Sept. 22, 1936. H. SIEBERT 2,055,111

EXCAVATOR

Filed Aug. 3, 1934 2 Sheets-Sheet 1

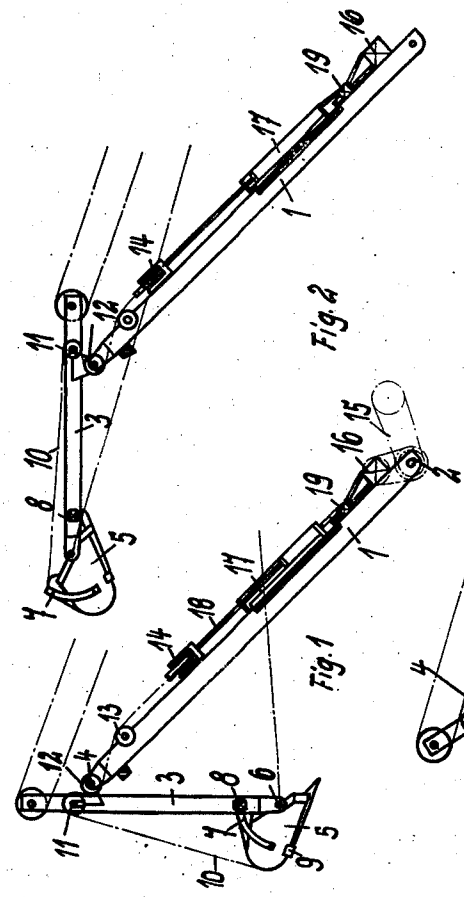


Fig. 2



Fig. 1

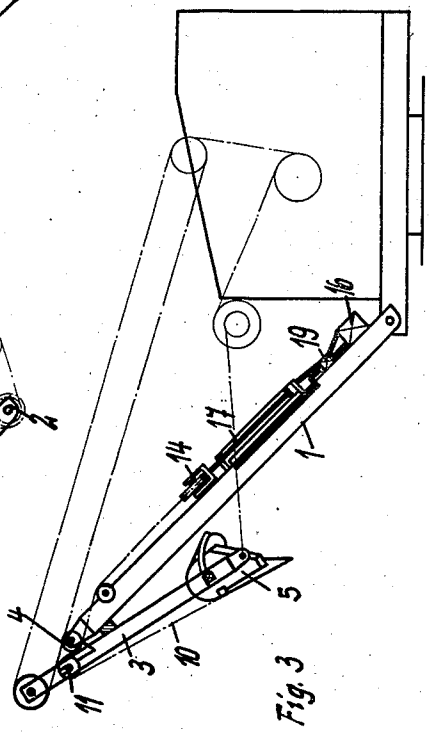


Fig. 3

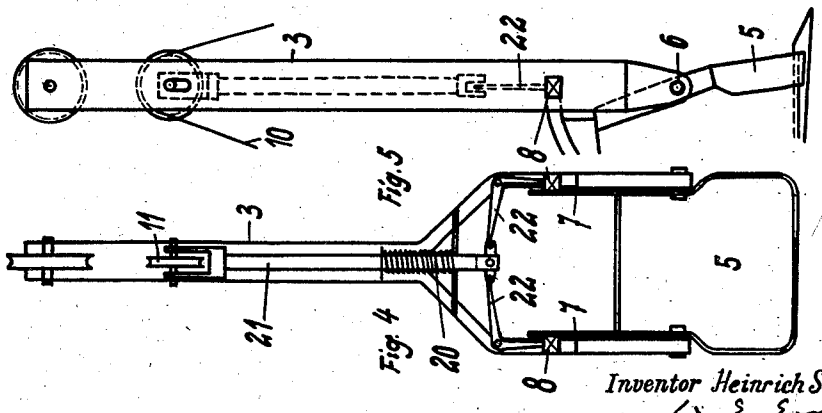


Fig. 5



Fig. 4

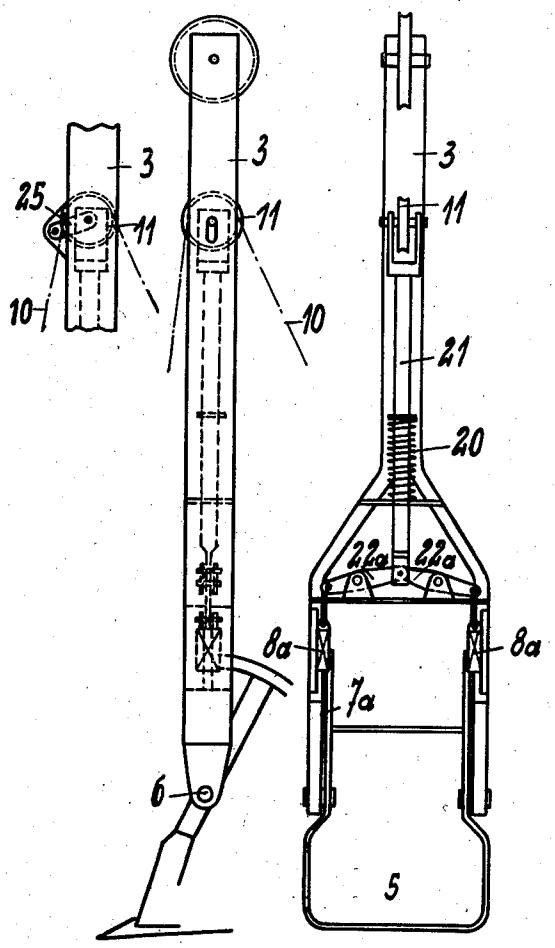
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Fig. 8 Fig. 6 Fig. 7




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# UNITED STATES PATENT OFFICE

2,055,111

## EXCAVATOR

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Application August 3, 1934, Serial No. 738,227
In Germany August 12, 1933

4 Claims. (Cl. 214—140)

The invention relates to an excavator, the shovel of which during the digging movement is maintained in determined relation to the haft by means of stops or projecting members applied on the haft, while after the digging movement is completed the shovel can be emptied irrespective of the position of the haft.

The invention consists in simplified means for controlling the shovel, the stops or projecting members by means of which the shovel is maintained in fixed relation to the haft being controlled by the shovel tipping mechanism, but more particularly by the tipping rope or cable itself.

The invention is diagrammatically illustrated by way of example in the accompanying drawings.

Figures 1 to 3 show the jib system of the excavator according to the invention, in three different positions.

Figures 4 and 5 show the haft and shovel.

Figures 6 and 7 illustrate a modification of construction of the stops or projecting members and Figure 8 a modification of construction of the guide for the tipping rope or cable.

As in known constructions of shovel excavators the excavator according to the invention comprises a jib 1 which is provided capable of luffing on the spindle 2. At its upper end the jib carries the shovel haft 3, which is pivotally connected at 4 to the jib 1. The excavator shovel 5 is capable of a swinging movement on the haft 3 about the spindle 6. During the digging operation, a segmental member 7, which may be a rail, a guide slot or the like, bears against a stop or projecting member 8; the latter may be replaced by a clamping device, a lock or brake. A tipping rope or cable 10 is made fast to the excavator shovel at the front side, approximately at the position 9; the rope or cable 10 then passes over the pulleys 11, 12, 13 and is operated by means of a movable pulley 14. The operation of the members hereinbefore described is effected from the operator's hut by means of a chain 15 or by a similar drive having an intermediate spindle lying coaxially with the jib spindle 2 and which drives a pump 16. The pressure medium from the pump 16 (a liquid or air under pressure) is fed to a cylinder 17, the piston within the cylinder 17 having a rod 18 connected to the carrier of the pulley 14. The pipes connecting the pump 16 to the cylinder 17 are connected through a control member 19 serving to couple the pipes together either transversely or in parallel, and in its middle position providing a short-circuit connection between the two pipes coming from the cylinder 17. Furthermore, the control member 19 may be adapted to take up a position in which both sides of the cylinder 17 are obstructed. This applies, however, only to an intermediate position. The hydraulic driving gear and its control mechanism do not constitute the subject-matter of the present invention, and may be replaced by any other suitable gearing, such, for example, as a winch.

The mechanism operates as follows:—

According to Figure 1, during the digging movement the stops or projecting members 8 are engaged by the segmental member or rail 7 which takes up a position in advance of the stops or projecting members in the movement of the shovel to the digging position in relation to the haft 3. The shovel is thus supported against the resistance offered by the earth in the digging operation. After the completion of the digging movement, the haft 3 takes up its innermost position. As the resistance of the earth is no longer effective, the shovel 5 so disposes itself that the center of gravity lies below the spindle 6, so that the shovel will swing freely. In this position the rope or cable 10 is loose. Thereupon the haft 3 is swung outwardly so that it reaches the position shown in Figure 2. As the shovel is loosely suspended this swinging movement does not cause the contents to be discharged so that the shovel can be moved without danger from the extreme inward to the extreme outward position by a swinging movement of the haft 3. The rope or cable 10 is loose and offers no appreciable resistance to the position taken up by the shovel 5.

If the shovel 5 is to be emptied this can be effected in any position—even the most inward—of the shovel; this operation is shown in Figure 3. By means of the shovel tipping mechanism the roller 14 is drawn downwardly and the rope 10 begins to tip the shovel. At first the segmental member 7 presses against the stops or projecting members 8. The pulley 11 is, however, not secured to the haft 3 but is provided to move in a slot 11*a*, and it is therefore pressed downwardly by the pull of the rope, the pressure of the spring 20 on the pulley carrier 21 being overcome in this movement. The pulley carrier 21 is connected to the levers 22 which move the stops or projecting members 9 in a direction parallel with the pivotal axis of the shovel and in this way withdraw them from the path of the segmental member 7 and allow the shovel to make the tipping movement. By means of the

tipping rope 10 the shovel 5 is then overturned until it reaches the position shown in Figure 3 and is completely emptied of its contents.

The shovel can be locked directly to the haft by bolts which are adapted to project into the track of one of the parts of the shovel. Such a construction is shown in Figures 6 and 7, according to which the levers 22a act on the slides 8a, which constitute the stops or projecting members for the extended side walls 7a of the shovel and are adapted to be withdrawn in the upward direction. The pulley 11 does not necessarily require to run in a guide slot but may instead be pivoted on a lever 25, as illustrated in Figure 8. In all the examples, however, the movement of the stops or projecting members, is automatic, the rope or its driving gear being capable of effecting the inward or outward movement of the stops or projecting members for the shovel according to the tension applied without any special manipulation.

The hydraulic shovel tipping mechanism may be replaced by any known mechanical driving means for controlling the stops or projecting members during the tipping of the shovel by the use of gearing rods or the like.

I claim:—

1. A drag-shovel excavator, comprising a shovel haft, a shovel pivotally mounted upon the said haft, movable restraining members upon the said haft for determining the position of the shovel relatively to the haft in the digging movement, a flexible element for tipping the shovel, a pulley upon the haft over which the flexible element is carried, the said pulley being relatively movable upon the haft and connected to the restraining members, and an element upon the haft for opposing the movement of the pulley, the flexible element when tipping the shovel withdrawing the restraining members and freeing the shovel in all positions of the haft.

2. A drag-shovel excavator, comprising a shovel haft, a shovel pivotally mounted upon the said haft, movable restraining members upon the said haft for determining the position of the shovel relatively to the haft in the digging movement, an operating element mounted upon and having limited longitudinal movement with respect to the haft, the said operating element being connected to the restraining members, a pulley supported upon said operating element, a flexible element connected to the shovel and passing over the said pulley, the said flexible element serving for tipping the shovel in all positions of the haft and for freeing the shovel from the restraining members, and a spring applied to the operating element to maintain the restraining members in the operative position.

3. A drag-shovel excavator according to claim 2, comprising levers connected between the restraining members and the operating element.

4. A drag shovel excavator comprising a jib, a shovel haft pivotally mounted on the said jib, a shovel pivotally mounted on the said haft, moveable restraining members upon the said haft for determining the position of the shovel relatively to the haft in the digging movement, a spring mounted operating element provided upon and having longitudinal movement with respect to the haft, the said operating element being connected to the restraining members, and a flexible element for tipping the shovel and engaging directly the said operating element to move it for the withdrawal of the restraining members in all positions of the haft.

HEINRICH SIEBERT.