

No. 720,841.

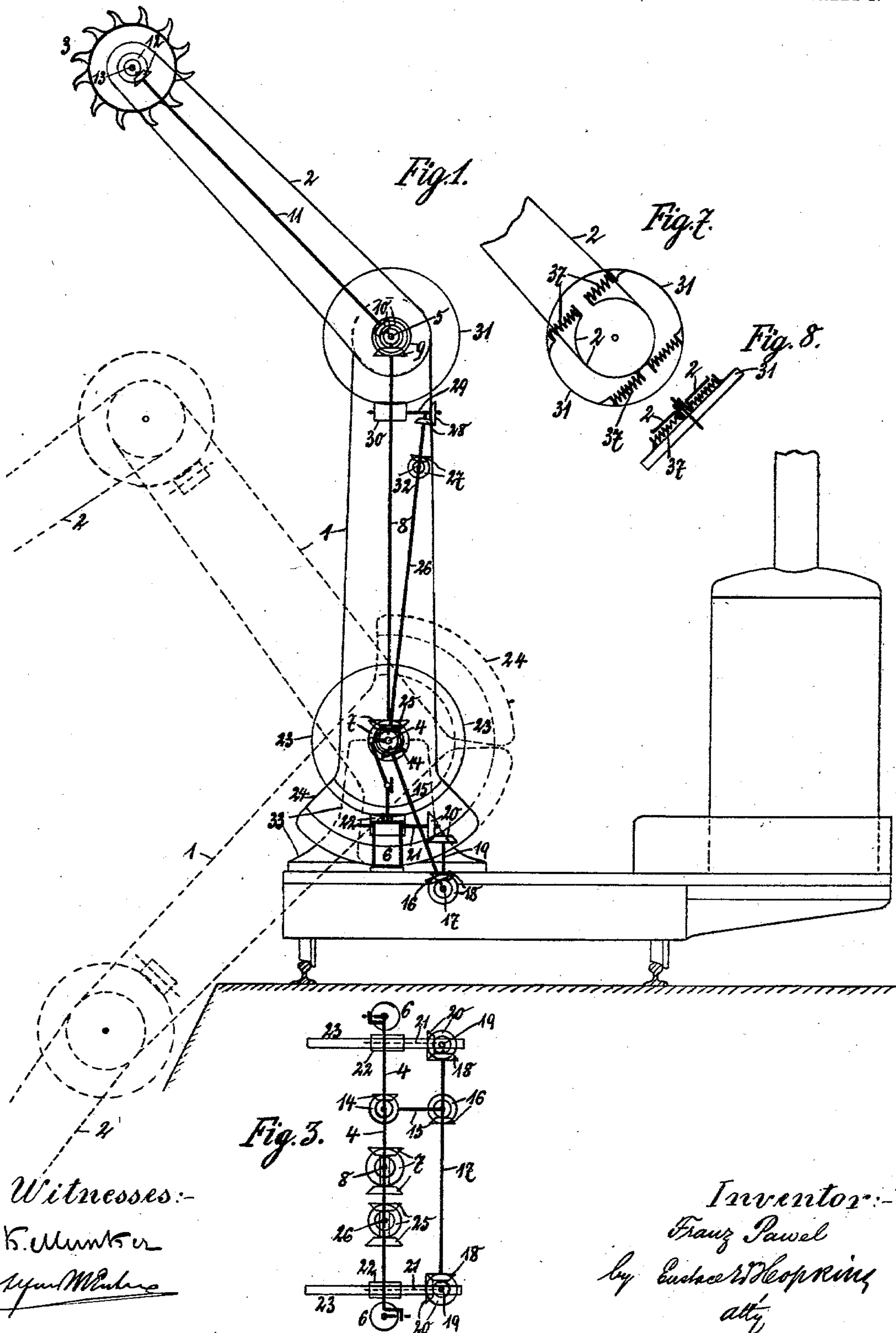
PATENTED FEB. 17, 1903.

F. PAWEL.
APPARATUS FOR PERFORMING EARTHWORKS.

APPLICATION FILED SEPT. 11, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



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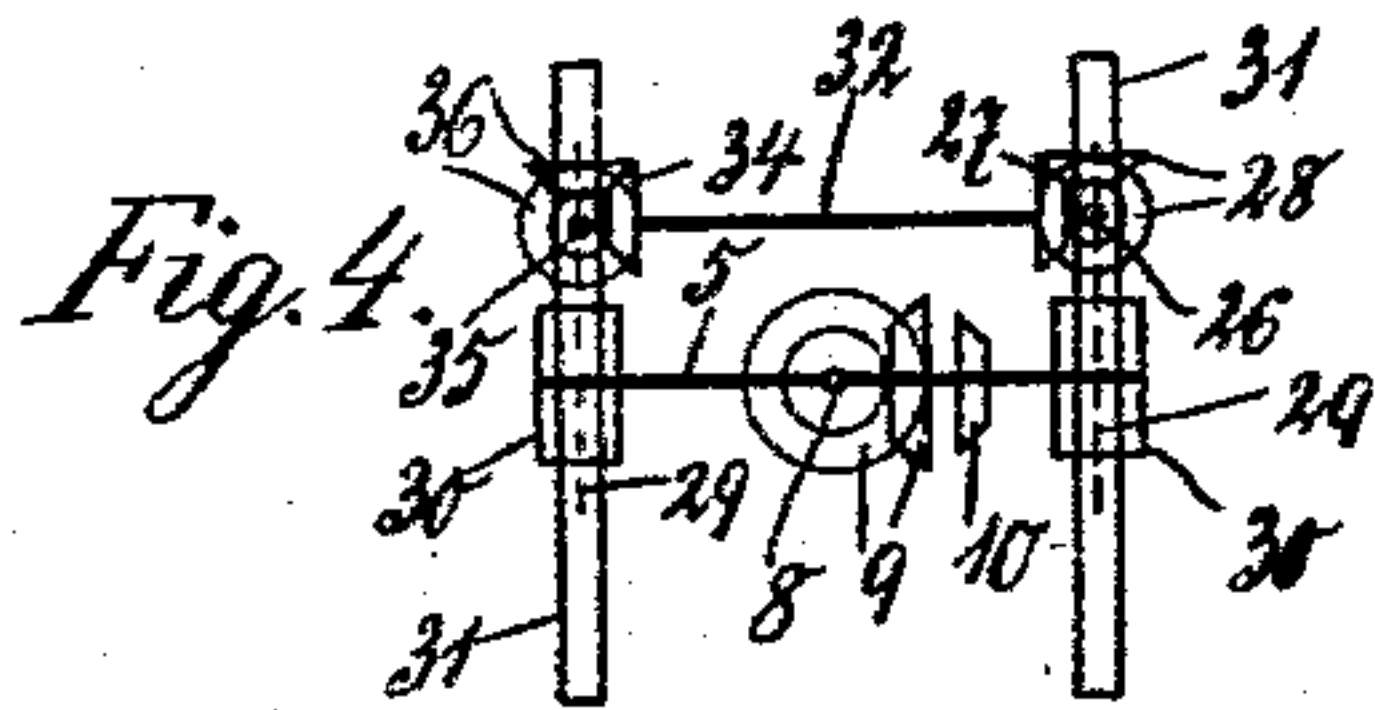
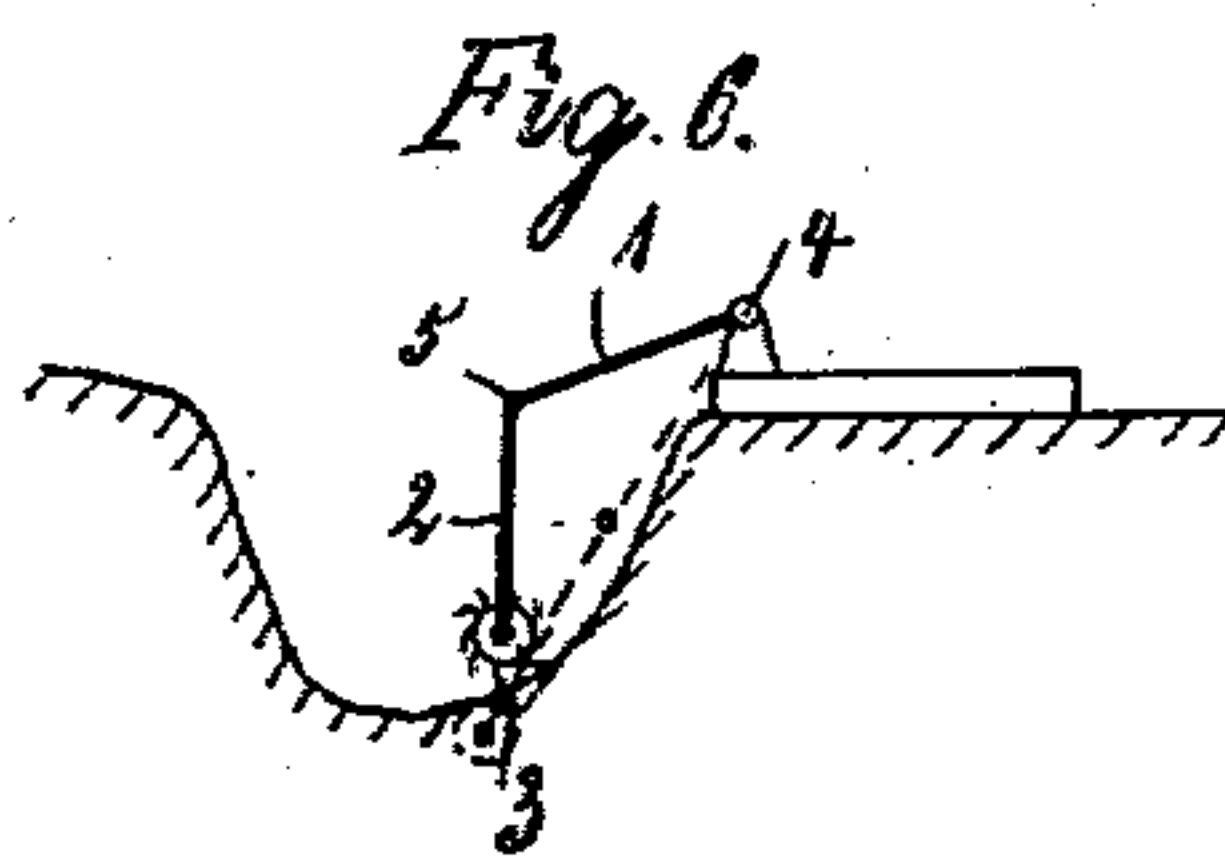
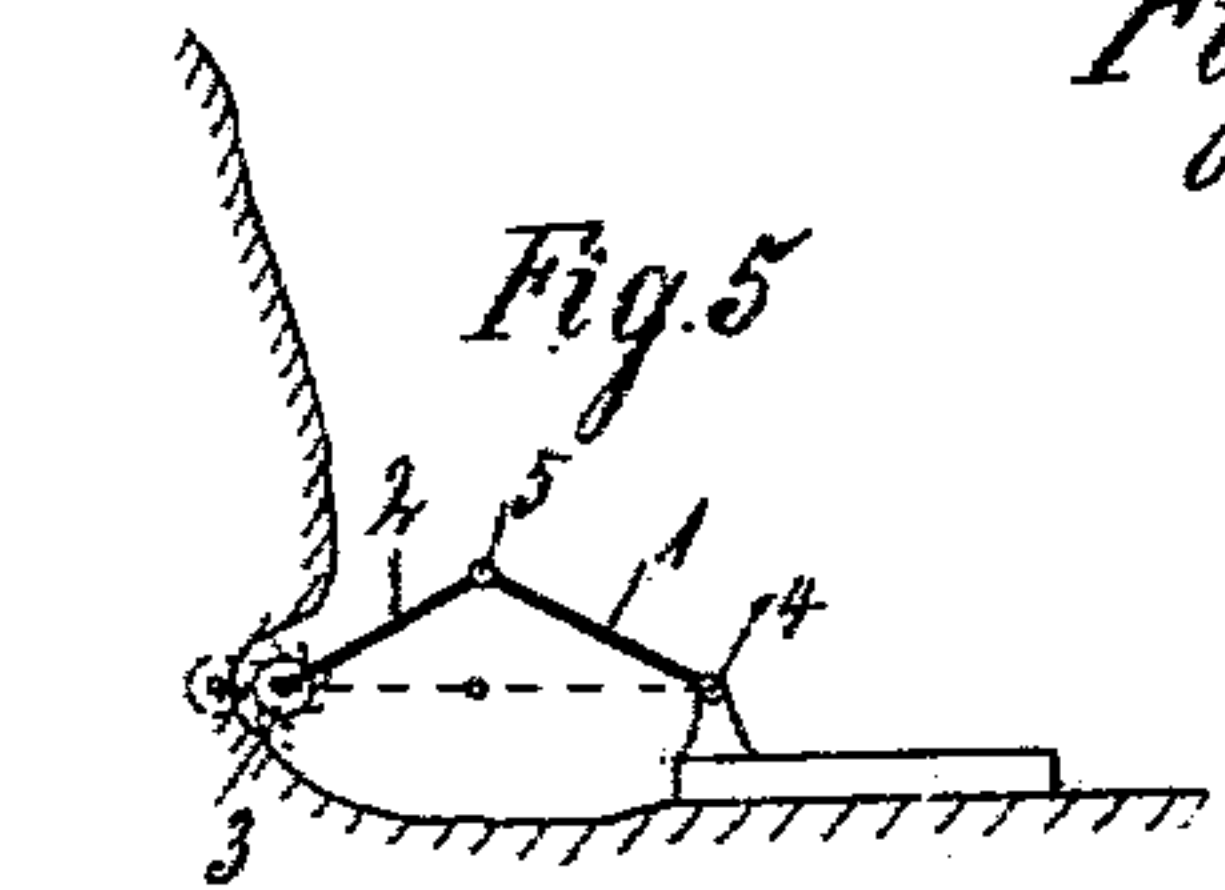
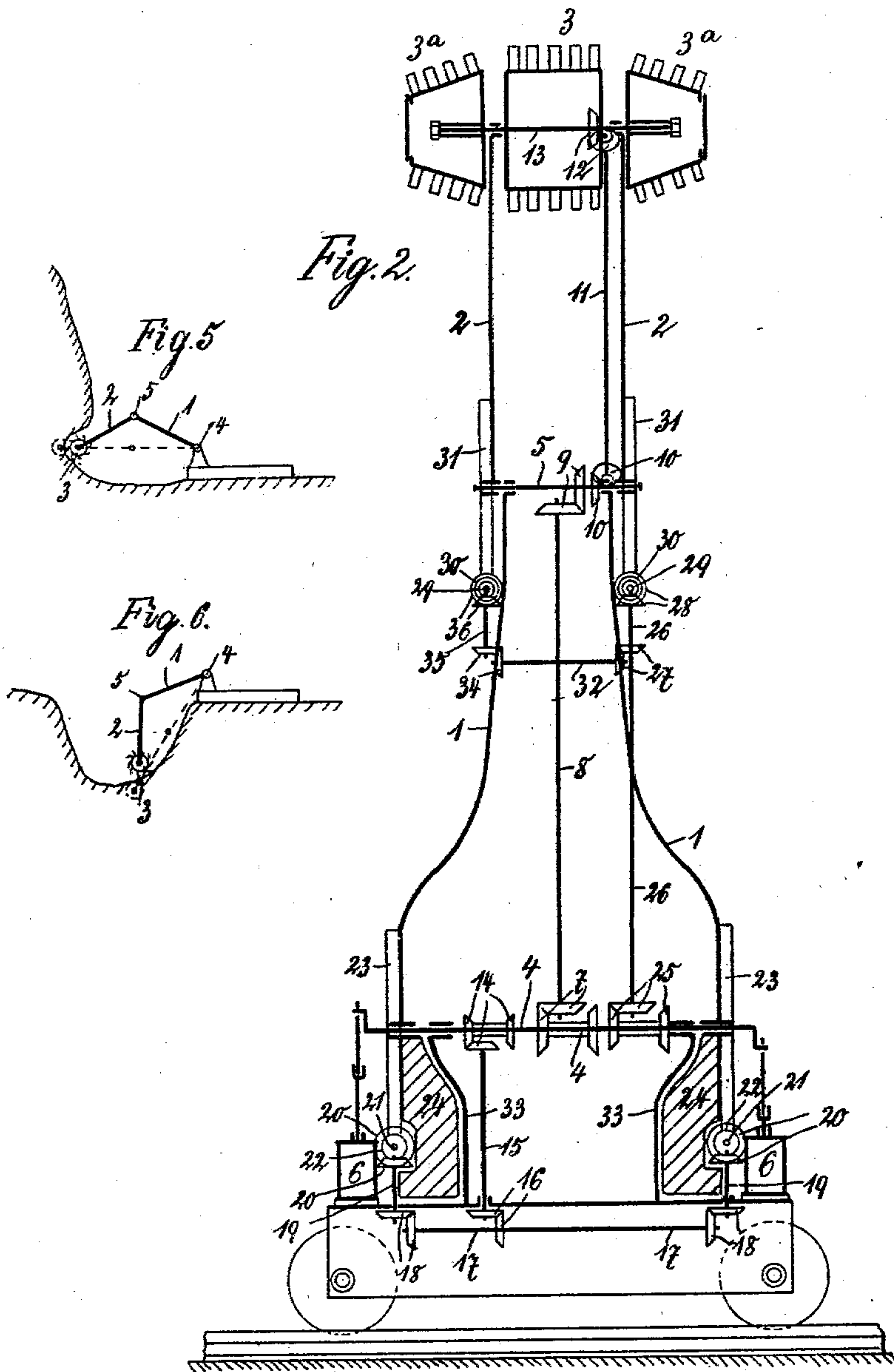
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2 SHEETS—SHEET 2.



Witnesses:-
K. Muntser
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UNITED STATES PATENT OFFICE.

FRANZ PAWEL, OF HANOVER, GERMANY.

APPARATUS FOR PERFORMING EARTHWORKS.

SPECIFICATION forming part of Letters Patent No. 720,841, dated February 17, 1903.

Application filed September 11, 1902. Serial No. 123,006. (No model.)

To all whom it may concern:

Be it known that I, FRANZ PAWEL, a subject of the German Emperor, and a resident of Hanover, German Empire, have invented certain new and useful Apparatus for Performing Earthworks, of which the following is a full, clear, and exact description.

The present invention consists of an apparatus for loosening the soil in connection with earthworks, the said apparatus being particularly adapted for working hard ground in cases where the ordinary dredgers would not be sufficiently strong to work the ground. The device is not intended to carry off the soil loosened, but merely to break up and undermine the parts to be removed, while the material loosened may subsequently be taken off by dredgers or other means.

In order to render the present specification easily intelligible, reference is had to the accompanying drawings, in which similar numerals of reference denote similar parts throughout the several views.

Figure 1 is a side elevation of the apparatus; Fig. 2, a front view of the same; Fig. 3, a plan of the lower part of the apparatus; Fig. 4, a plan of the upper joint; Figs. 5 and 6, diagrams showing the different positions of the parts for performing different classes of work, and Figs. 7 and 8 detail views of a spring arrangement of the parts.

The drawings are not constructional, but show the arrangement of the parts diagrammatically for the sake of greater clearness.

The lower member 1 of the frame is mounted on the shaft 4, which is advantageously the driving-shaft for the whole apparatus. At the top of the lower member 1 a shaft 5 is provided, on which is mounted the upper member 2, said upper member being thus hinged to the top of the lower member. At the top of the upper member a shaft 13 is mounted in suitable bearings, and this shaft carries the tool or rock working or loosening drum 3, at either side of which may be arranged auxiliary drums 3^a. The rotation of these drums, as also the adjustment of the members of the frames to the various positions indicated in dotted lines in Fig. 1 and in the diagrams in Figs. 5 and 6, is effected from the main driving-shaft 4 by means of the gearing, which will now be described.

At about the center of the shaft 4 change bevel-gears 7 are provided, by means of which the shaft 5 may be rotated by the aid of the vertical shaft 8 and bevel-gearing 9 in either direction, according to which of the bevels 7 of shaft 4 is in engagement. A pair of bevel-gears 10 connect the shaft 5 to the vertical spindle 11, while the bevels 12 are employed to gear up the said vertical spindle 11 to the shaft 13 of the tool-drums 3 3^a. The bevel-gears are all fast to their respective shafts, so that when the shaft 4 is rotated the drums 3 3^a will be rotated in either direction. The bevel-gearing 7 may also be so arranged that it may be thrown out of engagement with both of its bevels, so that the shaft 4 may run freely, as will be readily understood.

From the above description and the drawings it will be evident that when in engagement the drums may be rotated whatever the position of the members of the frame (1 and 2) may be.

The members 1 and 2 are adjusted as regards each other in the following manner: Centered on the shaft 4 and fast to the lower part 1 of the frame a worm-wheel 23 is provided, at each side of the same, and worms 22 on shafts 21 engage the same. Shafts 21 are each provided with bevel-gearing 20, coupled by means of short vertical shafts 19 and bevels 18 to a shaft 17, mounted in the stationary part of the frame and driven by means of bevels 16, vertical shaft 15, and change bevel-gearing 14 from the main driving-shaft 4. The bevel-gearing 14 is such that the shaft 17, and with it the pair of worms 22, may be driven in either direction or thrown out of gear with the shaft 4. The lower part of the member 1 is provided with suitable counterpoise 24, and when the worms 22 are turned they will turn the worm-wheels 23 of the member 1 and raise or lower the same around the shaft 4, as will be readily understood. The upper member 2 is also adjusted on the lower one from the shaft 4 by means of change bevel-gearing 25 of a similar description to the gearing 14. The gearing 25 drives the vertical shaft 26, which drives the two worms 30 by means of gearing 28 direct to one worm-shaft 29 and gearing 27, shaft 32, gearing 34, shaft 35, and bevel-gearing 36 to the opposite shaft 29 of the second worm.

(See Figs. 1, 2, and 4.) The worms 30 are in engagement with worm-wheels 31 at each side of the lower part of the upper member 2. The shaft 4 may be driven by the engines 6 and suitable crank-arms. The whole apparatus may be mounted on wheels to run on rails, and the trolley thus formed may also be driven by any known device from the shaft 4.

In order to avoid shaking or vibration as much as possible, springs 37, Figs. 7 and 8, may be arranged between the worm-wheels 31 and the upper member 2, so as to form a spring connection between these parts. The same arrangement might also be made in connection with the worm-wheels 23 and the lower member 1.

It will be obvious that the apparatus is not confined to the employment of two members. Three or more might be used and driven in a similar manner, and in place of the bevel-gearing other mechanical equivalents might be used. In some cases it might be advisable to make the members 1 and 2 telescopic, in which case the vertical connecting-shafts would also have to be telescopically arranged and coupled by a slot-and-pin device, as will be readily understood.

As will be seen from Fig. 5, the apparatus may be used for undermining purposes, or, as shown in Fig. 6, for loosening the hard or rocky soil in channels or canals, or for working embankments, as illustrated in dotted lines in Fig. 1.

I claim as my invention—

1. An apparatus for loosening hard or rocky soil, consisting of a plurality of members hinged together, a rotary working tool mounted on the top member, means for adjusting

the members on their pivots as regards each other and means for rotating the tool at the top of the upper member in any position of the said members substantially as described.

2. An apparatus of the class specified, consisting of a series of members hinged together, a rotary working tool at the top of the top member, a single driving-shaft and gearing to adjust the members as regards each other and to rotate the tool in any position of the said members in the manner and for the purpose substantially as described.

3. An apparatus of the class specified, consisting of a series of members pivotally connected together, means for retaining the same at any desired angles one to the other, and for adjusting them to such angle, a rotary tool at the top of the uppermost member, a counterpoise at the lower part of the lowermost member in the manner and for the purpose substantially as described.

4. An apparatus of the class specified, consisting of a series of members pivoted one to the top of the other, a rotary working tool at the top of the uppermost member, means for adjusting the members to any desired angle one to the other, and spring connections between the said members and the adjusting parts and means for rotating the tool when the parts are in any position substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

FRANZ PAWEL.

Witnesses:

EMMA G. WHITE,
LÜISE KNOKE.