(No Model.) 3 Sheets—Sheet 1.

C. W. MACLEAN.

HOISTING DEVICE.

No. 465,869. Patented Dec. 29, 1891.

Fig. 1.

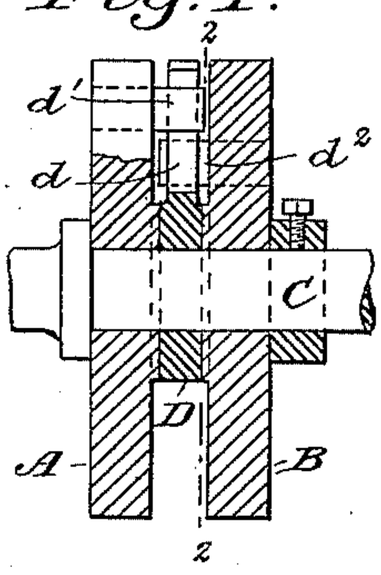


Fig. 2.

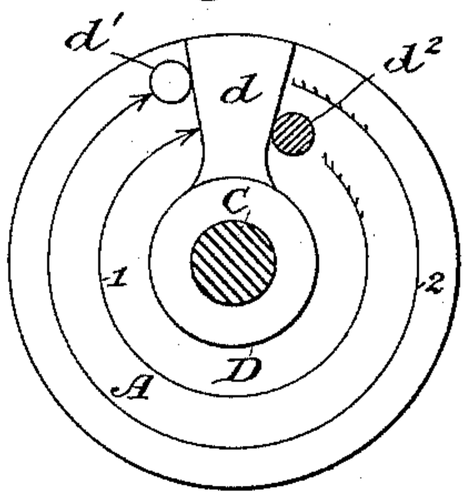


Fig. 3.

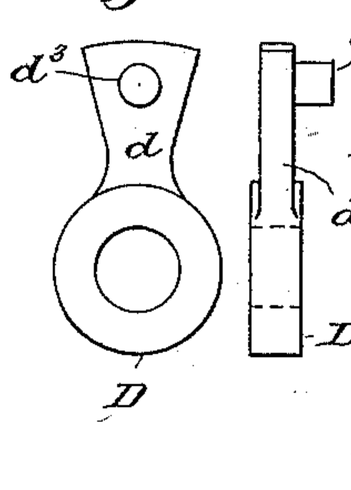


Fig. 4.

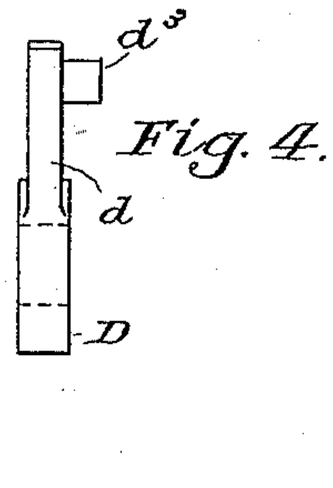


Fig. 5.

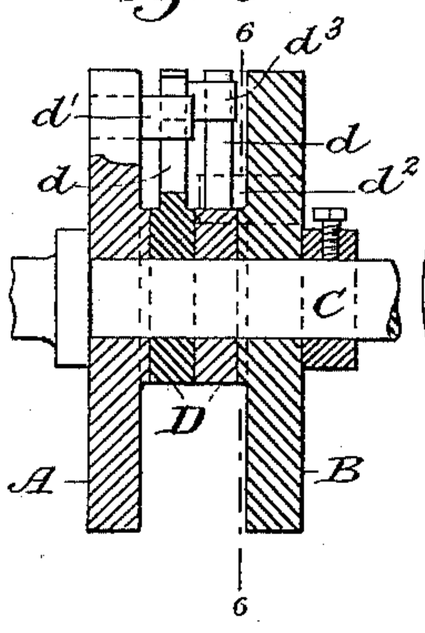


Fig. 6.

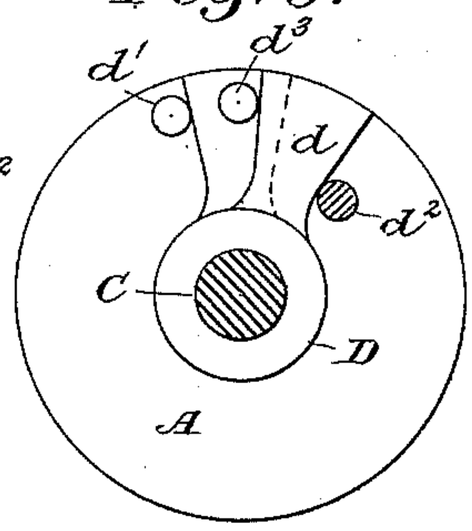


Fig. 22.

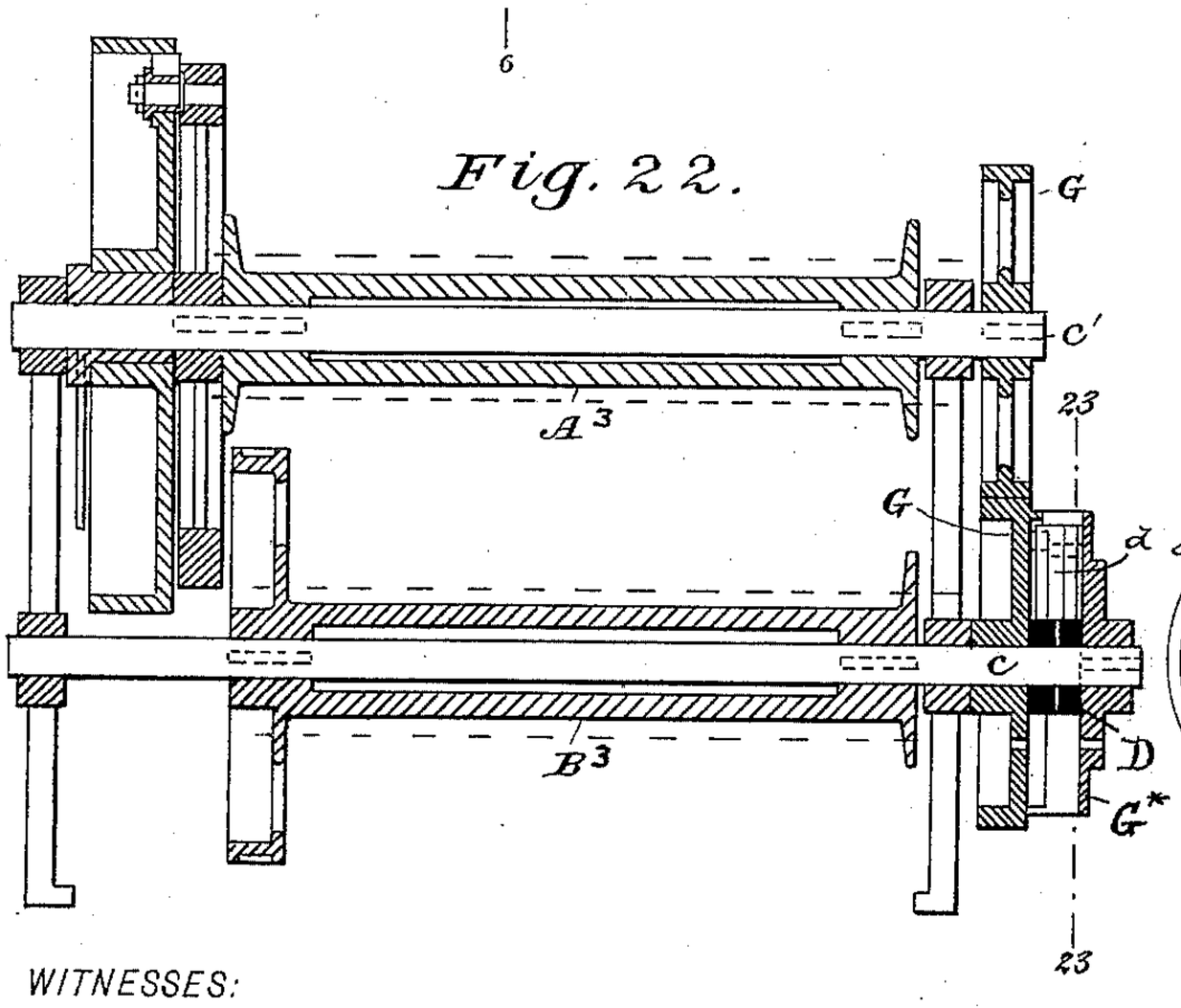
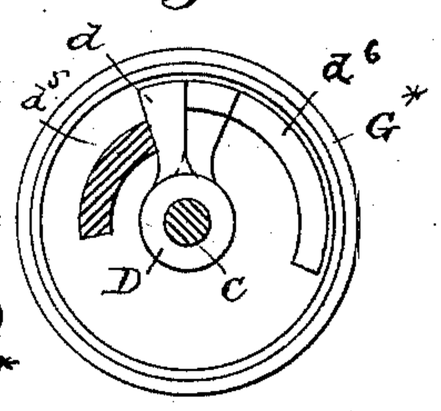


Fig. 23.



WITNESSES:

E. B. Bolton

E. K. Sturtevant

INVENTOR

Charles William Maclean

BY Richards & G

ATTORNEYS

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HOISTING DEVICE.

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Fig. 7.

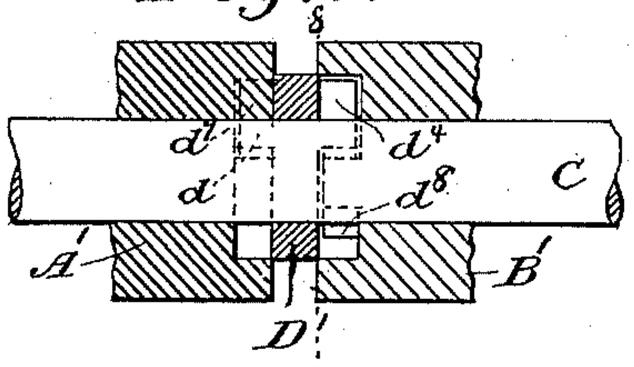


Fig. 8.

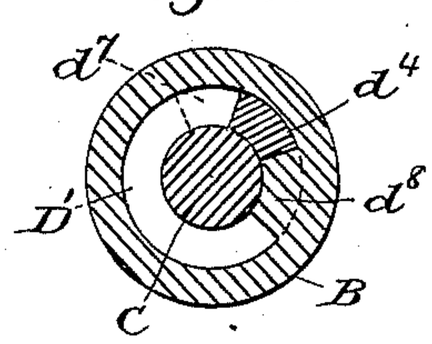


Fig. 9.

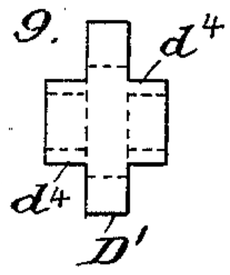


Fig. 10.

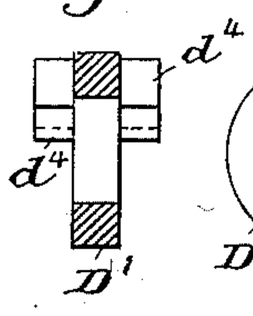


Fig. 11.

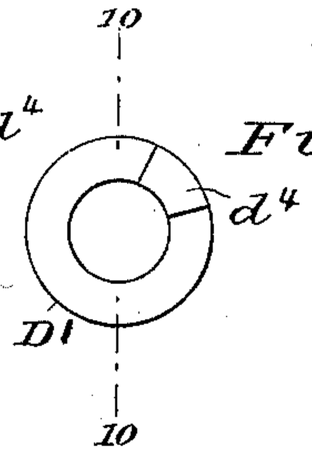


Fig. 12.

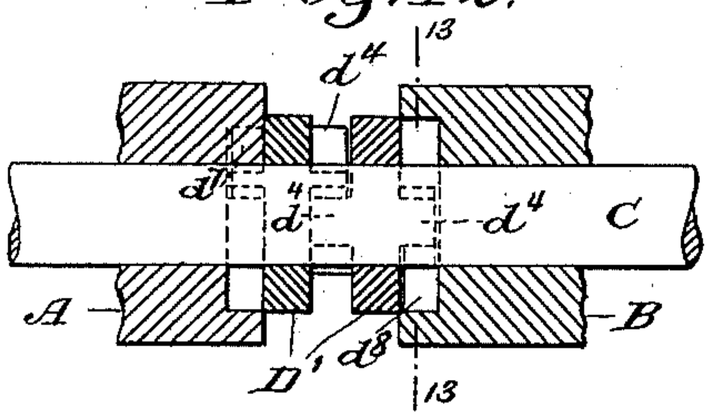


Fig. 13.

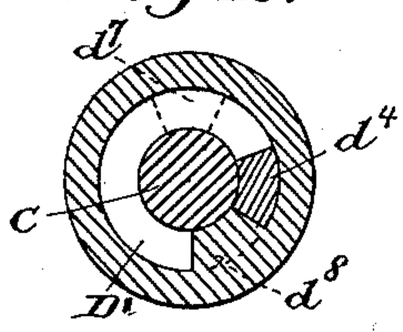


Fig. 16.

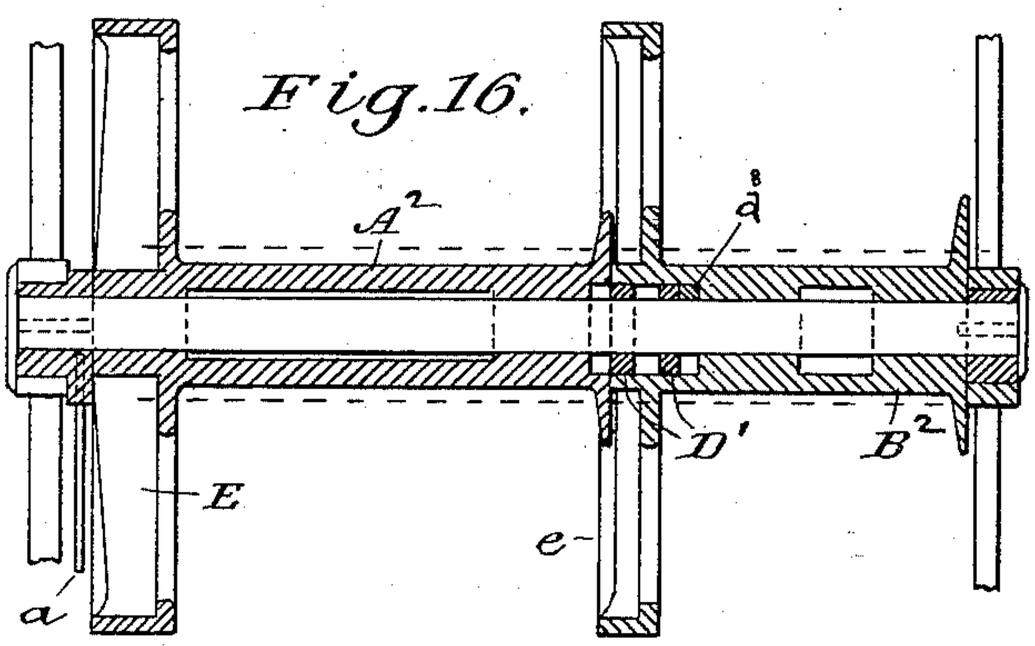
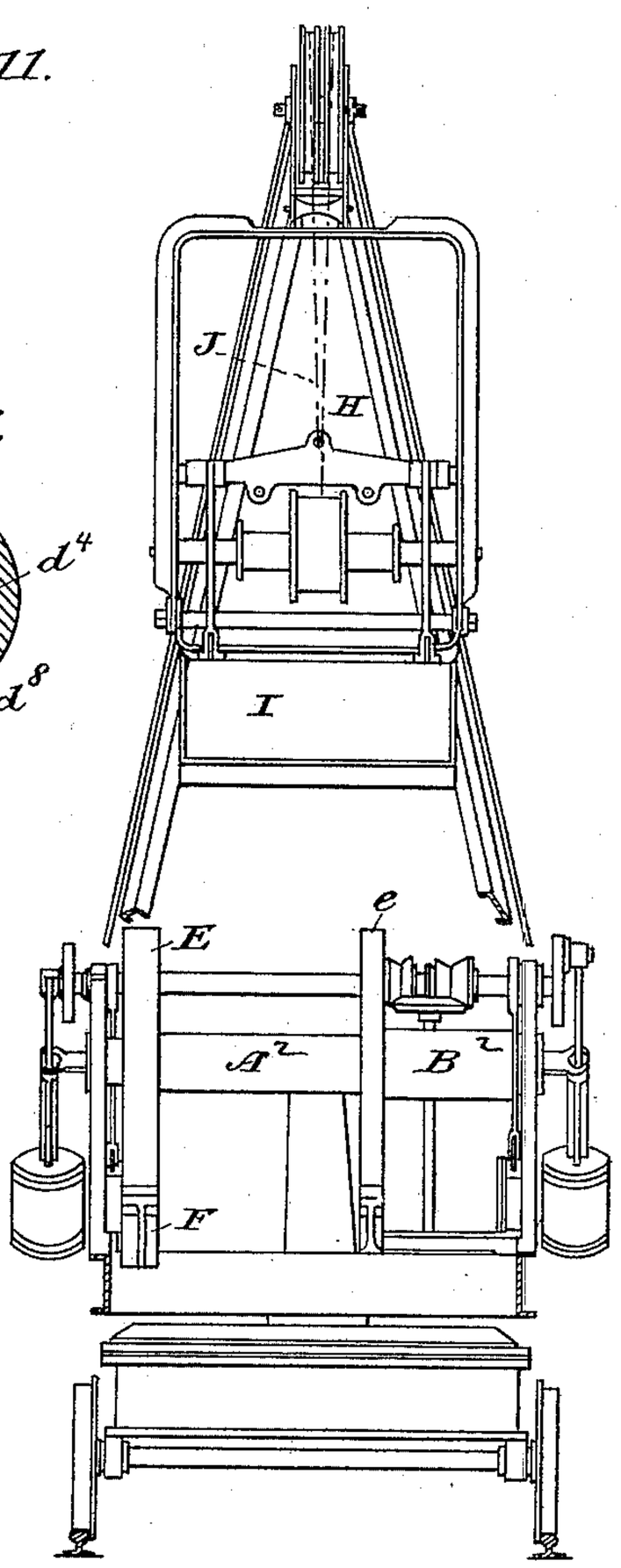


Fig. 21.



WITNESSES:

E. B. Bolton

E. K. Sturtevant

INVENTOR

Charles William Maclean

BY Richards & Co

ATTORNEYS

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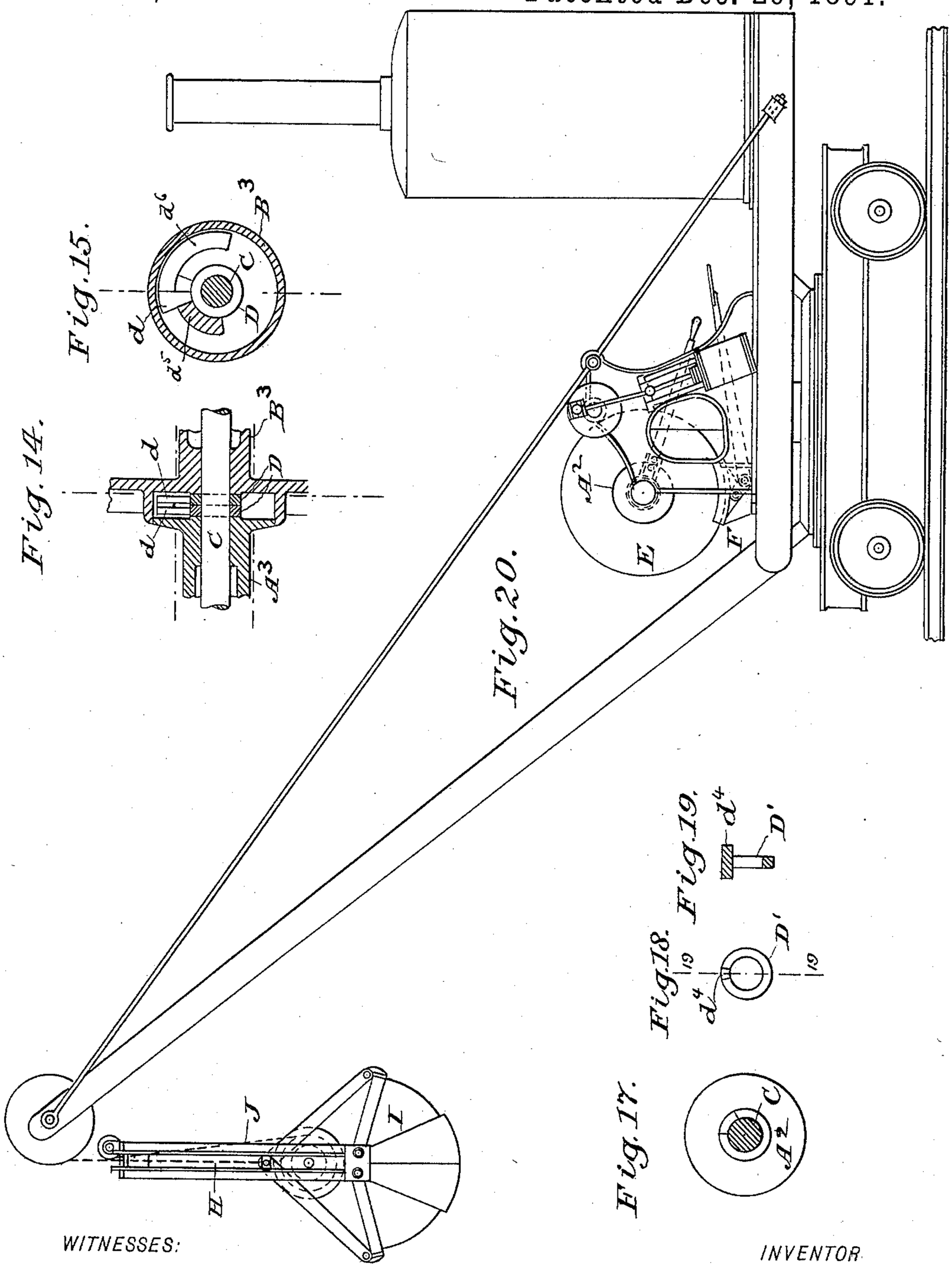

Fig. 20.

Fig. 15.

Fig. 14.

Fig. 18. Fig. 19.

Fig. 17.

WITNESSES:

E. B. Bolton

E. K. Stuntevant.

INVENTOR

Charles William Maclean

BY Richards & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES WILLIAM MACLEAN, OF MELBOURNE, VICTORIA.

HOISTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 465,869, dated December 29, 1891.

Application filed January 9, 1891. Serial No. 377,267. (No model.) Patented in Victoria April 26, 1890, No. 7,673; in New South Wales April 29, 1890, No. 2,166.

To all whom it may concern:

Be it known that I, CHARLES WILLIAM MACLEAN, engineer, a subject of the Queen of Great Britain, residing at 276 Walsh Street, South Yarra, Melbourne, in the British Colony of Victoria, have invented Improved Hoisting Devices, (for which I have obtained Letters Patent in the following British colonies, viz: Victoria, patent dated April 26, 1890, No. 7,673, and New South Wales, patent dated April 29, 1890, No. 2,166,) of which the following is a specification.

This invention has been devised primarily for the purpose of dispensing with the usual counterbalance-weight employed in taking up the slack of the opening-chain of grab-cranes.

It consists in certain hereinafter-described means whereby the main hoisting-drum and the opening-drum used for operating the grab may be connected to each other during the greater part of their travel and yet be disconnected whenever it becomes desirable for one of said drums to continue to rotate for any predetermined number of revolutions for the purpose of either slackening out or winding up either or both of the chains used for hoisting and opening the grab.

My invention is, however, equally applicable for connecting any rotating objects in the same axial line which are required to revolve simultaneously at times, and at times required to revolve independently of each other for a limited period—say one or more revolutions or a part of a revolution.

My invention consists, essentially, in the employment of one or more rings or collars fitting loosely upon the shaft upon which the two objects to be coupled are mounted, and each provided with a stop, shoulder, or abutment—such, for instance, as a radially-projecting arm or lug or a pair of teeth projecting from its faces and adapted to engage with other teeth or projections on the adjacent faces of the two rotating objects, as will be well understood from the following description, reference being had to my drawings, wherein—

Figures 1 to 15 are views illustrating various modifications of my invention. Figs. 16 to 21 are views illustrating the application of my invention to the hoisting and opening gear of a grab-crane. Of these different views Fig. 1 is a central vertical section of one of the simplest forms of my invention. Fig. 2 is a vertical transverse section on the line 2 2 in Fig. 1; and Figs. 3 and 4 are respectively a side elevation and an edge view of one of the essential features of my invention—that is, of a ring or collar adapted to fit loosely on the shaft or axle or on one of the shafts or axles upon which the two rotating objects to be coupled are mounted. This collar is provided with a radially-projecting arm or lug.

Similar letters of reference indicate the same or corresponding parts in all the figures.

A B represent two disks, one of which A may be called the "driver" and the other B the "driven" disk. These are mounted upon a shaft or axle C, and are supposed to be either connected with or else to form part of two rotating objects which it is desired to connect together in the manner above described—that is, so that after rotating together for a time the disk B may be permitted to continue its rotation for a part or the whole of a revolution or for any required number of revolutions, while the driving-disk A may be stopped; or, vice versa, the driven disk B may be stopped and the driving-disk A may be rotated for one or more revolutions or a part of a revolution in a reverse direction. Between these two disks A B and upon the same shaft C is loosely mounted a ring or collar D, having a radially-projecting arm or lug *d*, adapted to be engaged by suitable stops, shoulders, or abutments on said disks, such stops consisting in this construction of pins or studs *d'* and d^2, projecting from the adjacent faces of the said disks A B to serve as a connection between them, so that if, for instance, the one marked A is caused to revolve in a certain direction it will carry the other one B with it. If it is desired to stop the disk A at any point, the other one will be free to continue its motion for nearly two revolutions—that is, until the pin d^2 has traveled round once, as shown by the arrow 1 in Fig. 2, and engaged with the arm or lug *d*, and then carried said arm round until the latter engages with the pin *d'*, as indicated by the arrow 2 in said figure, whereby of course any further movement will be pre-

vented unless the disk A is again released. Vice versa, the disk A may be reversed at any time under the above conditions—that is, until the pin d' has carried the arm d round from one to the other side of the tooth d^2. If another collar D and arm or lug d having an outwardly-projecting tooth or projection d^3 on its face, as illustrated in Figs. 3 and 4, are mounted upon the spindle C alongside the first-mentioned arm d, as illustrated in Figs. 5 and 6, then the two disks A and B will each be free to rotate independently during nearly three revolutions. Still greater freedom of independent rotation may be obtained by mounting additional toothed arms d between the disks A and B, as will be well understood, the only proviso being that the pin or projection d^2 on the disk B must be free to pass the pin or projection d^3 on the next arm but one, as illustrated in Figs. 5 and 6.

Another form of my invention is shown in Figs. 7 and 8. This modification has been devised for use in situations where it is desirable to keep the diameter of the coupling appliances or adjustable connections as small as possible. Of these two views Fig. 7 is a vertical central longitudinal section of the adjacent ends of two rotating objects provided with my improved means for adjustably connecting them, while Fig. 8 is a vertical transverse section on line 8 8, Fig. 7. In these two figures A′ B′ represent the adjacent ends of a pair of rotating barrels mounted upon a common shaft or axle C and formed each with an annular recess in its end, in each of which recesses is provided a projection or tooth d^7 d^8, which is adapted to be engaged by the teeth or projections d^4 on a loosely-fitting ring or collar D′, which is mounted upon the shaft C between the two adjacent ends of the barrels A′ B′, as clearly illustrated in said Figs. 7 and 8. The construction of this interposed toothed ring or collar D′ is clearly illustrated in Figs. 9, 10, and 11, and its operation is precisely the same as that of the arm or lug d in Figs. 1 and 2. If it is desired to increase the independent freedom of rotation of the two barrels A′ B′, a second toothed ring D′ may be interposed between them, as illustrated in Figs. 12 and 13, in order to obtain a similar result to that obtained by interposing the duplicate ring D in Figs. 5 and 6, and of course the number of such interposed toothed rings may be increased to any desired extent according to the number of revolutions during which it is desired to leave the two rotating objects free of each other.

The arrangement illustrated in Figs. 14 and 15 is substantially the same as that illustrated in Figs. 5 and 6, except that projecting stops d^5 d^6 are used instead of pins d' d^2. This arrangement will be understood from the letters of reference without further description.

Having now described and ascertained the nature of my invention, I will proceed, by way of example, to describe its application to the operating mechanism of an ordinary grab-crane, whereby its application to other descriptions of mechanism of a similar character will be well understood.

Fig. 16 is a longitudinal section of a pair of barrels or drums such as are commonly used for hoisting and opening grabs and to which my invention has been applied. Fig. 17 is an end elevation of one of such barrels or drums. Fig. 18 is a front elevation of the toothed ring employed in adjustably connecting such barrels or drums according to my invention. Fig. 19 is a vertical transverse section on line 19 19, Fig. 18.

Figs. 20 and 21 are respectively a side elevation and a front elevation of a grab-crane having a bucket operated by a pair of barrels adjustably connected by my invention.

Fig. 22 is a longitudinal section showing the way in which my invention may be applied for connecting two parallel barrels, Fig. 23 being a transverse section on the line 23 23.

A^2 represents the barrel for closing and hoisting the grab, E a driving-wheel which can either be put into gear with some source of motive power or can be stopped and held by means of a suitably-arranged brake F, as in Fig. 20, while B^2 represents the grab-opening barrel which is also provided with a brake-wheel e, whereby its rotation may be stopped at will. According to my invention I construct the adjacent ends of these two barrels A^2 and B^2 as illustrated in Figs. 16 and 17—that is, with recesses provided each with a tooth or projection d^7 or d^8, as hereinbefore described with reference to Figs. 7 and 8. Within these recessed ends of said barrels one or more toothed rings D′ are loosely mounted upon the shaft C in such a manner that their teeth or projections d^4 will be caused to engage with the teeth d^7 d^8 in the ends of the barrels A^2 and B^2 when one of them is rotated, as has hereinbefore been described with reference to said Figs. 7 and 8.

When employing my invention, the end of the grab-opening chain H is made fast to the barrel B^2 instead of being led over pulleys and sheaves and having a counterbalance-weight upon its end, as has hitherto usually been the case.

The operation of a grab-crane, such as is illustrated in Fig. 20, when provided with my improved means for adjustably connecting its closing and hoisting and opening barrels is as follows: Assuming the grab I to have been closed and to be in the act of being hoisted by the chain or rope J being wound upon the barrel A^2, then the grab-opening chain H will be in a slack condition and will be wound upon the barrel B^2 at the same rate as said hoisting-chain J is wound upon its barrel, because both barrels are during this part of the operation connected through the medium of the stops and shoulders and the arms hereinbefore described—that is, the hoisting-barrel A is driving the opening-barrel B. When it is desired to open the grab,

the barrel B is stopped by means of a brake acting upon its brake-wheel, and the barrel A is released from its driving-gear and is allowed to run backward, thus transferring the weight of the grab onto the opening-chain and so discharging the contents of the grab. In order to lower the grab, the brake acting upon the wheel *e* of the barrel B is slightly released, thus lowering the open grab and allowing the closing-chain J to run out freely from off the barrel A. The grab having dropped onto the spoil the brake-wheel *e* is released, thus leaving the barrel B free. The barrel A is then caused to rotate and winds up the closing and hoisting chain J, the barrel B meanwhile being disconnected from the barrel A until the grab is closed, when it also begins to rotate with the barrel A and winds in the opening-chain H as the grab rises.

In Fig. 22 the drums A^3 and B^3 instead of being carried by the same shaft, are keyed on two shafts *c* and *c'*, arranged parallel with one another. These shafts are connected by two spur-wheels G and G'. The spur-wheel G is mounted to rotate on the shaft *c*, the spur-wheel G' being keyed to the shaft *c'*. The independent rotation of the spur-wheel G on the shaft *c* is controlled by collars D, furnished with arms *d*, engaging with stops d^5 and d^6, Fig. 23, in the manner previously described. The stop d^6 is formed on a flanged disk G*, keyed on the shaft *c*. By these means the driving-shaft *c* can rotate for nearly three revolutions, while the driven shaft *c'* remains stationary, or vice versa.

I wish it to be understood that the above description of the application of my invention to mechanism for operating a grab is given merely by way of example, it being obvious that it might be applied in many different ways, while, as hereinbefore stated, it is equally applicable to all classes of machinery wherein two rotating objects in the same axial line are required to be adjustably connected, as hereinbefore described.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The combination, with the rotary parts A and B, carrying pins or stops d' and d^2, of rings or collars D, each furnished with an arm *d*, and one of said arms being provided with a pin d^5, substantially as and for the purposes set forth.

2. In a hoisting device, the combination, with the rotary parts A and B, furnished with stops, of a plurality of loosely-fitting rings D, having stops, substantially as and for the purposes set forth.

CHARLES WILLIAM MACLEAN.

Witnesses:

WALTER SMYTHE BAYSTON,
WALTER CHARLES HART.