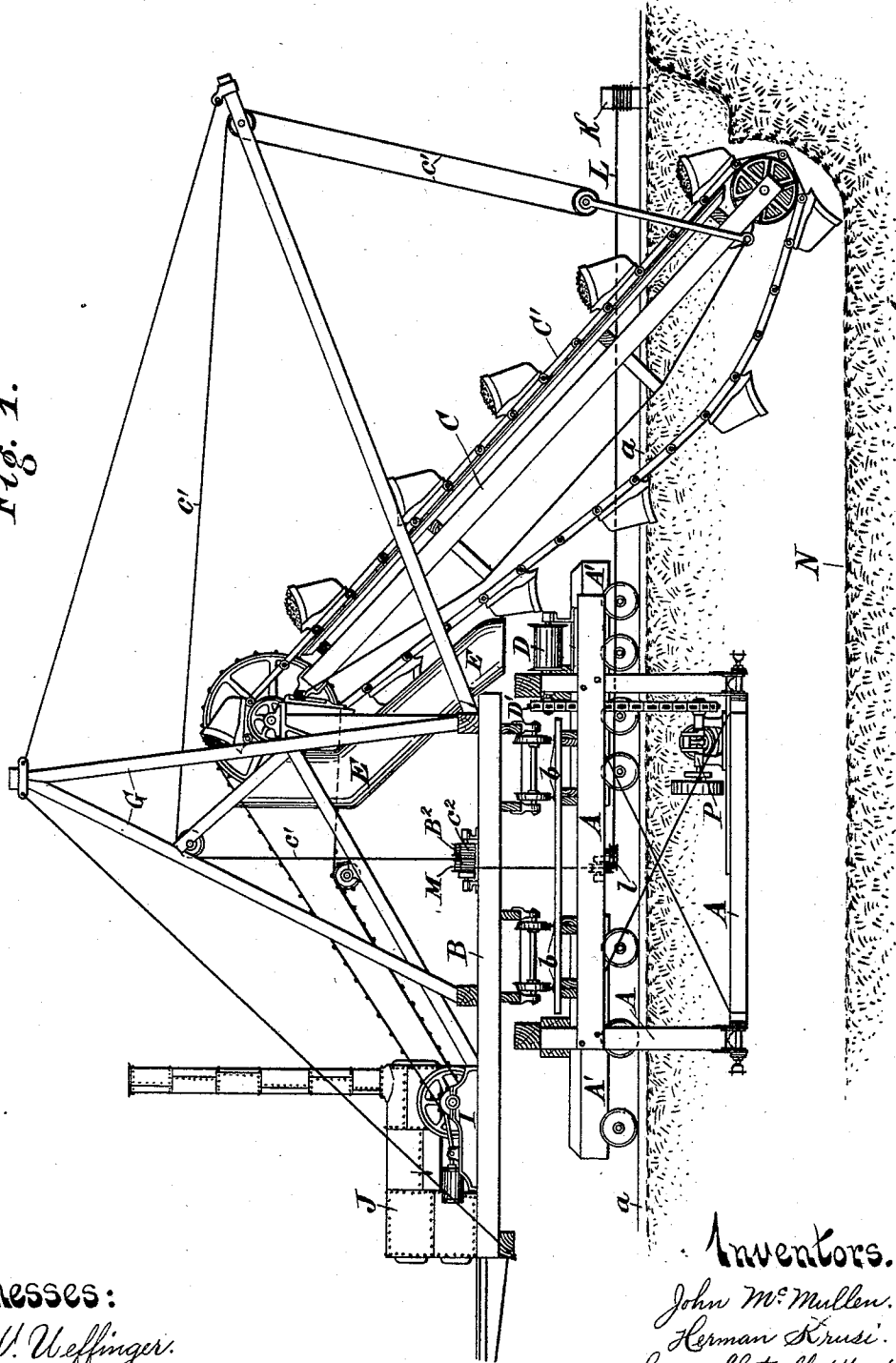


2 Sheets—Sheet 1.

CANAL DIGGER.

Patented Mar. 21, 1893.



Witnesses:

Geo. W. Ueffinger.

W. J. Miller

Inventors.

John M^cMullen.

Herman Krusi

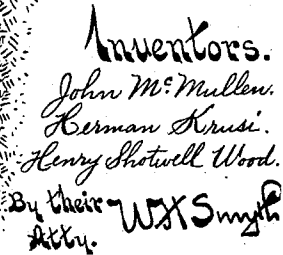
Henry Shotwell Wood

By their WXS myth.
Atty.

2 Sheets—Sheet 2.

CANAL DIGGER.

Patented Mar. 21, 1893.



UNITED STATES PATENT OFFICE

JOHN McMULLEN, HERMAN KRUSI, AND HENRY S. WOOD, OF SAN FRANCISCO, CALIFORNIA.

CANAL-DIGGER.

SPECIFICATION forming part of Letters Patent No. 494,112, dated March 21, 1893.

Application filed January 28, 1892. Serial No. 419,563. (No model.)

To all whom it may concern:

Be it known that we, JOHN McMULLEN, HERMAN KRUSI, and HENRY SHOTWELL WOOD, citizens of the United States, residing in the city and county of San Francisco and State of California, have invented an Improved Canal-Digger, of which the following is a specification.

Our invention relates to that class of machines employed in digging canals.

It consists in the mechanisms and combination of mechanism, hereinafter fully described and specifically pointed out in the claims.

Our invention relates more particularly to improvements on the device embodied in our previous patent for a "canal digging machine," No. 443,458, dated December 23, 1890.

The object of our present invention is to provide a canal digging machine of approximately similar construction to above patent but particularly adapted to depositing the spoil or debris into wagons or trucks to be conveyed from the place of operation, and to obviate the results of excessive wear on certain parts of such machines. We accomplish this object by means of the devices shown in the accompanying drawings, in which—

Figure 1 is a side elevation of our device. Fig. 2 is a front elevation, portions being removed to more clearly illustrate it. Fig. 3 is a detail of the digging buckets, chain and tumbler wheels. Fig. 4 is an enlarged view of the digging bucket chain. Fig. 5 is an enlarged view of conveyer belt. Fig. 6 is a cross section of conveyer belt.

Referring to the accompanying drawings, the digging machine C which consists of a series of buckets secured to an endless chain C' of peculiar construction, is pivotally secured to a suitable frame G, mounted on a transversely moving carriage B; upon this carriage B are also located the driving engine I, and connections for operating the digging mechanism. The moving carriage B is located on and supported by the bridge A which spans the course of the channel to be dug. Suitable tracks *b* are provided upon the bridge and wheels upon the moving carriage, to enable it to be readily moved from one end of the bridge to the other. The ends of the bridge are provided with wheels or trucks A'

which rest upon tracks or rails *a* on the banks of the canal.

To accomplish the forward motion of the whole structure suitable power connections are provided which preferably consist of fixed posts *k* driven into the banks ahead of the machine; to these posts ropes *L* are attached which are led to suitable winding drums located on the device. To effect the transverse movement of the carriage, suitable power connections are provided.

The digging machine C consists of endless chains to which digging buckets are secured. The chains pass around suitable chain sheaves or tumblers journaled at the ends of a frame, the inner end of said frame being pivotally secured to a supporting frame located on the traveling carriage; the free end is adjustably supported from the moving carriage. The chain digger is connected by belt or suitable driving connections with the main engine I.

The chain, of the chain digger, is of peculiar construction to provide for the excessive wear which necessarily takes place in handling the large amount of material moved by this digging machine. On each link of the chain, removable wearing pieces C² are attached, being set across and countersunk in the inner edges of the side-bars thereof; this is clearly shown in Fig. 4. For a like purpose removable wearing pieces X and X' are placed respectively upon the faces and inner sides of the flanges of the digger chain sprocket wheel. By preference, the pieces X are made of angular plates laid over bolts *x* and firmly set between the flanges of the wheel, as illustrated in the lower part of Fig. 3. The pieces X' consist of smaller plates bolted or otherwise secured to the same flanges, across the ends of the pieces X.

The spoil or dirt conveyer D is supported on the bridge A, transverse to the direction of the digger and canal, and preferably consists of an endless traveling belt, both rights of the belt passing around suitable pulleys, journaled on a frame. The conveyer is provided with suitable power connections to operate it in either direction, shown in the drawings as a reversing engine P.

To direct the spoil or dirt from the buckets of the chain digger, the dirt hopper E is pro-

vided, suitably placed to receive the dirt discharged from the buckets and discharge it on the conveyer.

It has been found in practice, that where the machine works in a wet channel, a large amount of water is carried up with the spoil, which when deposited in this condition on the conveyer, would flow over its edges were no provision made to retain it. This is accomplished by a raised edge being provided on each side of the conveyer frame and the conveyer belt being made wider than the so formed channel, the effect of these provisions being to cause the edges of the conveyer belt to be turned upward, thereby forming the traveling conveyer into a continuous trough, thereby effectively retaining the water or soft spoil, yet allowing said belt to flatten out for necessary passage around its end pulleys.

To prevent destruction by wear, of the digging buckets, their cutting edges are made separate from the body of the bucket, being thus renewable.

Suitable power connections are provided for raising and lowering the digger frame, moving the traveling carriage and also the whole structure, shown in the drawings as winding drums c^2 , M, and B^2 , and ropes c' , B' .

The operation of the device is as follows: The machine being in position, the ends of the bridge rest upon the temporary rails, on either side of the proposed canal. The traveling carriage is moved over to one side of the bridge and the chain digger put in motion by the main engine. The free end of the digger is lowered by means of its supporting rope until the buckets come in contact with the surface of the ground, which they at once commence to remove and carry up till the loaded buckets reach the highest point of their journey, where owing to their attachment to the chain, they are inverted and so deposit their contents in the hopper E, suitably placed to receive it. The dirt or spoil so dug is discharged by means of the hopper E on the spoil conveyer D, which being also in motion, its upper fold traveling toward the bank, the dirt is thereby carried and deposited beyond the line of the canal into carts or trucks to be removed to any suitable location. While the digging chain is in motion, transverse motion is given to the moving carriage B, and therefore to the free end of the digger, which causes the digging buckets to cut and remove the earth with their sides as well as their front edges, and so the digger traverses the proposed width of the canal. Having reached its limit of motion sidewise, the free

end of the digger is lowered for another cut and the moving carriage started on its return journey. These operations are repeated until the required depth of the canal is reached, when it becomes necessary to advance the whole structure. This is accomplished by the winding drums M and ropes L. The digger is again started on a fresh cut and so proceeds as before described.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a digging machine, the combination of a traveling bridge, the ends of which are provided with wheels or trucks upon which it is supported, and tracks upon which it travels, a transverse moving carriage thereon, a digging machine supported on the moving carriage, a conveyer belt of canvas or other suitable material, and a conveyer frame of less width than the belt, the said frame provided with raised edges whereby the edges thereof are turned up to form a trough of the upper fold of the belt, intermediate of the end carrying pulleys, substantially as described.

2. The combination of a traveling bridge, a transversely-moving carriage thereon, a digging machine pivotally-connected to and working at right angles with said carriage, a conveyer-frame having raised edges mounted on and extending the length of the bridge, below the pivoted end of said digging machine, an endless conveyer-belt of greater width than the said frame, and an engine whereby the said conveyer-belt may be run in either direction from the lowermost part of said bridge, substantially as set forth.

3. The combination, in a machine of the character described, of a conveyer-frame provided with raised edges, and a flexible endless conveyer of greater width than the said frame, substantially as and for the purpose set forth.

4. The combination, in a digging machine, of the chains C' and removable wearing plates C^2 set across and countersunk in the side-bars of the links composing the said chains, substantially as set forth.

5. The combination, in a digging machine, of a tumbler wheel, removable angular plates set over bolts across said wheel, between the flanges thereof, and other plates detachably secured to said flanges, across the ends of said angular plates, substantially as set forth.

JOHN McMULLEN.
HERMAN KRUSI.
HENRY S. WOOD.

Witnesses:

W. J. MILLER,
J. M. TAYLOR.