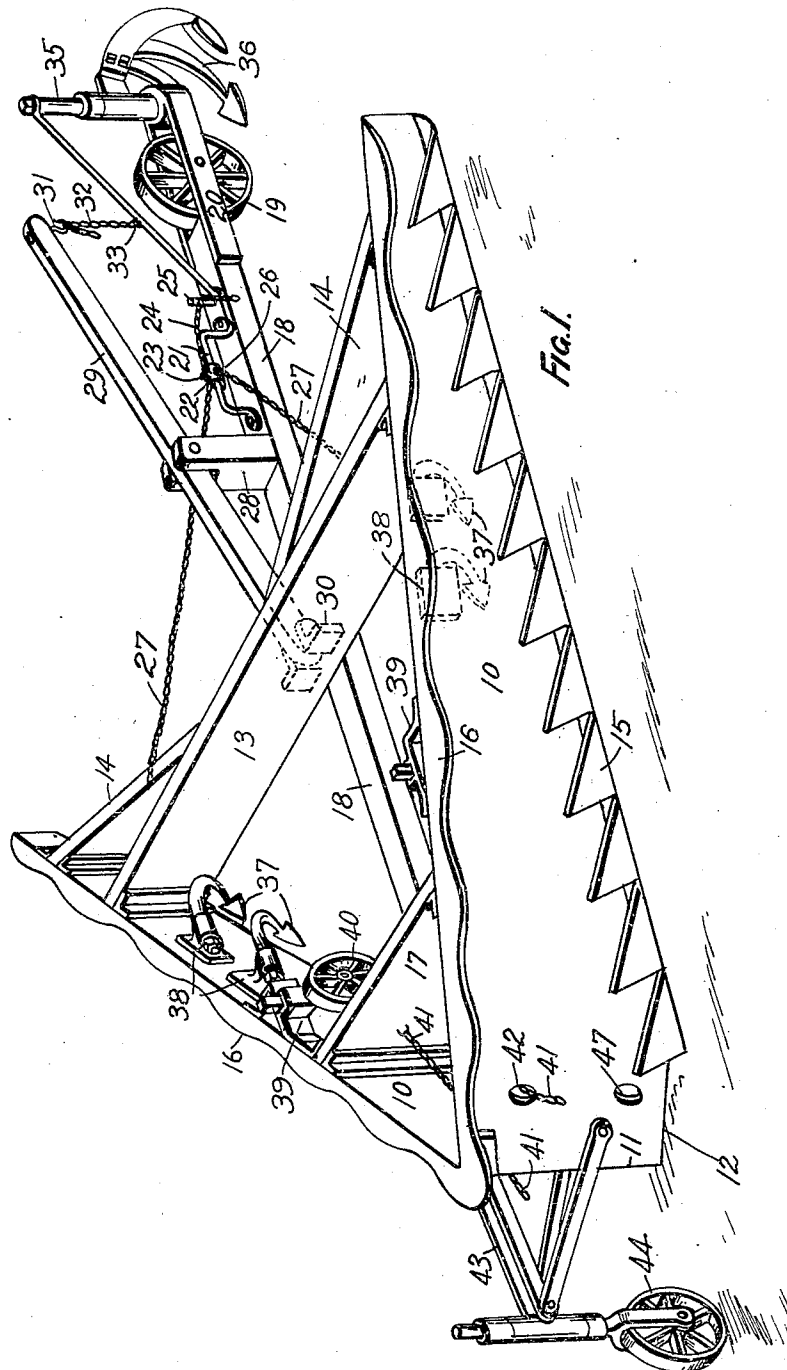


J. F. S. KIRBY.  
EARTH EXCAVATOR.  
APPLICATION FILED NOV. 15, 1909.

954,521.

Patented Apr. 12, 1910.

6 SHEETS—SHEET 1.



Witnesses  
*Smart & Allen*  
C. H. McHenry

Inventor  
John F. S. Kirby.  
*John F. S. Kirby*

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6 SHEETS—SHEET 2.

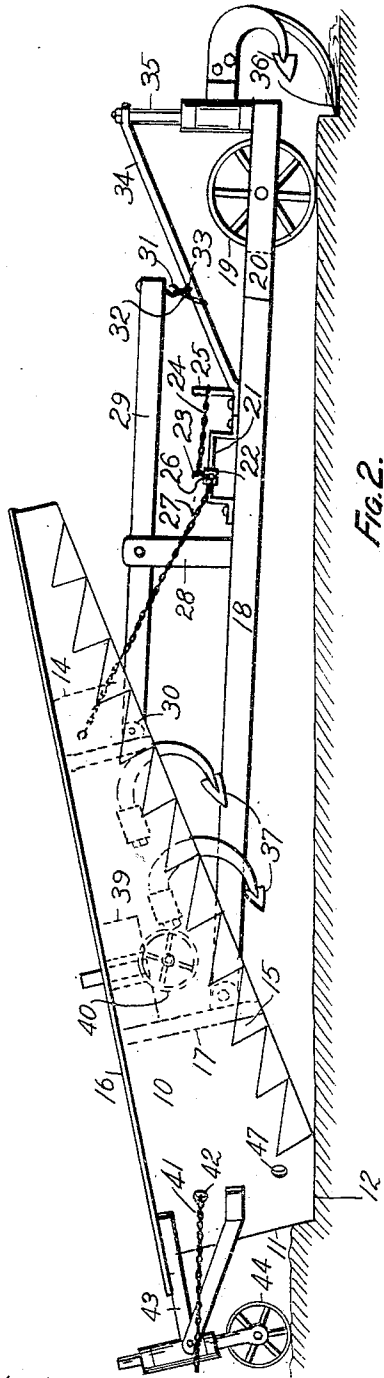


Fig. 2.

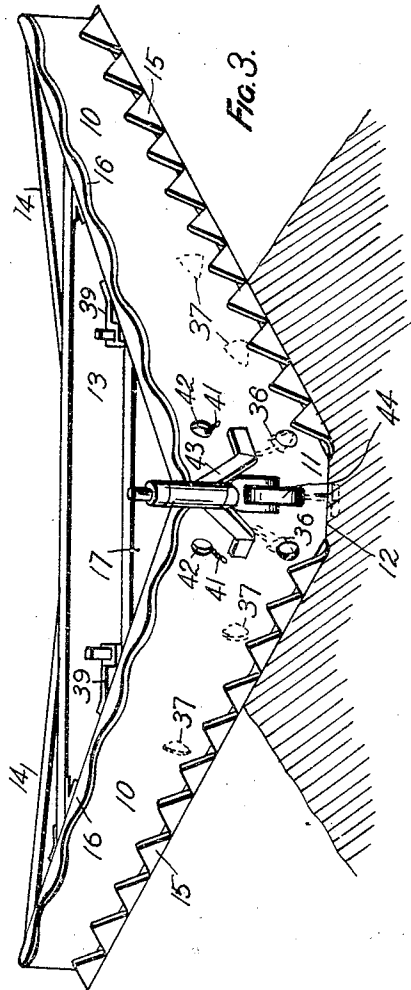


Fig. 3.

Witnesses  
*Stuart W. Allen*  
*C. H. McKim*

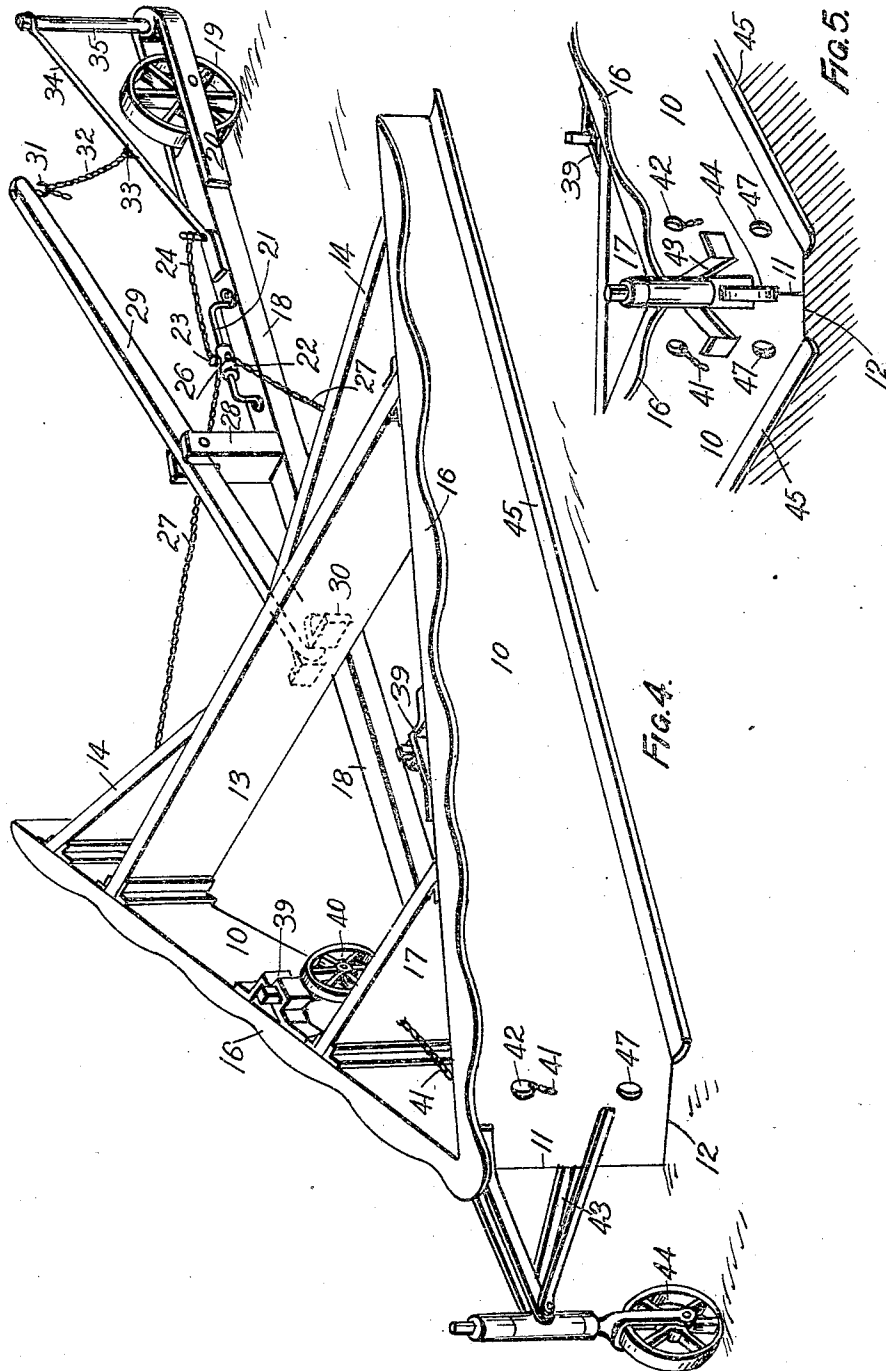
Inventor  
John F. S. Kirby.  
By *Frank F. Lusk*

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6 SHEETS—SHEET 3.



Witnesses  
*Stuart W. Allen*  
*O. H. McHenry*

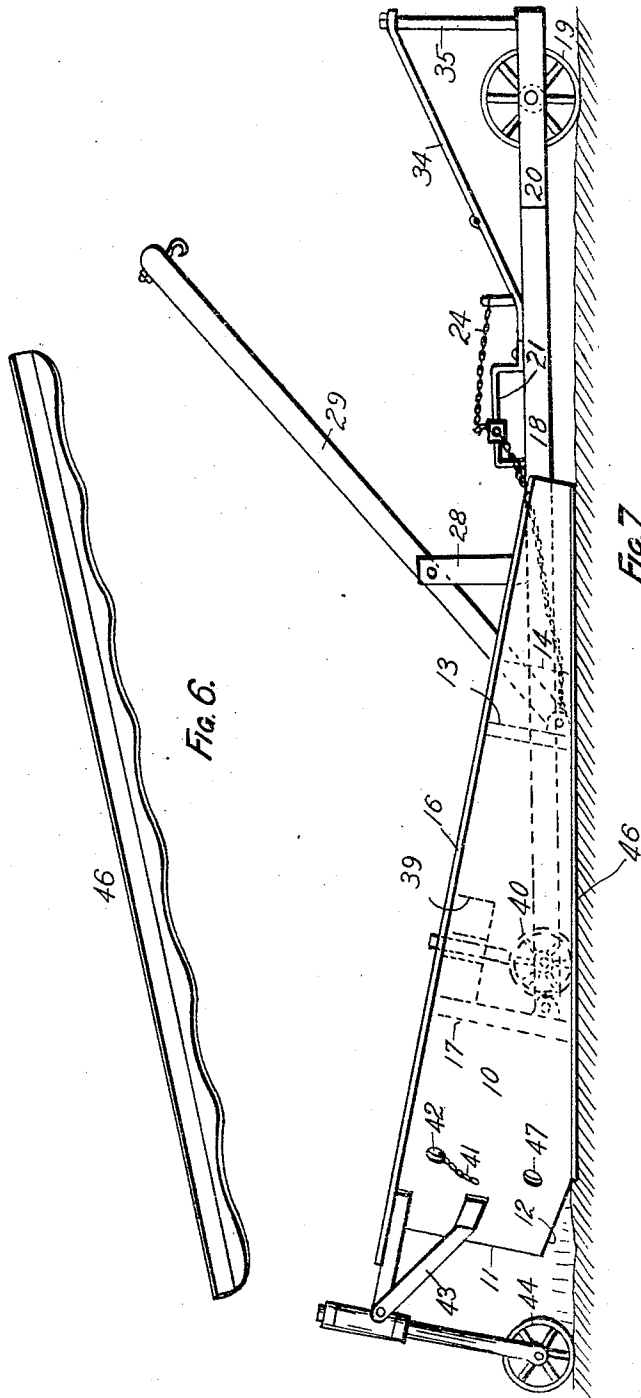
Inventor  
John F. S. Kirby.  
By *Frank S. Kirby*

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6 SHEETS—SHEET 4.



Witnesses  
*Stuart M. Allen*  
*B. R. McHenry*

Inventor  
John F. S. Kirby.  
*14* *Frank S. Edwards*

J. F. S. KIRBY.  
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6 SHEETS—SHEET 5.

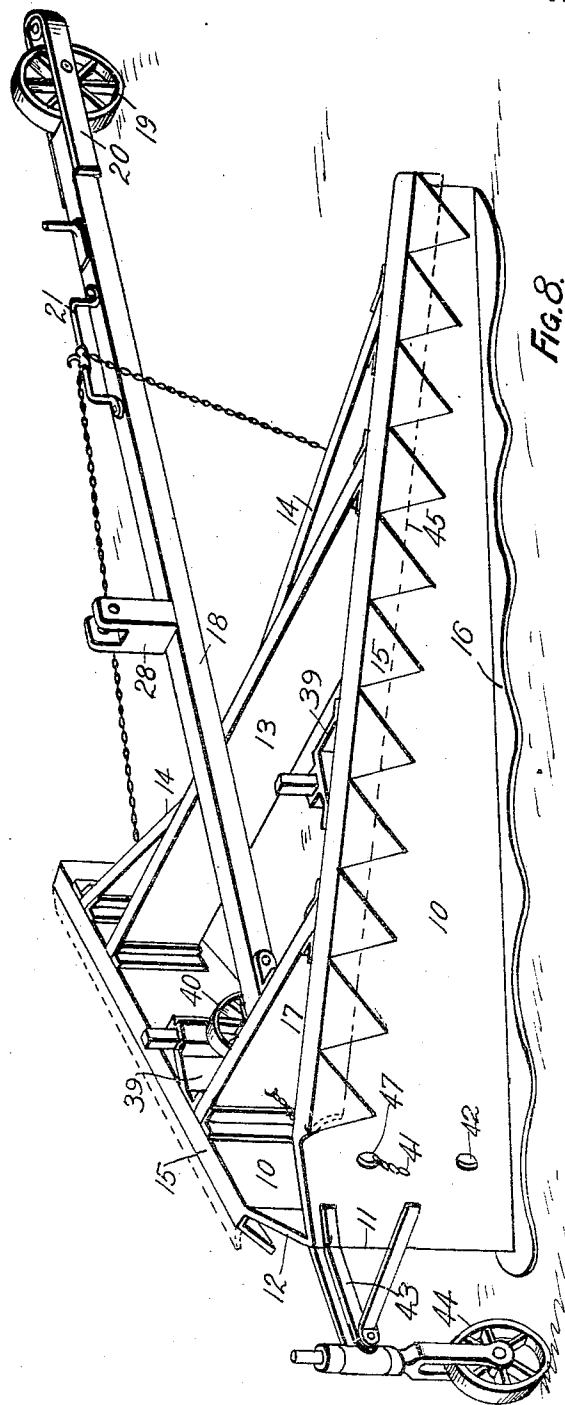


Fig. 8.

Witnesses  
*Stuart R. Allen*  
*C. H. M. Morris*

Inventor  
John F. S. Kirby.  
By *Frank S. Kirby*

J. F. S. KIRBY.  
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6 SHEETS—SHEET 6.

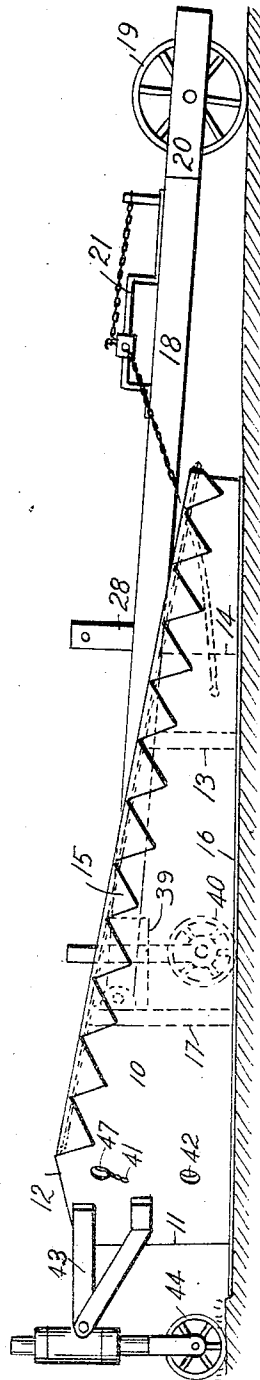


Fig. 9.

Witnesses  
*Smart R. Allen*  
*C. H. M. Kenney*

Inventor  
John F. S. Kirby.  
*By Fred L. Luntz*

# UNITED STATES PATENT OFFICE.

JOHN FRANCIS STEPHEN KIRBY, OF BELARRA, COLLARENEBRI EAST, NEW SOUTH WALES, AUSTRALIA.

## EARTH-EXCAVATOR.

954,521.

Specification of Letters Patent. Patented Apr. 12, 1910.

Application filed November 15, 1909. Serial No. 527,988.

*To all whom it may concern:*

Be it known that I, JOHN FRANCIS STEPHEN KIRBY, a subject of the King of Great Britain and Ireland, residing at Belarra, Collarenebri East, in the State of New South Wales, Commonwealth of Australia, have invented certain new and useful Improvements in Earth Excavators and Levelers, of which the following is a specification.

The object of this invention is to provide an improved drain or ditch excavator capable either of forming an entirely new drain or removing the loose earth or silt from an existing drain or ditch, and which can, when required, be used as a fire-break clearer and ground leveler.

The machine consists mainly of an angular frame the sides of which form the wings, while the apex constitutes the cutting edge or nose. The rearward ends of the wing pieces are held apart by rigid stays bearing on the rearward of two transverse bars which connect the said wing pieces and with them form a rigid frame of great strength.

Along the under edge of each of the wing pieces is attached a suitable blade set at the requisite angle thereto and projecting sufficiently far therefrom to cut away the earth from the sides of the drain, while the spreading wings carry the loosened earth or silt to the top of the sides of the excavation forming a raised bank on either side thereof. These blades are constructed in various forms, serrated, indented or plain as may be required for different classes of work as hereinafter specified. The front of the machine is supported by an adjustable wheel, held in a bracket secured to the nose in such a manner that the latter may be raised or lowered as desired when in operation. Hinged to the forward thwart piece, near the nose, is a central horizontal bar extending backward beyond the rear of the frame and supported at its outer end by a trailing wheel suitably connected thereto. Adjustable chains connect this central bar to the diagonal stays extending from the ends of the wings to points near the center of the rearward transverse bar, and hold the frame in its proper relative position to the said bar, while a set of adjustable wheels, connected by suitable brackets to the inner faces of the wing pieces are provided for transportation purposes but these are capable of being

raised, by suitable means, clear of the surface of the sides of the drain when the machine is in actual work.

On the inner face of each wing piece and also at the rear end of the central bar are adjustably secured a series of shovel-cutters for the purpose of breaking the ground below the level cleared by the operation of the machine. These cutters are capable of being raised from contact with the ground when not required.

When it is desired to use the machine for cutting a fire-break or leveling the surface of the ground, the wing pieces are fitted at their upper edges with suitable indented blades projecting horizontally, and the frame inverted, the various parts being made detachable to admit of this being done. But in order to make my invention clearly understood I will now refer to the accompanying drawings in which:—

Figure 1 is a perspective view of the machine complete as used for cutting a new drain. Fig. 2 is a side elevation thereof. Fig. 3 is a front view thereof. Fig. 4 is a perspective view of the machine as used for removing silt, etc., from a drain. Fig. 5 is a front view of a portion thereof. Fig. 6 is a perspective view of an indented blade. Fig. 7 is a perspective view of the machine as used for removing grass or leveling the ground when the indented blades are substituted for the serrated ones attached to the under edges of the wings. Fig. 8 is a perspective view of the machine when inverted and used for removing grass or leveling the surface of the ground by means of the indented blades attached to the normally upper edges of the wings; Fig. 9 is a side elevation thereof.

Referring to Figs. 1, 2 and 3:—The two sides 10, 10 of the angular frame form, at their junction, the nose 11 which is undercut as shown at 12. The wing pieces 10, 10, taper toward their rearward ends where they are stayed by the diagonal pieces 14, 14, which connect with a thwart piece 13 near the central point thereof as shown. To the under edge of each of the wings 10, 10, is affixed the horizontally projecting blade 15 extending the entire length thereof and carrying a series of saw-teeth set at right angles thereto as shown. To the top edge is affixed the horizontally projecting indented

blade 16 for the purpose hereinafter stated. Near the nose is the forward thwart piece 17 to which is pivotally attached the central longitudinal bar 18 supported at its rearward end by the trailing wheel 19 having bearings in the U shaped bracket 20 secured to the said bar. This bar carries a staple bracket 21 provided with a sliding sleeve 22 having a hook 23 engaging one end of an adjusting chain 24, the other end of which engages with a stud 25 also fixed in the said bar. Two sides hooks 26, 26, are also attached to the sleeve 22 engaging one end of each of the stay chains 27, 27, the other ends of which are secured to the diagonal stays 14, 14. This system of chains serves to hold the various parts of the machine in their proper relative positions as adjusted by the operation of the lever 29 fulcrumed on the bracket 28 and secured at one end in the bracket 30 on the thwart piece 13, the other end being adjustably secured by means of the chain 32 engaging with the hook 31 on the lever and an eye hole 33 in the stay bar 34. This stay bar secures in a perpendicular position, relative to the bar 18, the rod or pin 35 fixed in the bracket 20 and carrying a set of trailing shovel-cutters 36 provided for the purpose of breaking the ground below the level of that removed by the operation of the wing-pieces so as to facilitate a second cut should such be necessary. To the inside of each of the wing-pieces is affixed a set of similar cutters 37, 37, fulcrumed in brackets 38, 38, for the purpose of performing a similar function. All these sets of cutters are detachable so as to be capable of being readily removed or thrown out of operation. Between the thwart pieces 13 and 17 or in any suitable position are provided the vertically adjustable wheels 40, 40, supported by the angular brackets 39, 39, (attached to the inner faces of the wing-pieces) and acting in conjunction with the rear wheel 19 as a triangular wheel base by means of which the machine may be readily transported from place to place. The wheels 40, 40, may be readily raised from contact with the ground when the machine is in operation. Secured to the thwart piece 17 are the draft chains 41, 41, passing through orifices 42, 42, in the wing-pieces to which is transmitted the traction power necessary to move the machine. To the nose of the machine is attached a bracket 43 carrying a vertically adjustable wheel 44 by means of which the nose may be raised or lowered in order to regulate the depth of the cut.

In operation; the wheel 44 is set to give the required depth of cut, and the rear of the angular frame raised by the lever 29 so as to bring the point of the nose into cutting contact with ground and the rearward ends of the wing-pieces inclined upward at an

angle necessary to give the required batter to the sides of the drain as indicated in Fig. 2. As the machine is drawn forward the nose 11 cuts a groove or channel which is further widened and formed V shaped by the blades 15, 15, while the wing-pieces deposit the excavated material on the top of the sides of the drain. The transportation of the machine when out of operation may be accomplished as before described.

Referring now to Figs. 4 and 5, it will be seen that the blades 15, 15 have been removed and in their place are affixed the plain curved blades 45 designed for cleaning out the silt or loose dirt from an existing drain. As the cutters 36 and 37 shown in Figs. 1 and 2 are not required in this operation they are not shown. The wheel 44 is not necessary in this instance, but is shown in position and may be used or not as desired or required.

In operation; the machine is drawn along an existing drain. The nose 11 breaks the material in the bottom of the drain while the onward movement of the machine carries it to the top of the banks.

Referring to Figs. 6 and 7, the curved blades 45, 45, have been removed and in their place are affixed having the included angle of their two sides slightly greater than a right angle in order that the weight may rest on the outer or cutting edges the indented blades 46, 46, the rear of the angular frame being lowered by the release of the lever 29 so that the blades assume a position parallel with the general surface of the ground. This movement raises the nose 11 clear of the ground and the machine as thus set is adapted to be used for the purpose of leveling the ground or clearing grass to form a fire break.

Referring to Figs. 8 and 9 the frame of the machine is shown turned completely over so that the indented blades 16, 16, shown in the preceding figures affixed to the upper edges of the wing-pieces and having their included angle slightly greater than a right angle similarly to blade 46, 46, are now in contact with the surface of the ground. The drag chains 41, 41, are passed through holes 47, 47, instead of through the holes 42, 42. The bar 18 and the wheel bracket 43 are not inverted with the frame, but detached therefrom and reattached thereto. The machine as here shown is stripped of the parts which are not required when it is being used for leveling ground or clearing grass.

In operation; the machine as described in reference to Figs. 6, 7, 8 and 9 is drawn over the surface of the ground:—The indented blades 16, 16, or 46, 46, as the case may be, stripping off the grass and leveling off any inequalities. The weight of the machine itself is sufficient to enable it to do this

work; the wings throwing the surplus material in the form of a bank on either side of the cleared and leveled strip.

What I claim and desire to secure by Letters Patent is:—

1. In an improved combined drain-excavator, earth-leveler and fire-break cutter, an angular frame capable of having its rearward end lifted and its nose depressed by the action of a central lever, hinged to a rearward thwart-piece and fulcrumed on a longitudinal central bar such as herein described; all for the purposes herein set forth and substantially as described.

2. In a device of the class described, an angular frame, a pair of retaining chains secured at one end to said frame, a central longitudinal bar, a suitable bracket secured to said bar, and a sliding sleeve on said bracket, the free ends of said retaining chains being connected with the sliding sleeve, substantially as described.

3. In an improved combined drain-exca-

vator, earth-leveler and fire-break cutter, an angular frame consisting of wing-pieces such as 10, 10, thwart pieces such as 13 and 17 and provided with cutting blades such as herein described; in combination with a central longitudinal supporting bar such as 18 hinged to the forward thwart-piece and supported by a trailing wheel, and an adjustment lever such as 29; all for the purposes herein set forth and substantially as described and as illustrated.

4. In a device of the class described, the combination with an adjustable angular frame, a lever connected therewith, of a longitudinal central bar in combination with a series of shovel-cutters, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN FRANCIS STEPHEN KIRBY.

Witnesses:

WILLIAM NEWTON,  
CHARLES HATTON.