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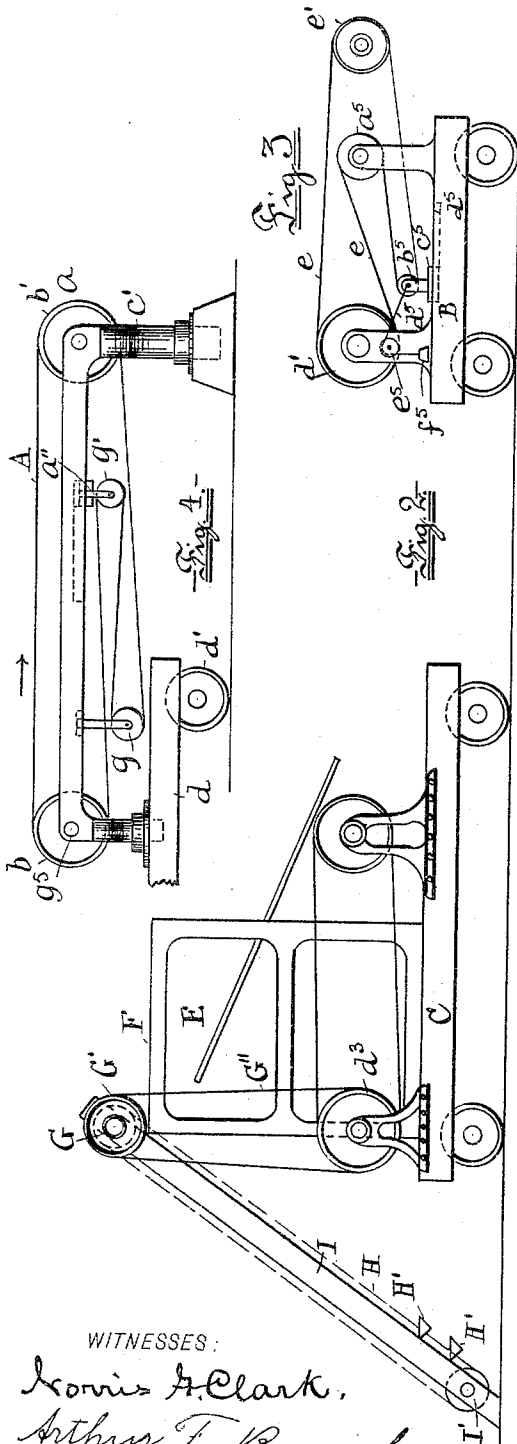
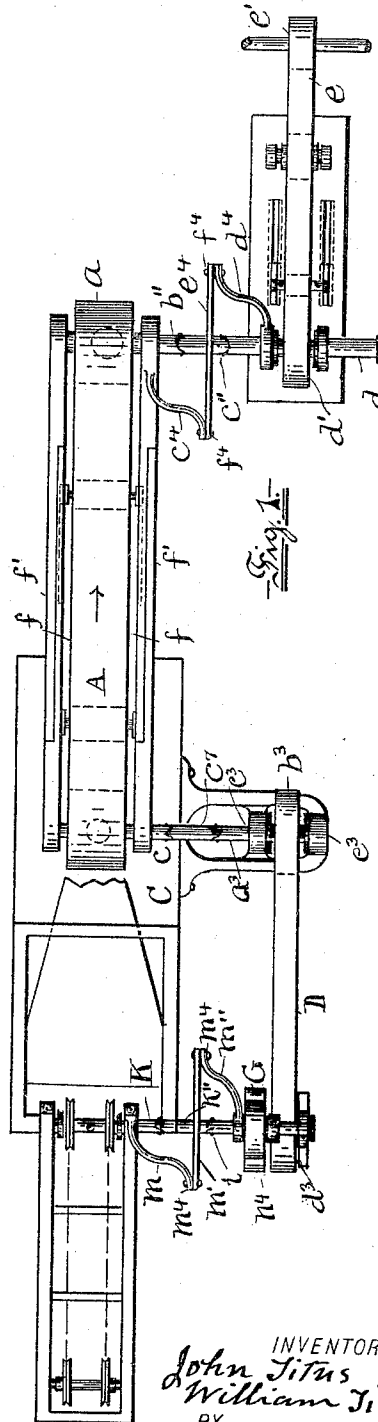
Patented Jan. 30, 1900.

J. & W. TITUS.
EXCAVATING APPARATUS.

(Application filed Nov. 29, 1898.)

(No Model.)

2 Sheets—Sheet 1.



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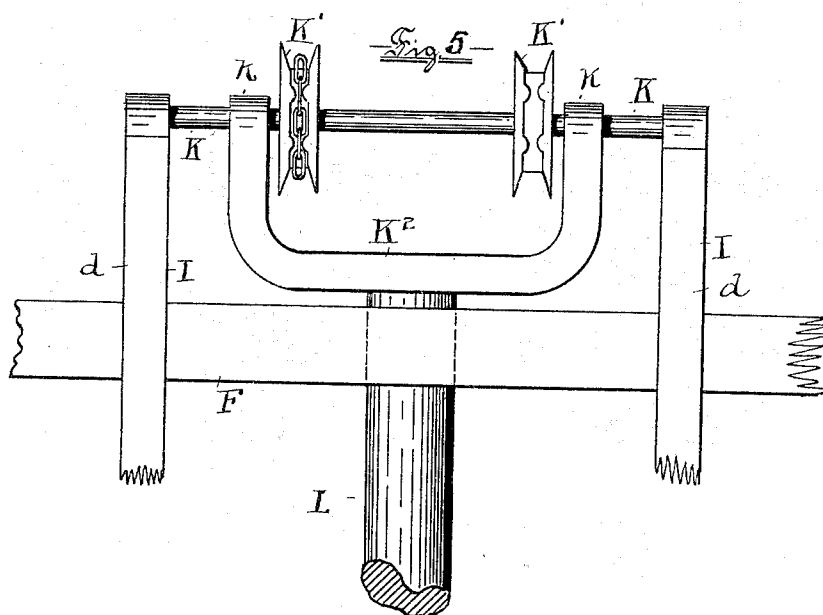
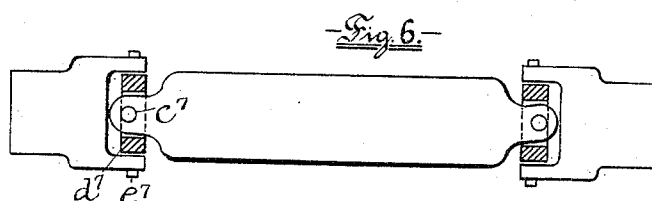
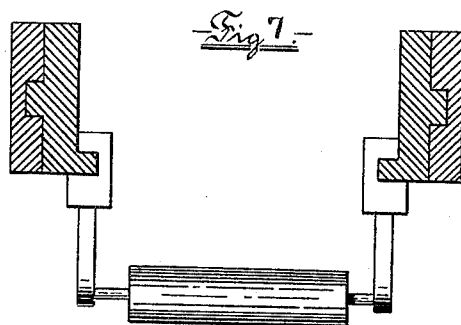
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

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EXCAVATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 642,175, dated January 30, 1900.

Application filed November 29, 1898. Serial No. 697,814. (No model.)

To all whom it may concern:

Be it known that we, JOHN TITUS, residing at Oyster Bay, and WILLIAM TITUS, residing at North Hempstead, in the county of Queens and State of New York, citizens of the United States, have invented certain new and useful Improvements in Excavating Apparatuses; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a plan view of an apparatus constructed according to our invention. Figs. 2, 3, and 4 are side elevations of certain parts of said apparatus; and Figs. 5, 6, and 7 are detail views of certain other parts of the said apparatus.

This invention relates to that class of excavating apparatuses in which an excavating device gathers or lifts the excavated material and passes the same upon an endless carrier-apron, to be thereby transferred to the desired place of deposit. Its object is to enable the excavating device to be advanced toward or into the sand-bank or other place to be excavated without changing the place of deposit of the excavated material and also to enable the apparatus to be moved laterally as occasion may require and to be conformed to any variety of surface on which it is placed.

To this end the invention comprises certain novel combinations and parts, whereby a strong, substantial, and easily-operated apparatus is provided.

A is the endless apron or carrier-belt, upon which the excavated material is transferred from the excavating device to the place of deposit, the upper or carrying portion of the belt moving in the direction of the arrow in Figs. 1 and 4. This endless apron runs upon the two working drums b b' . The drum b has its bearings in standards c , placed upon the movable platform d , preferably provided with supporting-wheels d' . The other working drum b' is supported in bearings in the upper part of standards c' , which when the apparatus is in operation are intended to be stationary. From the standards c extend horizontally side pieces f , which are constructed to slide in contact with similar side pieces f' ,

extending from the standards c' . This relative arrangement of the side pieces f and the standards c and those of f' with the standards c' is illustrated in the plan view of Fig. 1 and shown in detail in cross-section on a larger scale in Fig. 7. The two sets of side pieces therefore constitute a horizontal frame capable of being lengthened or shortened by moving the platform d —in other words, moving the standards c from or toward the standards c' . Upon the one movable part of the said extensible frame is provided an idler-pulley g and upon the other a corresponding idler-pulley g' . The endless apron A in addition to passing over the working drums b b' passes over and around the idler-pulleys g g' , as represented in Fig. 4. The idler-pulley g' is carried in a movable bracket a^2 , which is fitted to slide longitudinally when required upon the side pieces—in other words, upon that part of the horizontal frame which supports it. By this means the working drum b may be moved to any required distance within the capacity of the endless apron from the other working drum b' , the bracket a^2 being moved to shorten the loops of the apron A between the idler-pulleys g and g' when the working drums are moved apart and to lengthen such loops to take up the slack of the carrier-apron when the working drums are brought nearer together, so that by this means the upper or carrier surface of the carrier-apron may be shortened or lengthened, as circumstances may render it desirable.

The carrier movement of the carrier-apron A is provided for by the retention of the working drum b' , the shaft b^2 of which is connected by a bar c^2 with the shaft d' , which by a belt e connects with a driving-pulley e' , which latter may be operated by a steam-engine or any other suitable motive power. The bar c^2 is connected with the adjacent ends of the shafts b^2 and d' by universal joints—in other words, by universal joints at the end of the said bar c^2 —so that by this means motion may be transmitted from the shaft d to the working drum b' , regardless of very considerable variations in the position of said drum with reference to the shaft d . From the standard c' extends an arm c^4 , and from the frame which supports the shaft d of the pulley d' extends a similar

arm d^4 . These arms are connected by a bar e^4 , the connection at each end of the bar e^4 being by a transverse pin or rivet f^4 , which constitutes, in effect, a pivot or hinge, which allows considerable play in a vertical direction of the adjacent drum b' , so that by this means inequalities or differences between the level of the drum b' and its adjuncts and that of the pulley d' and its adjuncts are compensated for, so that changes within reasonable limits in the relative positions of the parts cause no inconvenience in the use and operation of the apparatus.

To prevent interference with the operation of the belt e from changes, whether horizontal or vertical, from position in shaft e with regard to the shaft d , the said belt is passed over idler-pulleys a^5 and b^5 , the former of which is fixed upon the supporting-platform b of the pulley d' . The idler-pulley b^5 is supported upon a movable block c^5 , which works in a guide d^5 in the platform d . This platform has attached to it a guide d^5 , which after passing over a guide-pulley e^5 has at its lower end a weight f^5 , so that the actual or working length of this belt e is automatically varied to compensate for any changes which may occur in the relative position of the working drum e' and the pulley d' or their adjuncts or neighboring parts of the apparatus. The shaft g^5 of the working drum b at the movable end of the extensible frame, which carries the working drums b and b' , as explained, is connected by a bar c^7 with a counter-shaft a^3 , which carries a pulley b^3 . The bar c^7 just last mentioned is in its connection with the shafts c and a^3 identical in character with the bar c^2 of the shaft b^2 of the working drum b' , being connected at each end to the adjacent part by a universal joint. These universal joints may be of any suitable or desired construction; but the most convenient and preferred form is that illustrated in Fig. 6, in which the ends of the bar are pivoted at c^7 in blocks d^7 , said blocks being pivoted in the forked ends e^7 of the adjacent shaft. By this means changes in the position of the platform c , which carries the excavating device, as presently explained, with reference to the pulley b —in other words, with reference to the adjacent end of the extensible frame which carries the carrier-apron A—are automatically compensated for.

It is of course to be understood that the shaft a^3 and the pulley b^3 , carried thereby, are supported in suitable bearings c^3 , supported by or upon a platform c , as shown in Figs. 1 and 2. The pulley b^3 carries a belt D, the opposite end of which passes over a pulley d^3 , the bearings of which are similarly supported on platform c . This platform carries a hopper E, the outlet of which extends from the adjacent end of the carrier-apron A, so as to serve as a conduit for the excavating device or buckets to the said apron. This hopper is supported by a framework F, which serves to support the upper part of the excavating de-

vice. The driving-shaft of the excavating device is shown at G and is provided with a pulley G' , which receives motion from the pulleys d^3 by means of belts G^2 . The excavating device, as represented in the drawings, comprises an endless chain H of buckets H' . This endless chain is supported by a frame which consists of two side pieces I, which carry at their lower ends a pulley I' , and which at their upper ends are pivotally connected with a shaft K. This shaft carries the sprocket-wheels K' , around which pass the endless chains H, which carry the buckets H' . As this construction of endless chains and buckets is well known in excavating apparatus it need not be more specifically of itself described. The shaft K works in bearings in the forked upper ends k of a bracket K^2 , fastened to the tip of a vertical shaft L, which latter is supported in suitable bearings provided in the frame F, so that by this means the excavating apparatus, including the endless chain, its buckets, and its frame I, may be swung around in a horizontal direction. The end of the shaft K is connected with the end of the shaft i of the pulley G by a bar K'' , the ends of which are connected with the shaft K and the shaft i , respectively, by universal joints in the same manner that the ends of the bar c^2 are connected with the ends of the shafts b^2 and d and for a similar purpose—viz., to permit the shafts connected with each other by the bar to be moved with reference to each other without impairing the transmission of power from one to the other. The frame I, which carries the endless chain and its buckets, is provided at its upper end with an arm m , which by means of a bar m' is connected with another similar arm m^2 , extended over the bar of the shaft i . This connection is made by transverse pins m^4 , which have a hinge-like action corresponding to the action of the pins f^4 on the bar c^2 , which connects the arms c^4 and d^4 in another part of the apparatus. By these means any changes or differences in the vertical adjustment of the upper part of the excavating apparatus with reference to the shaft i are rendered of no account.

In the operation of the apparatus motion is transmitted from the pulley e' , actuating the shaft d' , which in its turn transmits it to the shaft of the working drum b' . This through the carrier-apron A affords motion to the working drum b , the shaft of which in its turn operates the pulley b^3 , which through D operates the pulley d^3 , which latter by its pulley n^4 transmits through the belt G^2 motion to the pulley G' , which in its turn actuates the shaft K and rotates the sprocket-wheels K' , and thereby gives the usual and requisite motion to the chains of the endless system of buckets H' , this latter lifting or conveying the excavated material and passing the same to the hopper E, through which it passes to the adjacent end of the carrier-apron A, which in its motion finally throws or dumps it off

from the working drum b' to the place of deposit a . The excavating apparatus is capable of being advanced into the place or locality to be excavated as the work proceeds without disturbing or changing the place of deposit a , as hereinbefore explained, and the several parts of the apparatus are enabled to work in proper unison, notwithstanding the shifting about within wide limits of one or another part with reference to the others, whether horizontal, vertical, or in other ways.

What we claim as our invention is—

1. The combination with a movable excavating apparatus, of a movable platform, a drum carried thereon, a drum independent of the platform, a frame for carrying the two drums constructed with side pieces arranged to move longitudinally upon each other, idler-pulleys carried by said frame, and a carrier-apron carried by the drums and looped around the idler-pulleys so that its carrying length may be varied by the shortening or lengthening of the frame, substantially as and for the purposes set forth.

2. The combination with a movable excavating apparatus, of a drum, a standard for carrying said drum and horizontal side pieces, f , provided on said standard, a movable platform, a standard on said platform, a drum carried by said standard, horizontal side pieces, f , provided on said standard and arranged to cooperate with the corresponding side pieces of the other standard, a movable bracket, a^2 , an idler-pulley carried by said bracket, an idler-pulley provided on the opposing side of the frame, and a carrier-apron upon the drums and looped about the two idler-pulleys, the whole constructed and arranged substantially as and for the purposes herein set forth.

3. The combination with a movable excavating apparatus, of drums adjustable at variable distances apart, idler-pulleys also adjustable at variable distances apart, a carrier-apron carried by the drums and looped about the idler-pulleys, an independent shaft, d , for actuating that one of the drums which gives motion to the carrier-apron, a universal joint connecting said shaft with said drum-actuating shaft, an arm extended from the standard or support of the drum which actuates the carrier-apron, a similar arm extended from the support of the shaft, d , and a bar which loosely connects the said arms, substantially as and for the purposes herein set forth.

4. The combination of an endless-chain excavating apparatus, a traveling platform which supports the upper end thereof, a driving-shaft, G , provided with a suitable pulley at the said upper end of the excavating apparatus and arranged to transmit motion

thereto, a pulley, d^3 , provided to the platform, a belt connecting said pulley with the pulley of the driving-shaft, G , a shaft, n^4 , connected by a universal joint and means for operating the shaft, n^4 , and consequently the excavating apparatus in concert with the carrier-apron, A , substantially as herein set forth.

5. The combination of an endless-chain excavating apparatus, a traveling platform which supports the upper end thereof, a driving-shaft, G , provided with a suitable pulley at the said upper end of the excavating apparatus and arranged to transmit motion thereto, a pulley, d^3 , provided to the platform, a belt connecting said pulley with the pulley of the driving-shaft, G , a shaft, n^4 , connected by a universal joint, a carrier-apron, drums for supporting and operating the same a shaft, c , for actuating one of said drums, a shaft, a^3 , connected with the shaft, c , with a universal joint and a belt, D , which connects the pulley, b^3 , with the pulley of the shaft, d^3 , all substantially as and for the purposes herein set forth.

6. The combination of an endless-chain excavating apparatus, a traveling platform which supports the upper end thereof, a driving-shaft, G , provided with a suitable pulley at the said upper end of the excavating apparatus and arranged to transmit motion thereto, a pulley, d^3 , provided to the platform, a belt connecting said pulley with the pulley of the driving-shaft, G , a shaft, n^4 , connected by a universal joint, an arm, m , provided to the top of the frame of the excavating apparatus, a similar arm provided to the bearing of the shaft, d^3 , and a bar, m' , which connects the arm, m , with the arm, m' , all substantially as and for the purposes herein set forth.

7. The combination of an endless excavating apparatus, a movable platform supporting the same, a shaft, belts and pulleys for transmitting motion thereto, a driving-shaft connected by a universal joint with the said shaft, a drum supported upon a movable platform, a drum independently supported, idler-pulleys arranged in connection with said drums, an endless carrier-belt carried by said drums and looped about the idler-pulleys, a shaft connected by a universal joint with the shaft which gives motion to the drums and an endless belt for simultaneously communicating motion to the mechanism which operates the endless carrier-belt, all substantially as and for the purposes herein set forth.

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