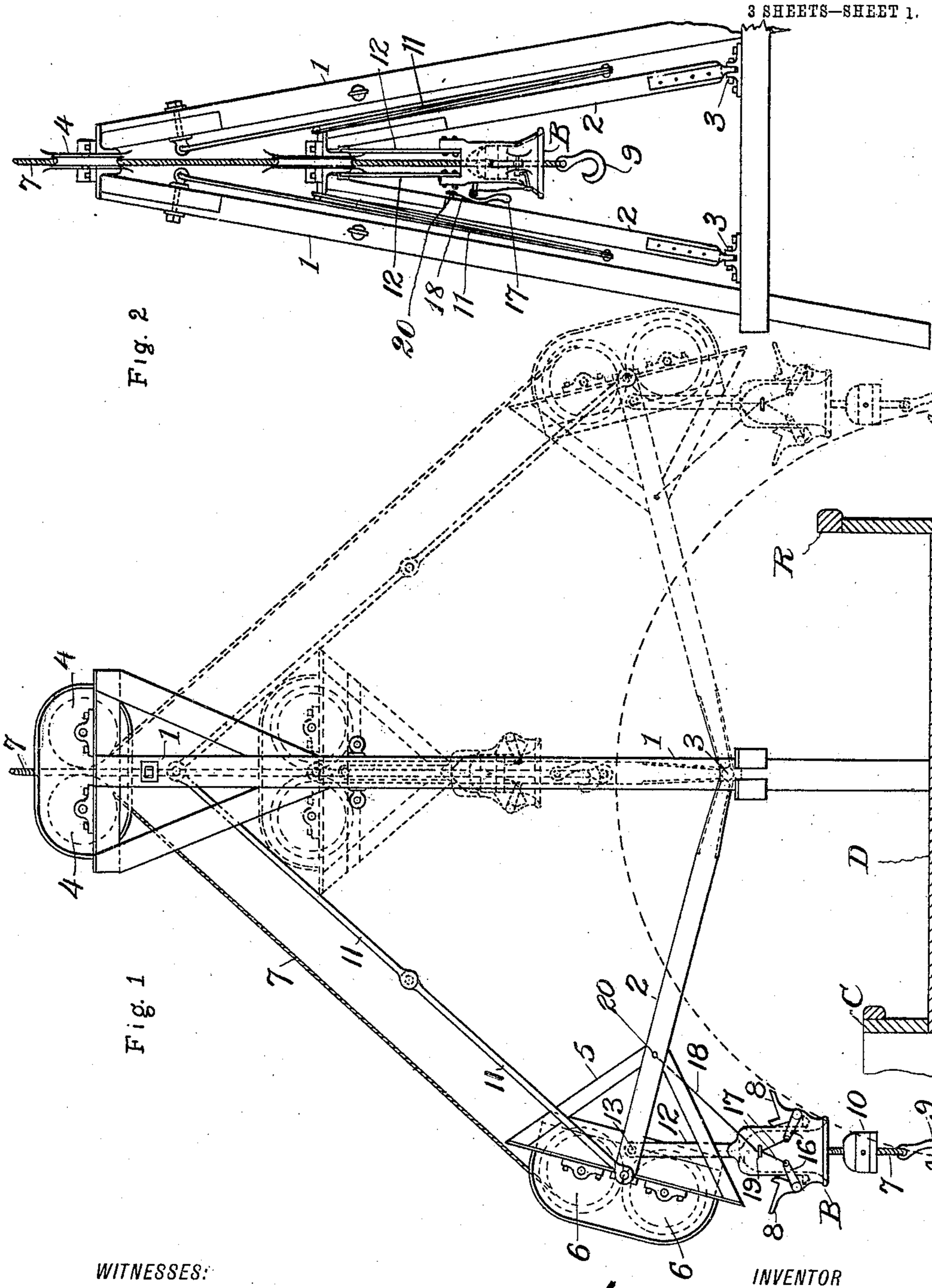

Fig. 2

Fig. 1

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3 SHEETS—SHEET 2.

Fig. 10

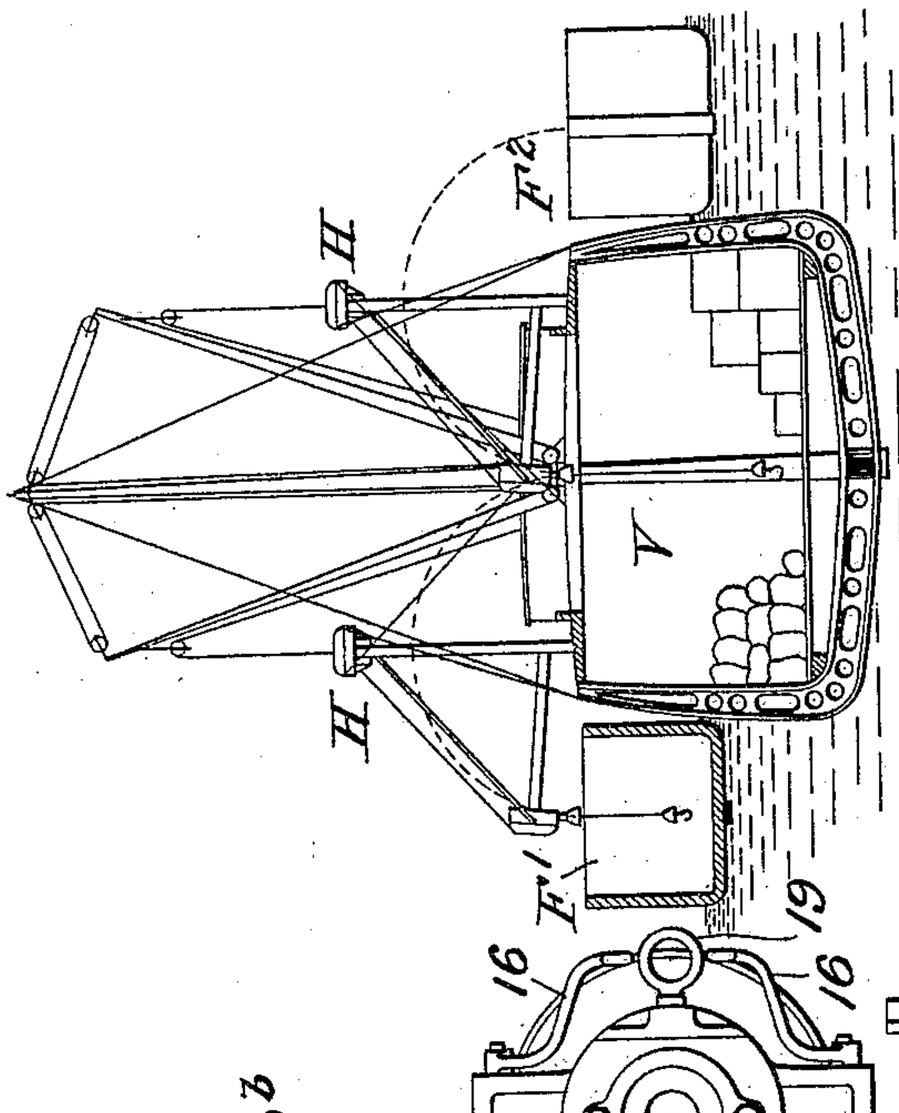
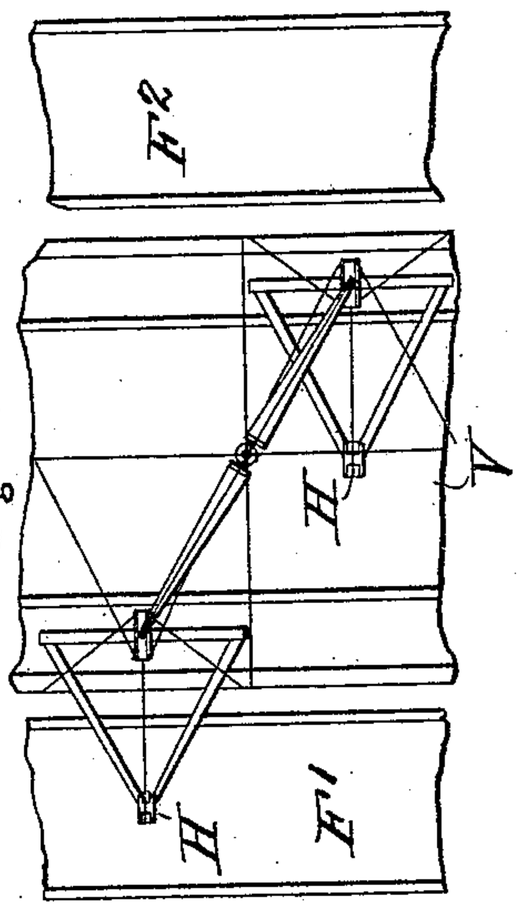


Fig. 11.



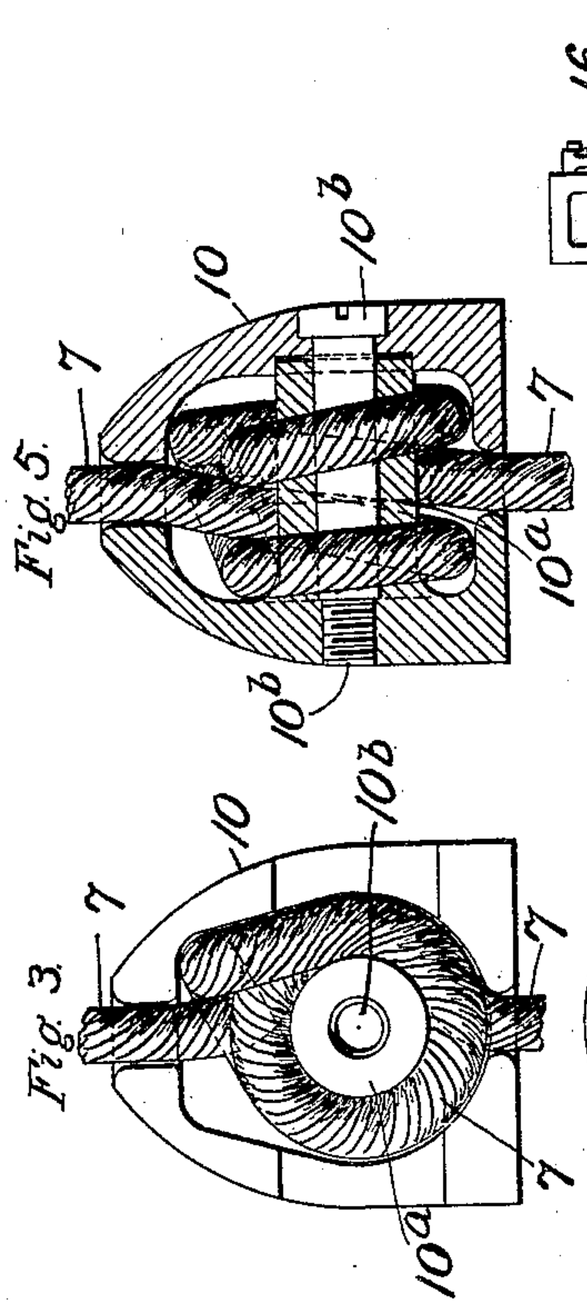


Fig. 5.

Fig. 3.

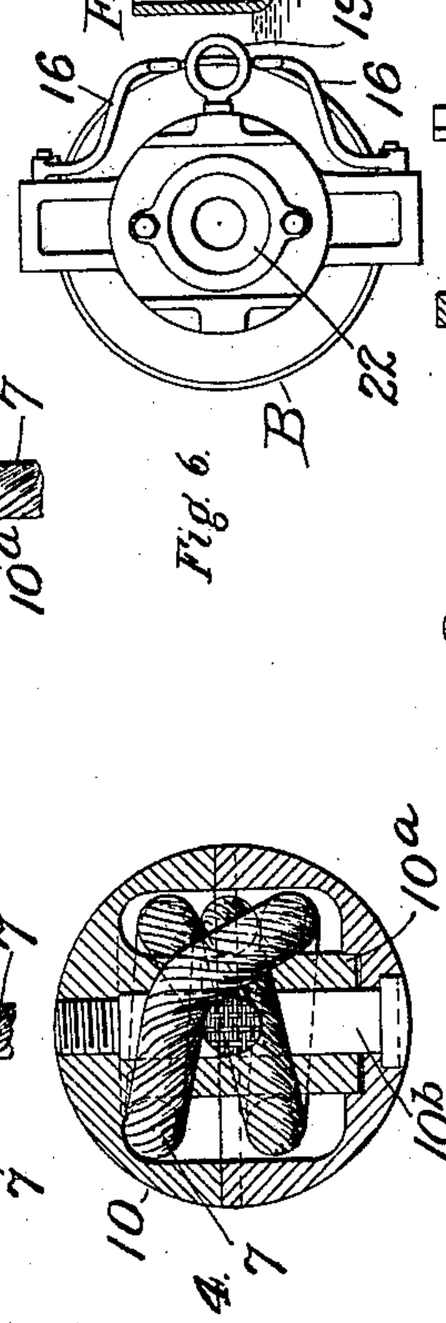


Fig. 6.

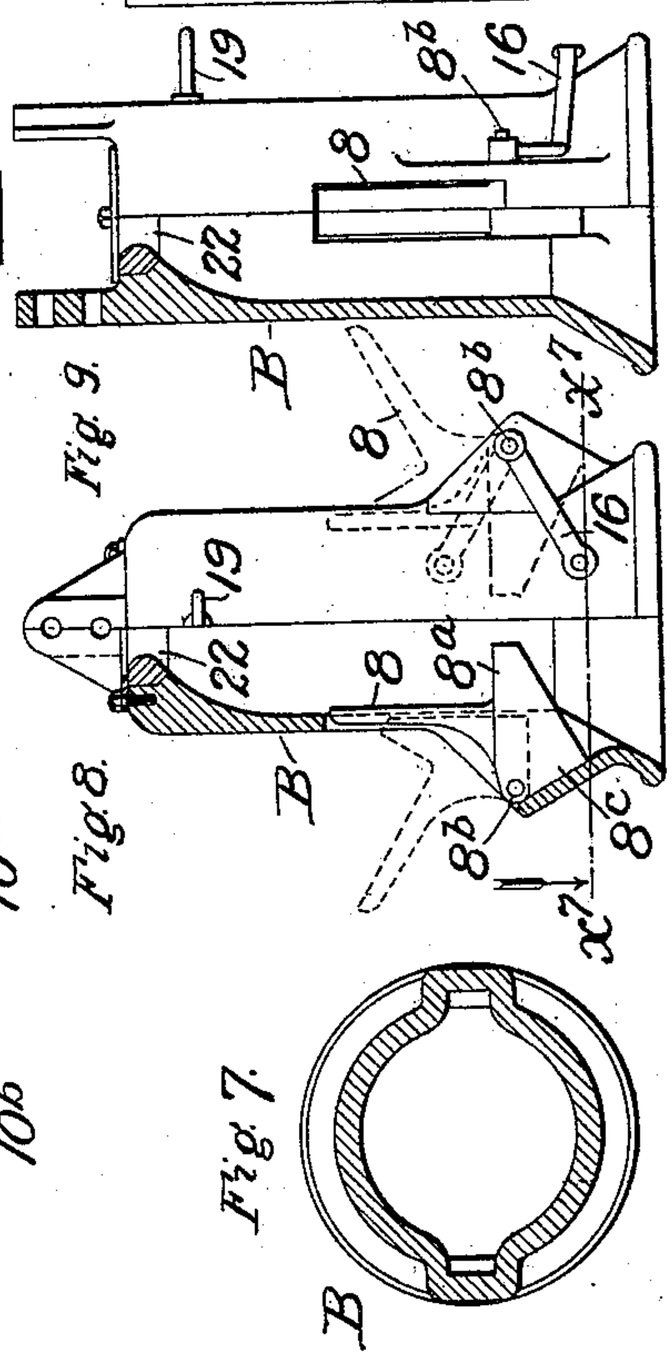


Fig. 9.

Fig. 8.

Fig. 4.

Fig. 7.

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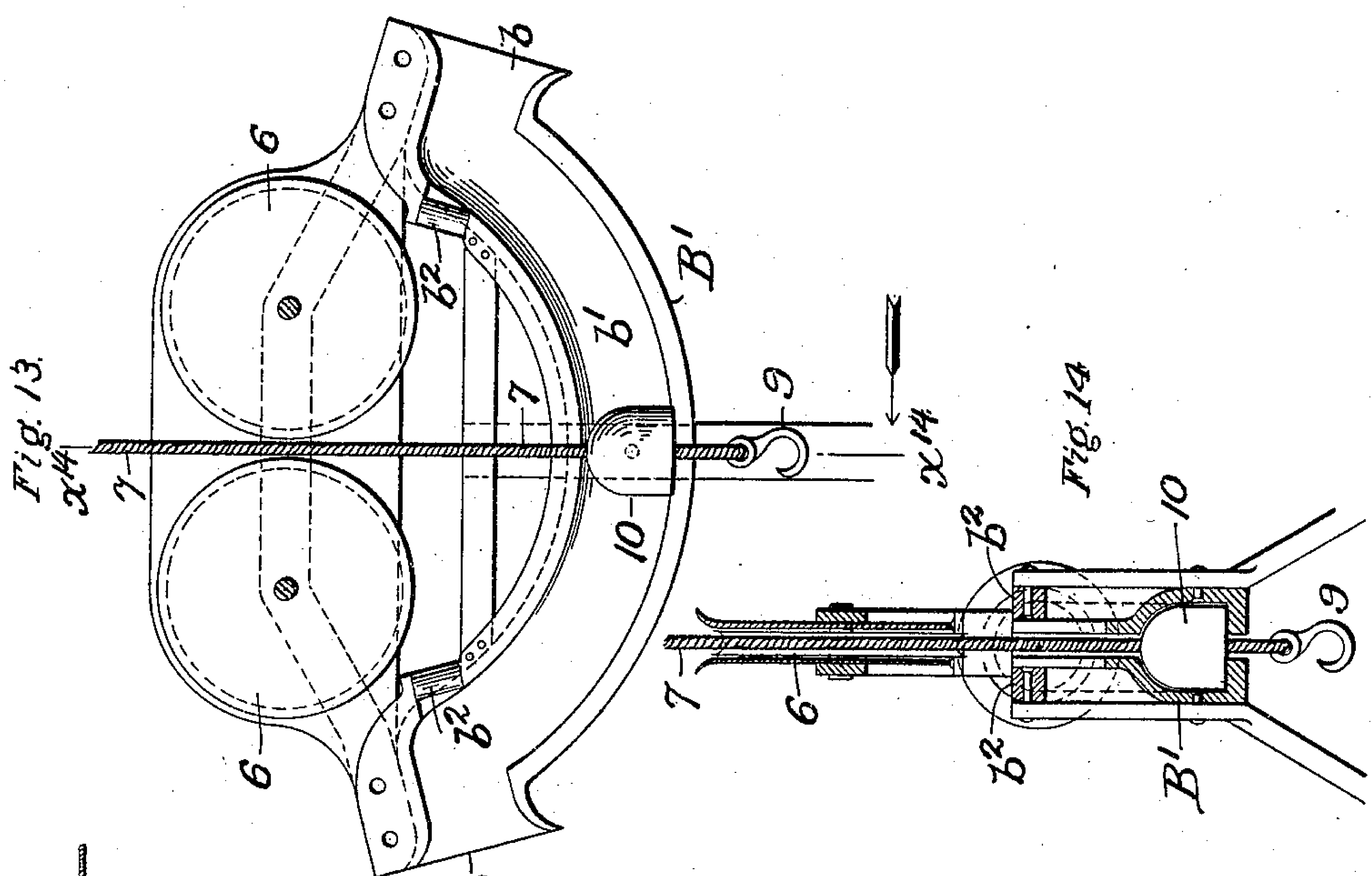
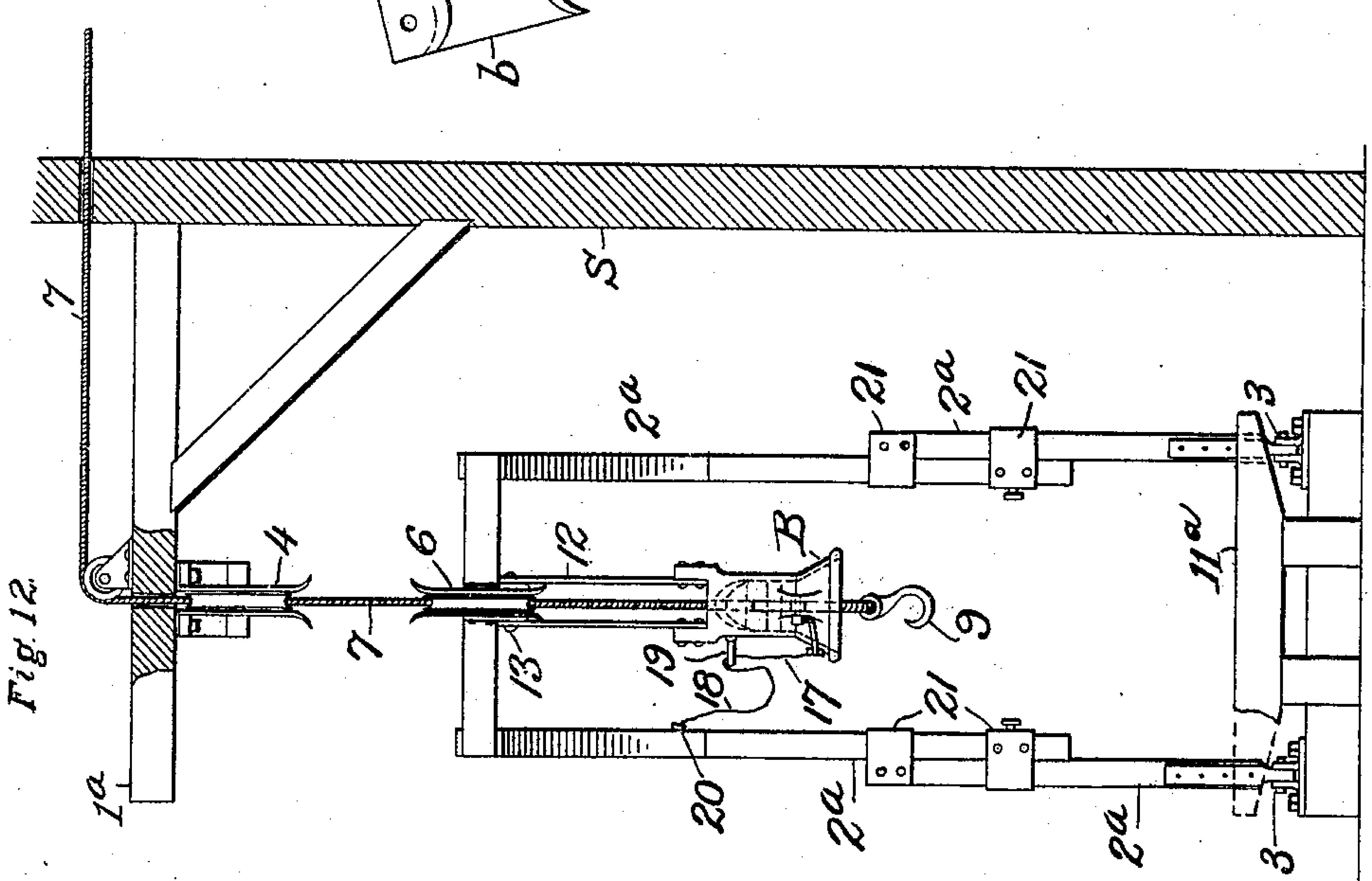
3 SHEETS—SHEET 3.





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HOISTING AND TRANSFERRING APPARATUS.

No. 819,445. Specification of Letters Patent. Patented May 1, 1906.

Application filed December 19, 1904. Serial No. 237,450.

To all whom it may concern:

Be it known that I, CHARLES A. MORRIS, a citizen of the United States, residing at Bloomfield, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Hoisting and Transferring Apparatus, of which the following is a specification.

This invention relates to the class of devices wherein a boom is employed for hoisting a load of any kind, transferring it to the desired point, and lowering it at the delivery-point.

The characteristic features of the present apparatus are these: First, the load is transferred to a distance about equal to twice the length of the boom; second, the boom swings in a vertical plane and may move through nearly one hundred and eighty degrees, the load being lifted through nearly ninety degrees and lowered through the same arc; third, the load, when lifted to the boom, is automatically locked to the boom by the swing of the latter, and is automatically released from the boom when the delivery-point is reached. These are the main characteristics. Other points will be hereinafter set forth and the novel features carefully defined in the claims.

In the accompanying drawings, which serve to illustrate embodiments of the invention, Figure 1 is a side elevation of the apparatus in one embodiment, and Fig. 2 is a front elevation of the same. Figs. 3, 4, and 5 are enlarged sectional details illustrating the preferred construction of the rope-stop on the hoisting-rope. Figs. 6, 7, 8, and 9 are details showing the construction of the locking-bell for securing the load to the boom. In these views Fig. 6 is a plan. Fig. 7 is a horizontal section at line x^7 in Fig. 8. Fig. 8 is a side elevation as seen from the right in Fig. 6, the left-hand side being in axial section; and Fig. 9 is a side elevation as seen from below in Fig. 6, the left-hand side being in axial section. Figs. 10 and 11 are views on a small scale illustrating the application of the invention to simultaneously loading and unloading a vessel. Fig. 12 is a view similar to Fig. 2, illustrating the employment of a boom which may be made longer or shorter at will; and Figs. 13 and 14 show a modification of the locking device, the latter being a section at line x^{14} in Fig. 13.

Referring now primarily to the first nine figures of the drawings, the invention will be described. In Figs. 1 and 2 the apparatus is represented as mounted on the deck D of a vessel, of which R is the rail at the side and C the coaming of the hatch. The hoisting-boom and its attachments are shown in full lines at the left and in dotted lines at the center and right. 1 designates an ordinary **A**-frame mounted on the deck of the vessel, and 2 the boom of the hoisting apparatus. For convenience and for structural strength this boom is here shown as composed of two members which diverge toward the hinging end of the boom and which are hinged at 3 to the transverse member of the frame 1, so that the boom may swing over through the **A**-frame from the nearly horizontal position at one side to a corresponding position on the other side, the movement being through an arc of nearly one hundred and eighty degrees. Above on the frame 1 are mounted two guide-sheaves 4, and in a frame 5 on the outer end of the boom 2 are mounted two guide-sheaves 6. Over these plays the hoisting-rope 7, which leads from a hoisting-engine (not shown) down between the sheaves 4 and then to the sheaves 6 and inwardly between them and down through a pendent locking-bell B, carried by the boom. This device B will be hereinafter minutely described. On the end of the rope 7 there may be attached a hook 9 to receive the load, and above it and attached to the hoisting-rope is a suitable rope-stop 10, adapted to enter the bell B when the freight or load is hoisted. The boom is connected at its outer end to the frame 1 above by means of links 11, which limit the descent of the boom.

Before describing further the details of the construction the operation of the apparatus may be explained. Let it be supposed that the apparatus is being employed for hoisting freight out of a vessel through a hatch thereof and delivering it to a float or pier alongside. The boom being in the position seen in Fig. 1, the hook 9 is lowered into the hold of the vessel by slackening or letting out the hoisting-rope, and said hook is made fast to a parcel of freight. The hoisting-engine is set in motion and the load lifted until the rope-stop 10 enters the hollow of the locking-bell B. The rope cannot now be taken up any farther without carrying the boom with it, and the latter lifts, turning about the hinges

3 at its heel. As the boom lifts the stop 10 is automatically locked in the bell B and the supporting-links 11 flex at their joints. As the boom nears the vertical position (seen in dotted lines) the momentum of the load carries the boom past the vertical line and the hoisting-rope is slackened to permit the boom and load to descend on the other side to the delivery-point. During the descent the load is almost entirely suspended from and carried by the boom. As the boom descends nearly to its terminal point on the delivery side the locking device is unfastened automatically, and this frees the load from the boom and allows it to be lowered to the float or pier. The reverse operation is precisely the same as that already described.

As the rope-stop 10 may have to be secured at various points on the hoisting-rope at different times, and as it is not desirable that the rope be cut or injured, a special construction of this stop is desirable, and this preferred construction is illustrated in Figs. 3, 4, and 5. The first-named figures are vertical axial sections of the rope-stop, taken in planes at right angles to each other, and Fig. 5 is a horizontal section at the securing-screw. The stop is of conical form and is formed of two interlocking hollow sections. One section carries a transverse tubular stem 10^a, to which the hoisting-rope 7 is secured by two half-hitches before the sections are put together. After they are put together they are secured by the transverse screw 10^b. This secures the rope firmly in the stop and without injury to it.

The locking-bell B (seen in detail in Figs. 6 to 9) has a hollow bell-like form and is suspended by a pair of strong arms 12 from a pivot at 13 in the boom. The hoisting-rope passes down through the axis of the bell, and when the load is hoisted the stop 10 moves up into the hollow of the bell until it can go no farther. To prevent the stop 10 from dropping back out of the bell when the hoisting-rope slackens, and to throw the weight of the load on the boom, so that the latter cannot fly up, the bell B is slotted at opposite sides and is provided with two opposite locking-levers 8, playing through these slots, and having arms 8^a, which when the levers are in their normal positions extend into the bell under or below the rope-stop 10, as indicated in full lines in Fig. 8. The levers 8 are fulcrumed at 8^b, and when in the position seen in Fig. 8 the heel 8^c of the lever bears on a part of the bell, so as to provide a firm support. The position of the levers 8 when the arms 8^a thereof are withdrawn from under the rope-stop is indicated in dotted lines in Fig. 8. In order to hold the said levers in their inoperative positions when the boom is in its terminal positions, each lever 8 is provided with an operating-arm 16, and these arms are connected by a bridle 17 to a cord 18, which extends up through a guide 19 on the bell to a point 20 on the boom, where it is secured. It will be understood that this point 20 is so placed that when the boom is in its two terminal positions the line or cord 18 will be so taken up that the arms 16 are lifted and the levers 8 rocked outwardly into their inoperative positions; but as the boom rises to a less angle with the vertical and the bell B remains suspended vertically this line 18 tends to slacken and allows the levers 8 to fall into their operative positions. When the boom descends toward the delivery-point, the line 18 is again taken up and the levers 8 shifted to their inoperative positions. To allow the levers to be so shifted, however, the stop 10 must rise in the bell high enough to permit the levers to move under it, and while this is being effected the load must be transferred to the hoisting-rope.

In Figs. 10 and 11 the vessel V is furnished with two hoisting devices H. One of these may be unloading a float F′ and the other discharging freight onto a float F^2.

The **A**-frame 1 is only a convenience for providing a support for the two guide pulleys or sheaves 4. It will be obvious that these may be mounted on any form of beam or support overhead. It will also be obvious that the boom 2 may be made telescopic or extensible, so as to transfer the load to a greater or less distance within limits. In Fig. 12, for example, the **A**-frame is dispensed with and the guide-sheaves 4 supported by a beam 1^a, projecting out from a structure S of any kind. The two elements of the boom 2^a are disposed parallel and are made telescopic or adjustable as to length by constructing each element of two overlapping parts, which slide, in adjusting, through rings or collars 21. There are many ways by which this telescoping of the boom members may be effected. The descent of the boom is limited by a stop 11^a.

One means of automatically locking and unlocking the rope-stop on the hoisting-rope has been shown. In Figs. 13 and 14 another means of effecting this is illustrated. In these Fig. 13 is a sectional view, and Fig. 14 is a cross-section. The curved receiver B′ is carried by the boom 2 and has an entrance *b* at each end which receives the rope-stop 10. As the boom shifts its angle with the vertical the stop 10 moves into the curved channel *b*′ in the receiver and finally emerges at the other end as the load reaches the delivery-point. The receiver is made in two sections, between which the hoisting-rope 7 plays as the load is transferred. Fig. 13 shows the position of the parts when the boom is vertical.

It may be explained that if the sheaves 4 are located very high with respect to the length of the boom the latter may descend nearly to a horizontal position. It is desirable that the hoisting-rope 7 shall lead away

from the boom at an angle approaching near a right angle when the boom is receiving and discharging its load. In limiting the descent of the boom the links 11 perform the same function as the stop 11^a in Fig. 12. Any suitable limiting means for this purpose may be employed.

In order to prevent the chafing of the hoisting-rope where it plays through the aperture in the top of the bell B, the latter is or may be provided with a ring 22 of hard wood, as seen in Fig. 8, secured removably by any suitable means. The same end is accomplished by rollers b^2 in the curved receiver B′.

It has been stated that the load lifted by the hoisting-rope is automatically locked to the boom when the latter is lifted; but it will be understood that strictly speaking it is the rope which is locked to the boom, and this will obviously lock the load to the boom when there is a load on the rope; but the rope will be locked to the boom on the return of the latter without a load. It is important that the boom shall be coupled or locked to the hoisting-rope during all but the terminal parts of its movement.

Having thus described my invention, I claim—

1. A hoisting and transferring apparatus, comprising a fixed, elevated guide for the hoisting-rope, the said rope, a boom hinged at a point directly below the said guide and adapted to swing in a vertical plane from one side to the other of a vertical line passing through the said hinging-point of the boom, and automatic means, carried by the boom, for locking the rope thereto when the boom rises and freeing it when the boom descends, said means comprising a single stop on the rope, and means carried by the boom for engaging the stop above and below while the boom is swinging over.

2. A hoisting and transferring apparatus, comprising a fixed, elevated guide for the hoisting-rope, the said rope, a boom hinged at a point directly below the said guide and adapted to swing in a vertical plane from one side to the other of a vertical line passing through the said hinging-point of the boom, the latter being adjustable as to length, and automatic means for locking the rope to the boom when the latter rises and freeing it when the boom descends.

3. A hoisting and transferring apparatus, comprising a fixed, elevated guide for the hoisting-rope, the said rope, a boom hinged at a point directly below the said guide and adapted to swing in a vertical plane from one side to the other of a vertical line passing through the said hinging-point of the boom, means for limiting the descent of the boom at each side of said line, and automatic means, carried by the boom, for locking the rope to the latter as it is lifted, said means comprising a single stop on the rope, and means carried by the boom for engaging the stop above and below while the boom is swinging over.

4. An apparatus for the purpose specified, having elevated guide-sheaves for the hoisting-rope, the said rope, a boom hinged at its foot beneath said guide-sheaves and adapted to swing over from side to side through an arc exceeding ninety degrees, means for limiting at both sides the descent of the boom, guide-sheaves on the boom between which the hoisting-rope plays, and automatic means for locking the rope to the boom when the latter is lifted thereby, said means comprising a bell suspended from the boom and provided with a restricted aperture in its crown for the hoisting-rope, a single stop on the rope, to enter said bell, and stop devices on the bell to take under said rope-stop while the boom is swinging over.

5. An apparatus for the purpose specified, having an elevated guide for the hoisting-rope, the said rope, a boom hinged at its foot below said guide and adapted to swing over from side to side through an arc exceeding ninety degrees, said boom being made up of members with a space or way between them, a guide for the hoisting-rope, carried by said boom, a locking-bell B, suspended between the members of the boom and open for the passage of the hoisting-rope, a stop on the hoisting-rope adapted to be drawn up into said bell, levers 8 on the bell and provided with shoulders to take under the said rope-stop, and means for displacing said levers when the boom descends to its lowest positions.

6. An apparatus for the purpose specified, having a hoisting-rope, and a stop 10 secured to said rope, said stop being hollow, in two sections, with a transverse stem 10^a for the attachment of the rope, and a securing-screw 10^b, which extends through said stem and draws the two sections of the stop together.

7. An apparatus for the purpose specified, having a boom, a guide on the boom for the hoisting-rope, the said rope, a bell B through which the rope plays in hoisting the load, arms 12, which suspend the bell from the boom, a stop on the hoisting-rope of such size as to enter the bell, levers mounted in slots in the bell and having shoulders which extend into the bell under said stop, arms 16 for displacing said levers, a guide 19 on the bell, a bridle connected with the arms 16, and a cord, connected to said bridle and to the boom, and playing through said guide, for operating the levers to displace them.

In witness whereof I have hereunto signed my name this 15th day of December, 1904, in the presence of two subscribing witnesses.

CHARLES A. MORRIS.

Witnesses:
HENRY CONNETT,
WILLIAM J. FIRTH.