

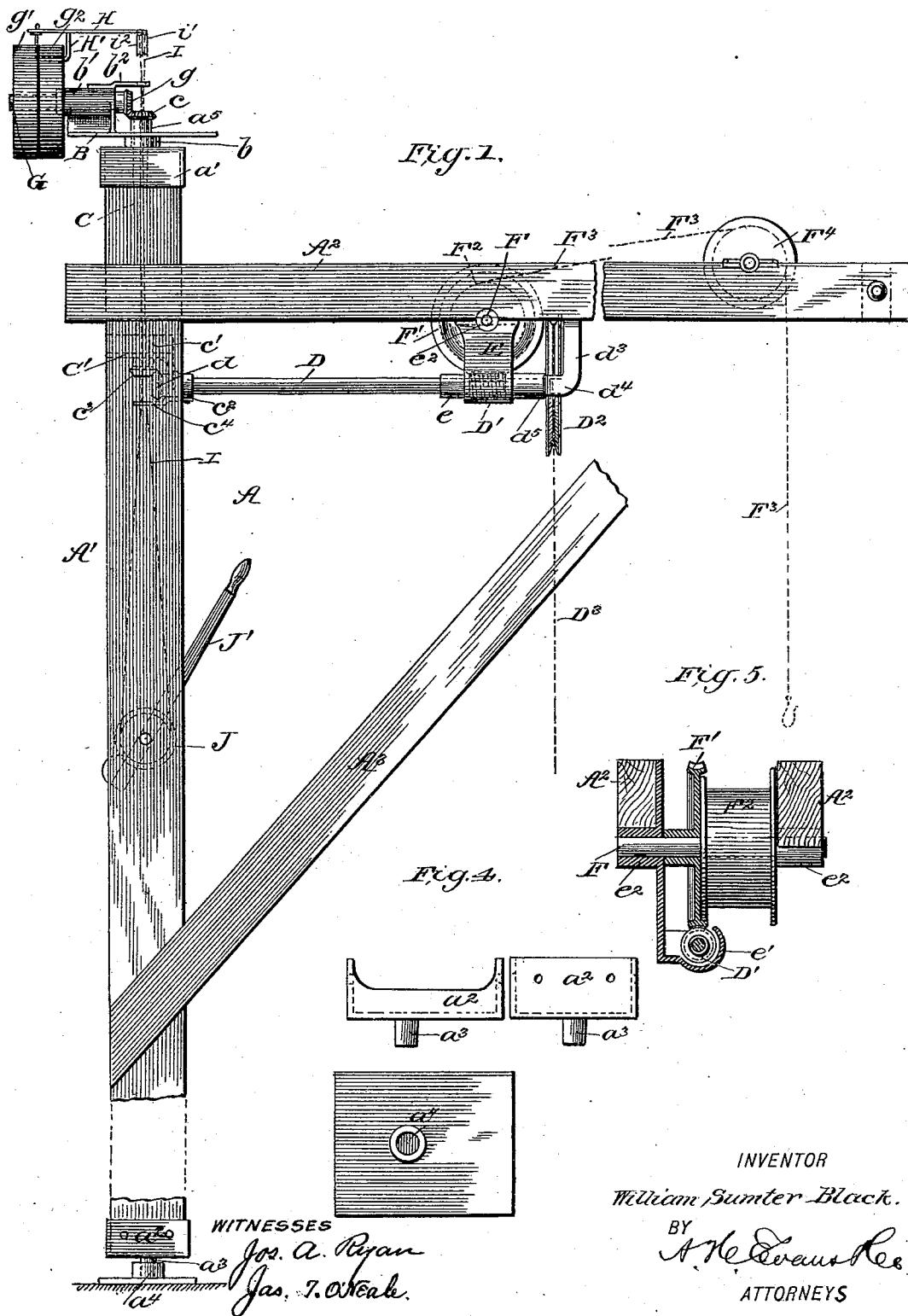
(No Model.)

2 Sheets—Sheet 1.

W. S. BLACK.
HOISTING CRANE.

No. 515,276.

Patented Feb. 20, 1894.



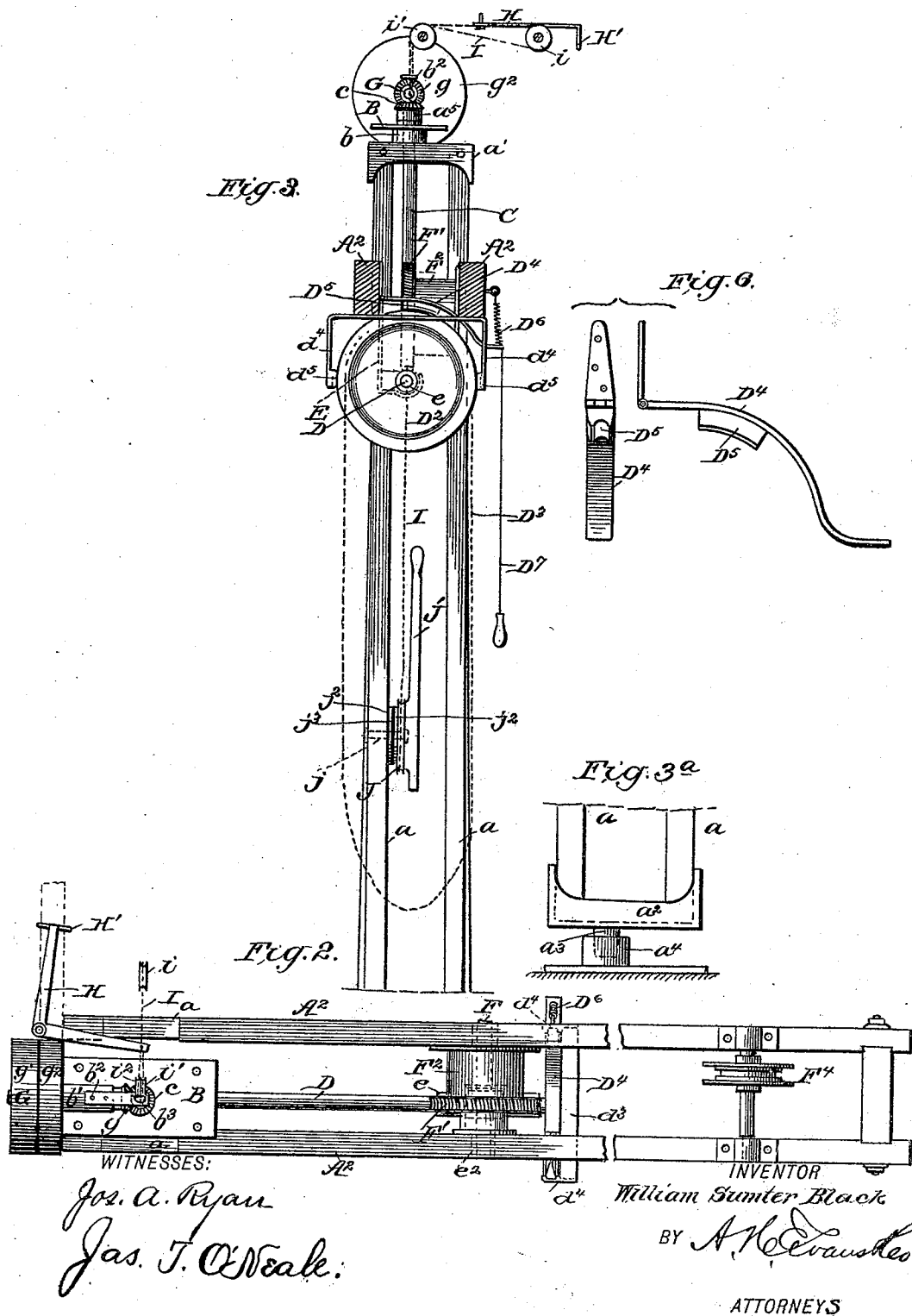
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UNITED STATES PATENT OFFICE.

WILLIAM SUMTER BLACK, OF BALTIMORE, MARYLAND.

HOISTING-CRANE.

SPECIFICATION forming part of Letters Patent No. 515,276, dated February 20, 1894.

Application filed December 6, 1893. Serial No. 492,922. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM SUMTER BLACK, a citizen of the United States, residing at Baltimore, State of Maryland, have invented certain new and useful Improvements in Hoisting-Cranes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in which—

10 Figure 1, is a side elevation of my improved crane. Fig. 2, is a plan thereof. Fig. 3, is a front elevation with the horizontal arm or boom shown in section on line $x-x$ Fig. 1. Fig. 3^a is a front elevation of the lower end of the crane or a continuation of Fig. 3. Figs. 4, 5 and 6 are details showing the lower end cap, the worm gearing and hoisting drum, and the brake lever.

My invention relates to that class of cranes particularly designed for use in packing establishments; the object being to provide a crane for this purpose which will be comparatively inexpensive, very simple in its construction, and not liable to get out of order.

25 The invention will first be described, and then specifically pointed out in the claims.

A, represents the crane, formed of a vertical mast A¹, horizontal boom A² and strut A³. The mast A¹ is formed of two parallel bars a 30 a secured together by means of the upper and lower end caps a' a'' , the lower cap a'' being provided with a pivot post or stud a^3 mounted in a step bearing a^4 while the upper cap a' is provided with the tubular bearing a^5 . 35 These bearings or axes a^3 a^5 are placed a little to one side of the longitudinal vertical axis of the mast, as clearly shown in Fig. 3, for a purpose to be hereinafter described. The upper bearing a^5 extends through a vertical bearing b , formed on a bracket B, the said bracket also being formed with a horizontal tubular bearing b' . This bracket B will be secured to the ceiling or other support in any well known manner, and will be 40 stationary with respect to the crane.

C, is a vertical tubular shaft extending through the bearing a^5 and provided at its upper end with a bevel gear c , the lower end of the shaft being mounted in a bearing c' , 50 formed on a bracket C' secured between the two members or side pieces a of the mast. The said bracket C' being also formed with

a horizontal bearing c^2 parallel with the boom, the lower extremity of the shaft C, is provided with a bevel gear c^3 which meshes with 55 the bevel gear d on the inner end of the shaft D, extending through the bearing c^2 and supported near its outer end in the bearings e , formed on a hanger E depending from the boom. The hanger E, between these bearings is formed with a worm-box e' within which turns the worm D' on the shaft D. The bracket E, above the worm-box and at right angles thereto is provided with a transverse bearing e^2 in which is mounted the shaft 65 F carrying a worm wheel F' and a drum F²; the said worm wheel meshing with the worm D'. A hoisting chain F³, extends from the drum outwardly along the boom over a guide pulley F⁴ mounted in bearings near the outer 70 end of the boom. The front extremity of the shaft D, is provided with a grooved pulley D² around which extends the depending endless rope or chain D³.

D³ is a guide depending from the boom with its ends d^4 provided with flanges d^5 which cross 75 the periphery of the pulley D² and prevent the endless cord or chain from slipping off.

D⁴ is a brake lever hinged at its inner end to the boom and provided between its ends 80 with a shoe D⁵ the sides of which are beveled to engage the beveled walls of the pulley groove and the lower edge of the shoe being grooved so as to avoid contact with the endless chain or rope D³. 85

D⁶ is a spring normally holding the brake lever elevated.

D⁷ is an operating chain or cord depending from the outer end of the brake lever for pulling it down to bring its shoe in contact with 90 the said pulley D².

The worm and the worm wheel will be formed with a very coarse pitch.

G, is the driving shaft mounted in the bearing b' of the bracket B and provided at its 95 inner end with the bevel gear g meshing with the bevel gear c of the shaft C while the outer end of the shaft G is provided with a fast and a loose pulley g' g^2 . The bracket B is provided with a guide arm b^3 projecting beyond the gear g and provided with an aperture b^3 concentric with the longitudinal axis 100 of the shaft C, and of less diameter than the bore of the said shaft. A similar guide arm

c^4 is secured to the bracket C' , and is also provided with an aperture of less diameter than the bore of the shaft and concentric therewith.

5 H, is a horizontal bell-crank belt shifter pivoted at its angle to the ceiling or other support, and provided at one end with a belt loop H' through which passes the belt for engaging the pulleys $g' g^2$. To the other arm
10 of the lever H is secured the cord or chain I, which extends outwardly around the guide pulley i , thence inwardly over a guide pulley i' , down through the guide b^2 , tubular shaft c and guide c^4 to and around the large pulley or drum J, thence upwardly through the
15 said guides and shaft over a pulley i^2 to the said arm of the bell crank lever. The cord or chain I, is secured to the said drum or pulley J, so that when the drum or pulley is
20 turned, it will throw the bell crank lever and cause it to shift the belt from the fast to the loose pulley or vice versa. The apertures in the guide B and C^2 are made of smaller diameter than the bore of the tubular shaft C,
25 so as to prevent the said cord or chain I, from getting into contact with the interior of the said shaft. The pulley or drum J is pivoted to the mast by means of a bolt j , and is held frictionally in its adjusted position by means
30 of the wood and leather disks $j^2 j^3$ interposed between it and the inner face of one of the members or side pieces a of the mast.

J' is a lever secured to the drum or pulley J for operating it.

35 When it is desired to raise an article, the hook on the lower end of the chain F^3 is engaged therewith and the lever J' is operated to cause the belt shifter to shift the belt from the loose to the fast pulley g' whereupon the
40 shaft G' will rotate the shaft D, through the medium of the shaft C, and the shaft D by means of its worm D' will rotate the worm wheel and drum in the direction of the arrow shown in Fig. 1. When the article has been
45 raised a sufficient height, the lever J will be thrown in an opposite direction to throw the belt from the fast to the loose pulley and the crane may be swung in any desired position; the operator grasping the cord or chain D^7 to
50 prevent the rotation of the shaft D. To lower the article, it is simply necessary to release the brake cord or chain D^7 and pull on the endless chain or cord D^3 to start the shaft D when the weight of the article will cause the
55 rotation of the drum F^2 and its operating gearing in the opposite direction; the pitch of the worm gear $D' F'$ being such as to permit this action.

It will be noticed that the drum and the
60 worm wheel F' lie between the two members or side pieces of the boom, and that by placing the axes of the mast to one side of the center a much wider drum can be used than if said axes were concentric with the mast as
65 clearly shown in Fig. 3. It is evident also that by arranging the belt shifting mechanism, largely within the mast, much less room

is required and a much more compact apparatus is afforded.

I desire it understood that the tubular mast- 70 axis, tubular shaft and drive shaft may be placed at the lower end of the mast if desired; such being a mere reversal of the said parts as shown in the drawings.

Having thus described my invention, what 75 I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination with a derrick, of a vertical shaft journaled in the mast, a drive shaft geared thereto, and provided with a fast 80 and a loose pulley, a hoisting drum mounted on the boom, a shaft journaled on the boom and geared to said drum and to the said vertical shaft, a belt shifter, and an operating mechanism for said shifter mounted on the 85 mast, substantially as herein described.

2. The combination with the derrick having one of its axes tubular, of a tubular shaft mounted in the mast and extending through 90 said tubular axis, a drive shaft geared to the projecting end of said tubular shaft and provided with fast and loose pulleys, a belt shifter, operative connections for operating the said shifter extending through the said tubular shaft, and the hoisting mechanism on the 95 boom geared to said vertical shaft, substantially as herein described.

3. The combination with the derrick having a tubular axis, of a tubular shaft mounted in the mast and extending through said tubular 100 axis, a drive shaft geared to the projecting end of said tubular shaft, and provided with fast and loose pulleys, a belt shifting lever, guides adjacent to the ends of the tubular shaft, a pulley or drum mounted on the 105 mast, a flexible connection extending therefrom, through said guides and tubular shaft to the belt shifting lever to throw it in either direction said guides holding the flexible connection out of contact with said tubular shaft, 110 guide pulleys for said flexible connection, and a hoisting drum on the boom and geared to the said tubular shaft, substantially as herein described.

4. The combination with the derrick hav- 115 ing one of its axes tubular, a shaft mounted on the mast and extending through the said tubular axis, a drive shaft geared to the projecting end of said shaft and provided with fast and loose pulleys, a belt shifting mechanism, 120 a shaft mounted on the boom, and geared to said vertical shaft, and provided with a coarse worm wheel and with a fixed pulley over which passes a depending endless rope or chain, and a hoisting drum on the boom and 125 provided with a coarse worm wheel meshing with said worm, substantially as herein described.

5. The combination with the derrick having one of its axes tubular, a shaft mounted in 130 the mast and extending through said tubular axis, a drive shaft geared to the projecting end of said shaft and provided with a belt shifting mechanism, a worm shaft journaled

on the boom and geared to the mast shaft, a worm wheel geared to said worm shaft, a hoisting drum operated thereby, a fixed pulley on the outer end of the worm shaft, and
5 provided with a depending endless rope or chain, and a brake lever for said fixed pulley, substantially as herein described.

6. The combination with the derrick, of the hoisting drum on the boom thereof, the worm
10 shaft geared thereto and provided with a fixed pulley, a driving mechanism for operating the worm shaft, a depending endless rope or chain for the said pulley, a guide secured to the boom and extending at opposite sides
15 of the pulley to prevent displacement of its endless operative rope or chain, and a spring retracted brake lever having a shoe engaging said pulley, substantially as herein described.

7. The combination with the derrick having one tubular axis, a tubular shaft extending through said axis, a drive shaft geared to the projecting end of said shaft, and having
20 a fast and a loose pulley, a belt shifting lever, and the hoisting mechanism mounted on the boom and operated from said tubular shaft,
25

of the frictionally held drum or pulley on the mast, the friction disks between the drum or pulley and the adjacent face of the mast, and the flexible operative connection extending from said pulley or drum through the tubular
30 shaft to the belt shifter, substantially as herein described.

8. The hoisting apparatus comprising the mast A' provided with end caps having respectively a tubular and a non-tubular axis
35 eccentric to the longitudinal vertical axis of said mast, the tubular shaft extending through the tubular axis, the drive shaft having a fast and a loose pulley, and geared to the projecting end of said tubular shaft, a belt shifter,
40 operative connections therefrom extending through the tubular shaft, a worm shaft on the boom and geared to the tubular shaft, and a hoisting drum on the boom, geared to the worm shaft, substantially as herein de-
45 scribed.

WILLIAM SUMTER BLACK.

Witnesses:

GEORGE S. BOOKER,
CHARLES E. GARTEE.