

No. 676,075.

Patented June 11, 1901.

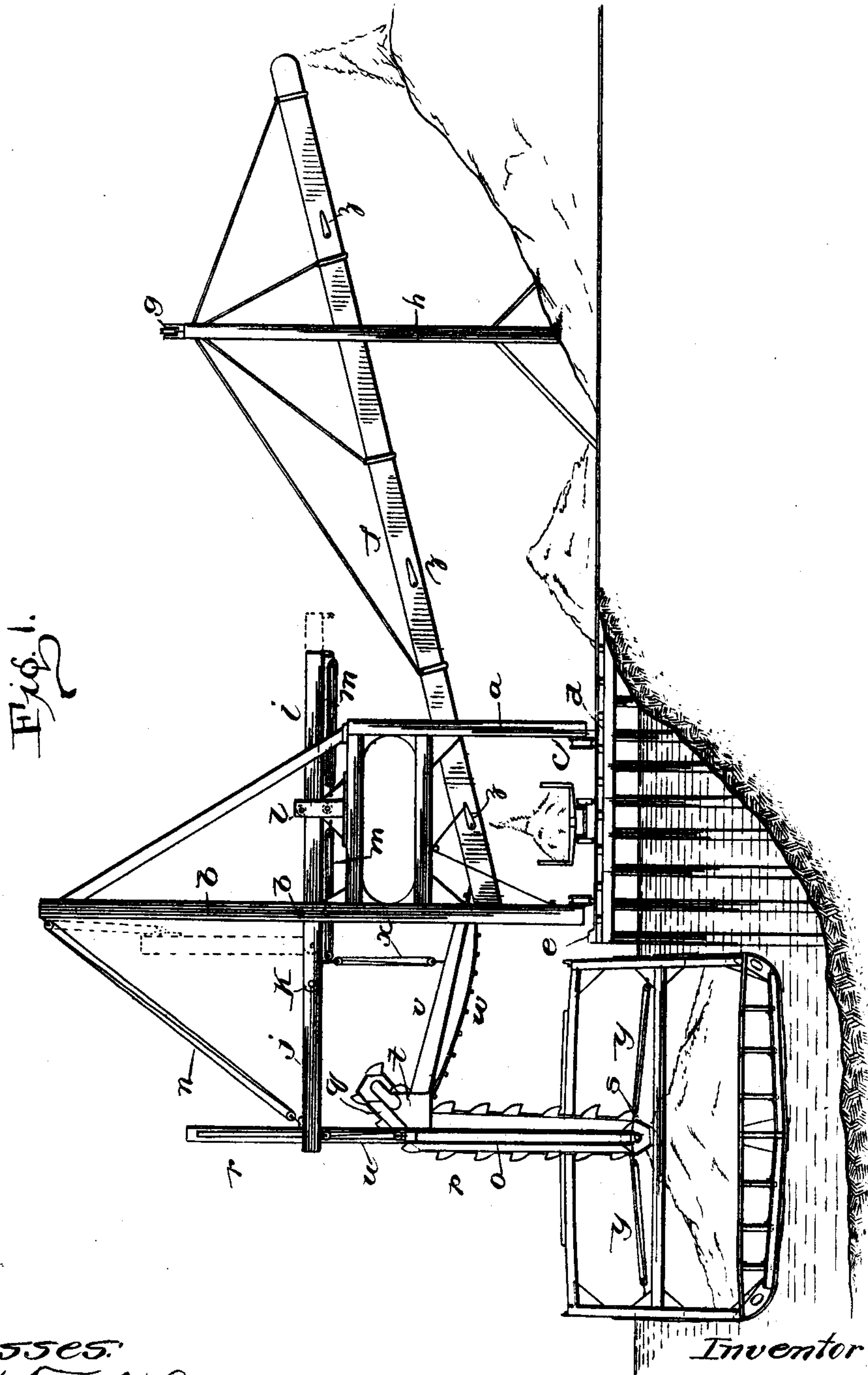
A. McDOUGALL.

MEANS AND MECHANISM FOR UNLOADING ORE, COAL, &c., FROM VESSELS
TO DOCKS, CARS, &c.

(Application filed Oct. 7, 1899.)

(No Model.)

2 Sheets—Sheet 1.



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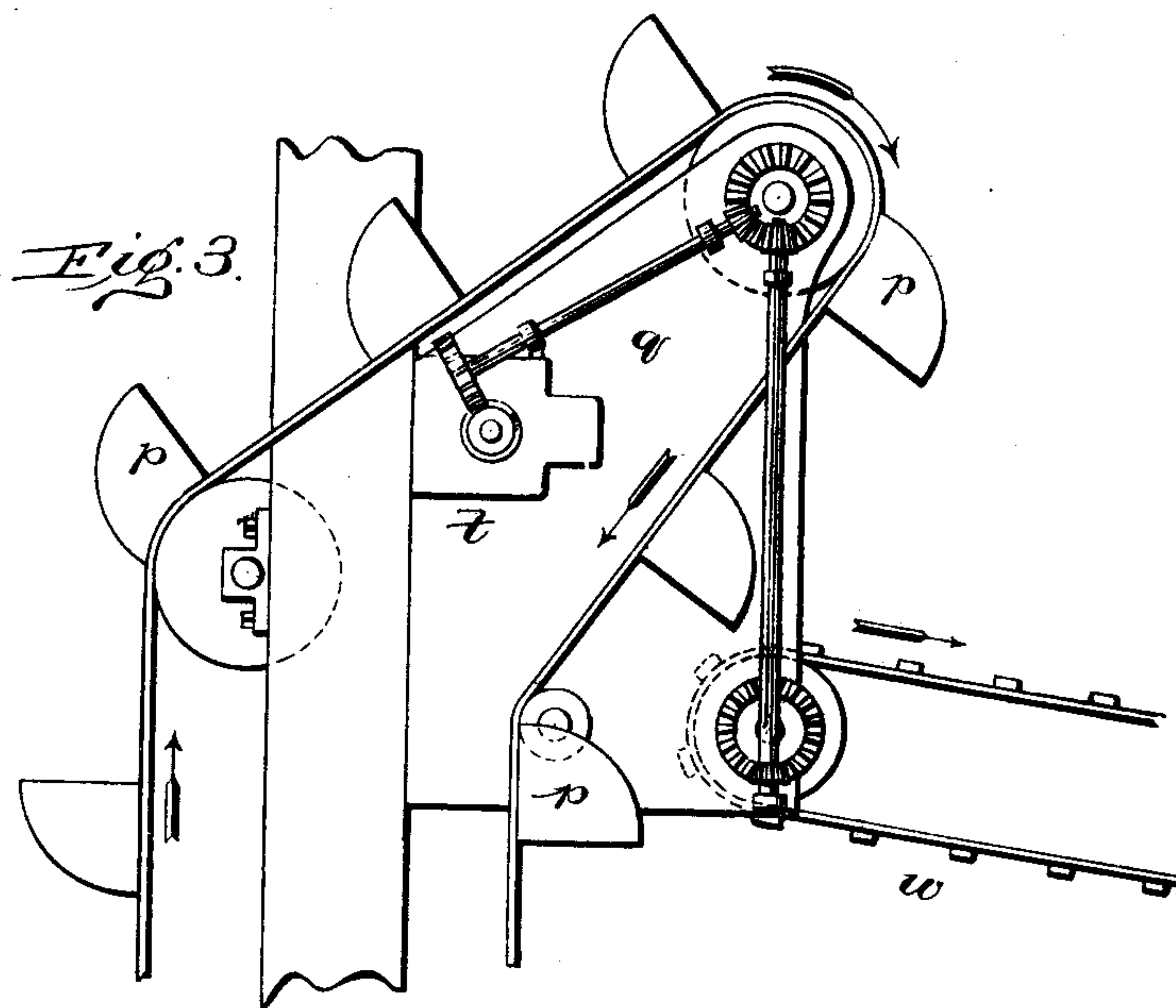
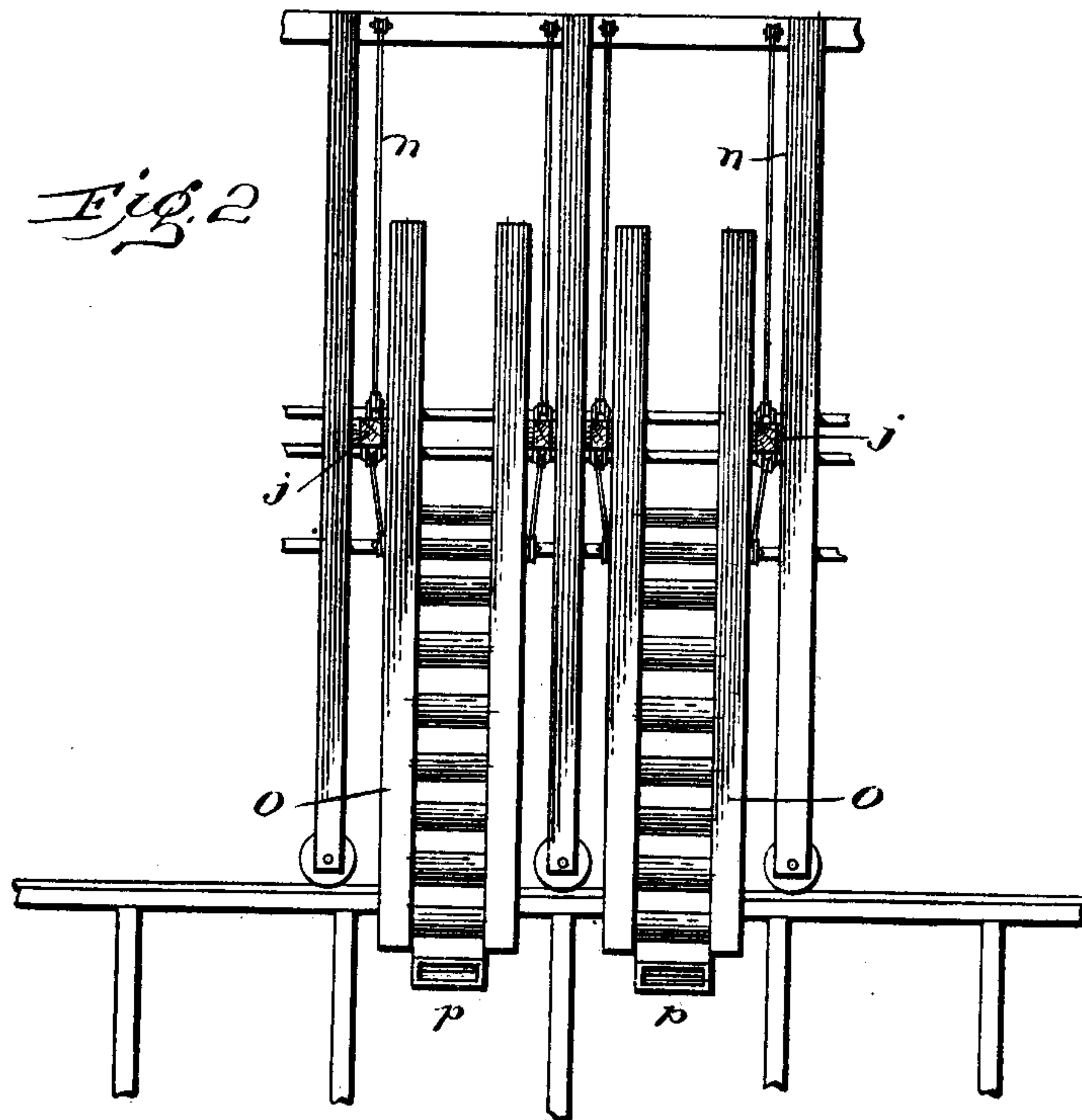
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

ALEXANDER McDOUGALL, OF DULUTH, MINNESOTA.

MEANS AND MECHANISM FOR UNLOADING ORE, COAL, &c., FROM VESSELS TO DOCKS, CARS, &c.

SPECIFICATION forming part of Letters Patent No. 676,075, dated June 11, 1901.

Application filed October 7, 1899. Serial No. 732,893. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER McDOUGALL, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Means and Mechanism for Unloading Ore, Coal, and other Bulk Cargo from the Holds of Vessels to Docks, Cars, &c., or from One Vessel to Another; and I do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to means and mechanism for unloading ore and coal from the holds of vessels to docks, cars, &c.

Iron ore or coal as it is commercially transported is frequently moist, and consequently gummy, or approaches the consistency of thick mud. Occasionally the ore or coal is dry, like fine gravel; but when thrown into the holds of vessels from the high docks in general use it cakes together and compacts into a solid homogeneous mass. When the usual elevator-leg is placed into engagement with the top of the mass of material, it will work down a hole the shape and size of the elevator-foot, with perpendicular sides, with but little tendency for the mass to fall into engagement with the buckets. This makes it necessary to station men on the top of the cargo to force the material to a point adjacent to the foot by shovels or the like. My invention is particularly designed to work in connection with such material.

Generally speaking, the invention is as follows: I use a series of elements, each consisting of a self-contained vertical endless elevator carried in a leg which is preferably straight for the greater portion of its length, with an offset or bend near the top to allow the elevated material to be discharged to one side. An operating-motor may be mounted in the offset. The leg is flexibly and adjustably supported over the hatchway of the unloading ship. The leg is supported upon sheer-legs, the pivoting-points of which are adjustable in relation to the dock. Means is provided for elevating and lowering the leg; also to move it bodily either inward or out-

ward. This means preferably, but not necessarily, consists of tackles. In order to avoid the difficulty of the foot making a hole or crater of its own size or a crater of but little larger size and to eliminate the necessity of shoveling the ore into the foot, I pivot the elevator-leg at the point where it connects with the horizontal sheer-legs and provide means for swinging the leg back and forth or from side to side within the hold of the vessel to bring the foot into engagement with the greater part of the cargo. This means may consist of tackles, levers, screws, chains, drums, &c., as may be convenient. The sheer-legs are supported upon a wheeled framework on the dock side or dock end. Supporting connections are arranged between the outer ends of the sheer-legs and a tower or vertical standard on the frame. An endless horizontal conveyer is pivoted to the leg immediately below the offset thereof and empties into the usual chute. An adjustable and flexible connection suspends the inner end of the conveyer from the sheer-legs or the supports thereof and holds the conveyer in a normally-horizontal position. Such connection may be disengaged, allowing the conveyer to turn upon its pivot and assume a vertical position parallel with the elevator-leg when the latter is not in use.

In order to better understand the nature of the invention, attention is called to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is an end elevation of one form of my device with the dock end and the unloading vessel in section. Fig. 2 is a front view of the tower, sheer-legs, and elevator; and Fig. 3 is an enlarged sectional view of the upper end of the elevator.

In all the several views like parts are designated by the same letters of reference.

The tower *a* is provided with a high vertical extension or mast *b*. If desired, flanged wheels *c* may be provided to run upon rails *d*, secured to the dock *e*. The second conveyer *f* is secured at one extremity to the tower and also at any suitable point to the wire cable *g*, with which it engages by means of a pulley, as shown. The cable *g* is supported between the masts *h*, but one being

shown. The horizontal extension *i*, to which the sheer-legs *j* are pivoted at *k*, is mounted in roller bearings or slides *l l*, attached adjacent to the top of the tower. Suitable means 5 are provided for moving the extension horizontally in relation to the tower. For simplicity and ease of illustration I show the tackles *m m* for this purpose. The outer extremities of the sheer-legs *j* are kept in position and are elevated or depressed, as desired, by means of the tackle *n*, connecting them with the upper extremity of the mast *b*. 10 The elevator-leg *o* is of the general shape shown and is made of angle-irons or channel-irons or, if desired, of wood. An endless chain carries the requisite number of buckets *p*. The elevator-leg is provided with the offset *q*, adjacent to the exit thereof. This could be modified by dispensing with the offset, or the offset could be made a little different. An electric, steam, or other motor is 20 located at *t* and serves to operate the endless chain carrying the buckets *p*. *s* is the lower end of the elevator, which comes in contact with the cargo. An extension *r* of the elevator-leg passes through bearings upon the outer extremities of the sheer-legs *j*. A tackle or other device *u* is employed to raise the elevator-leg. 30 *v* is a horizontal or approximately horizontal conveyer or chute having the endless chain or belt *w*, carrying slats thereon. This conveyer is pivoted to the offset *q* of the elevator-leg. Suitable means are provided for driving the belt *w*, which means preferably consists of the motor *t*, which also drives the buckets of the elevator-leg *o*, or a separate motor. A tackle or other means *x* is provided to support and elevate the inner end of 40 the conveyer. This tackle preferably depends from the horizontal extension *i*, adjacent to the hinge or joint *k*. Suitable tackles *y y* connect the elevator-foot to the sides of the vessel. These tackles act as an agency by means of which the foot or intake may be swung back and forth over the top of the cargo. 45

z z z are flaps or valves arranged in the conveyer *f* for diverting the cargo to the car 50 or dump, as may be desired.

The drawings show but one elevator and its appurtenances; but it is intended in practice to arrange a number of elevator-legs side by side upon the same or other towers adjacent 55 to the different hatchways of the unloading vessel.

The tackles *m*, *n*, *u*, *x*, and *y y* may be, but not necessarily, arranged to lead to the same place, which is preferably the engineer's platform. They may there be attached to the necessary operating winches or windlasses, 60 as will be obvious.

The operation of the device is as follows: The parts being in the position shown, the 65 motor *t* is started, giving motion to the elevator-buckets and the first or horizontal conveyer. The tackle *u* is kept a little slack,

and the tackles *y y* are alternately hauled upon, swinging the elevator-leg and moving the foot over the cargo, causing the buckets 70 *p* to come in contact with all parts of the upper surface of the iron ore or coal. The cargo is raised, deposited upon the conveyer or chute, and from there upon the conveyer *f*, from which it may be loaded upon cars or 75 deposited upon the dump. After the vessel is unloaded the elevator-leg *o* is raised as high as possible by hauling upon the tackle *u*. At the same time the tackle *x* is slacked off, allowing the horizontal conveyer to pivot 80 at *t* and drop to a vertical position parallel to the elevator-leg. The horizontal extension *i* is then drawn in until the joint *k* is adjacent to the mast. The sheer-legs are then raised to the position shown in dotted lines by means 85 of the tackle *n*, at the same time raising the elevator-leg and horizontal conveyer. In this position the tower may be moved along the pier side to any desired position. It will be seen that there is nothing projecting beyond 90 the plane of the pier side.

Having now described and ascertained the nature of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a device for handling ore, coal, or bulk 95 cargo, the combination of an elevator-leg pivoted over a vessel, an endless bucket elevator within the leg, means for operating the elevator, means for supporting the leg in a vertical position, means for raising and lowering 100 the leg, a conveyer, connecting the outtake of the leg to a fixed discharge, a flexible means for supporting the conveyer in a normally-horizontal position, and means for swinging the intake of the leg over the cargo, 105 such means operating simultaneously with the elevator-operating means, substantially as set forth.

2. In a device for handling ore, coal, or bulk 110 cargo, the combination of an elevator-leg pivoted over a vessel, an endless bucket elevator within the leg, means contained within the leg for operating the elevator, means for supporting the leg in a vertical position, means 115 for raising and lowering the leg, a conveyer, connecting the outtake of the leg to a fixed discharge, flexible means for supporting the conveyer in a normally-horizontal position, and means for swinging the intake of the leg 120 over the cargo, such means operating simultaneously with the elevator-operating means, substantially as set forth.

3. In a device for handling ore, coal, or bulk 125 cargo, the combination of an elevator-leg pivoted over a vessel, an endless bucket elevator within the leg, means contained within the leg for operating the elevator, means for supporting the leg in a vertical position, means 130 for raising and lowering the leg, a conveyer connecting the outtake of the leg to a fixed discharge, flexible means for supporting the conveyer in a normally-horizontal position, and means for swinging the intake of the leg over the cargo, such means operating simul-

taneously with the elevator-operating means, and during the descent of the leg, substantially as set forth.

4. In a device for handling ore, coal, or bulk cargo, the combination of an elevator-leg pivoted over a vessel, an endless bucket elevator within the leg, means for operating the elevator, means for supporting the leg in a vertical position, means for raising and lowering the leg, a conveyer pivoted to the leg and connecting the outtake of the leg to a fixed discharge, flexible means for supporting the conveyer in a normally-horizontal position, and means for swinging the intake of the leg over the cargo, such means operating simultaneously with the elevator-operating means, substantially as set forth.

5. In a device for handling ore, coal, or bulk cargo, the combination of an elevator-leg pivoted over a vessel, an endless bucket elevator within the leg, means contained within the leg for operating the elevator, means for supporting the leg in a vertical position, means for raising and lowering the leg, a conveyer pivoted to the leg, and connecting the outtake of the leg to a fixed discharge, flexible means for supporting the conveyer in a normally-horizontal position, and means for swinging the intake of the leg over the cargo, such means operating simultaneously with the elevator-operating means, substantially as set forth.

6. In a device for handling ore, coal, or bulk cargo, the combination of an elevator-leg pivoted over a vessel, an endless bucket elevator within the leg, means for operating the elevator, means for supporting the leg in a vertical position, means for raising and lowering the leg, a conveyer connecting the outtake of the leg to a fixed discharge, connections between the conveyer and elevator-operating means, flexible means for supporting the conveyer in a normally-horizontal position, and means for swinging the intake of the leg over the cargo, such means operating simultaneously with the elevator-operating means, substantially as set forth.

7. In a device for handling ore, coal or bulk cargo, the combination of an elevator-leg pivoted over a vessel, an endless bucket elevator within the leg, means contained within the leg for operating the elevator, means for supporting the leg in a vertical position, means for raising and lowering the leg, a conveyer connecting the outtake of the leg to a fixed discharge, connections between the conveyer and the elevator-operating means, flexible means for supporting the conveyer in a normally-horizontal position, and means for swinging the intake of the leg over the cargo, such means operating simultaneously with the elevator-operating means, substantially as set forth.

8. In a device for handling ore, coal, or bulk cargo, the combination of an elevator-leg pivoted over a vessel, an endless bucket elevator within the leg, means for operating the ele-

vator, means for supporting the leg in a vertical position, means for raising and lowering the leg, a conveyer pivoted to the leg and connecting the outtake of the leg to a fixed discharge, connections between the conveyer and the elevator-operating means, flexible means for supporting the conveyer in a normally-horizontal position, and means for swinging the intake of the leg over the cargo, such means operating simultaneously with the elevator-operating means, substantially as set forth.

9. In a device for handling ore, coal, or bulk cargo, the combination of an elevator-leg pivoted over a vessel, an endless bucket elevator within the leg, means contained within the leg for operating the elevator, means for supporting the leg in a vertical position, means for raising and lowering the leg, a conveyer pivoted to the leg and connecting the outtake of the leg to a fixed discharge, connections between the conveyer and the elevator-operating means, flexible means for supporting the conveyer in a normally-horizontal position, and means for swinging the intake of the leg over the cargo, such means operating simultaneously with the elevator-operating means, substantially as set forth.

10. In a device for handling ore, coal, or bulk cargo, the combination embracing an elevator-leg, an endless bucket elevator within the leg, means for operating the elevator, a tower, an adjustable horizontal extension mounted on said tower, sheer-legs pivoted to the outer extremity of said extension, connections between said elevator-leg and sheer-legs, connections between said tower and sheer-legs, means for raising and lowering the leg, and tackles connecting the lower extremity of the elevator-leg with a vessel, by means of which the leg may be swung to and fro simultaneously with the elevator-operating means and during the descent of the leg, substantially as set forth.

11. In a device for handling ore, coal, or bulk cargo, the combination embracing a pivoted elevator-leg, an endless bucket elevator within the leg, means for operating the elevator, a tower, an adjustable horizontal extension mounted on said tower, sheer-legs pivoted to the outer end of said extension, connections between said elevator-legs and sheer-legs, tackles *n, n*, connecting said tower and sheer-legs, tackle *u* for raising and lowering the leg, and tackles *y, y*, connecting the lower extremity of the elevator-leg with a vessel, by means of which the leg may be swung to and fro while the elevator is being operated and during the descent of the leg, substantially as and for the purpose, set forth.

This specification signed and witnessed this 3d day of October, 1899.

ALEXANDER McDOUGALL.

Witnesses:

M. J. MULLIN,
C. F. WIBERG.