Feb. 20, 1973 H. SCHAEFF 3,717,269

MOBILE SHOVEL EXCAVATOR

Original Filed Oct. 25, 1968 2 Sheets-Sheet 1

Fig. 1

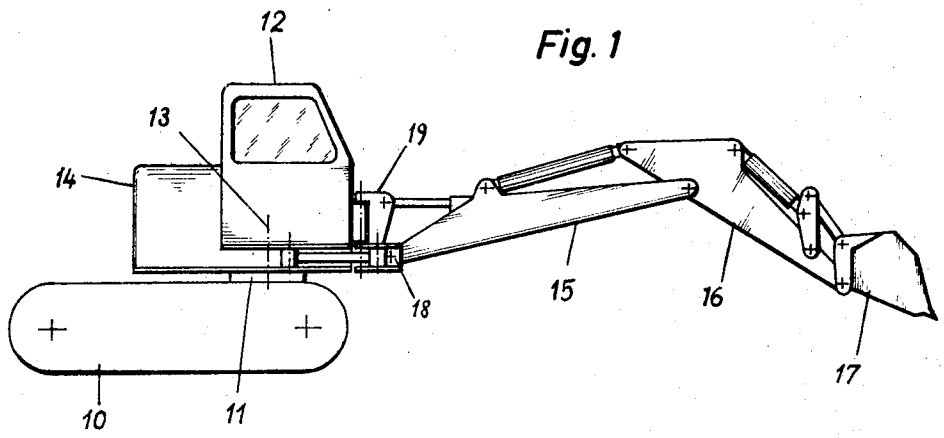
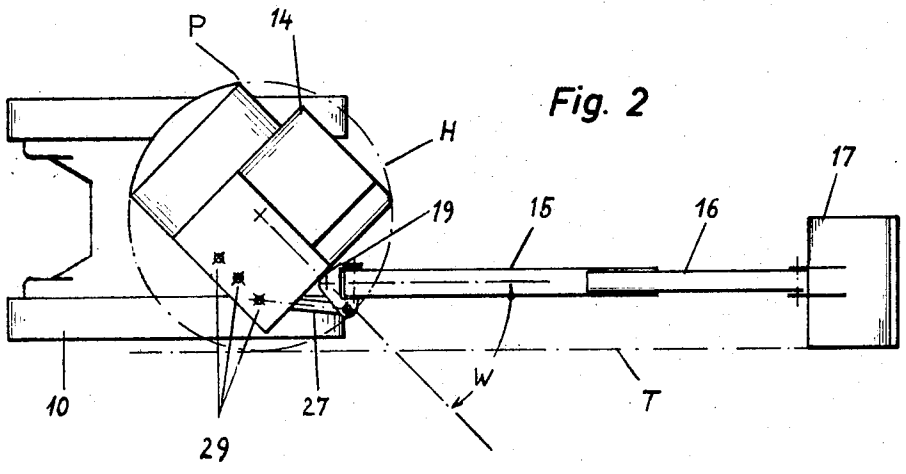


Fig. 2



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Fig. 3

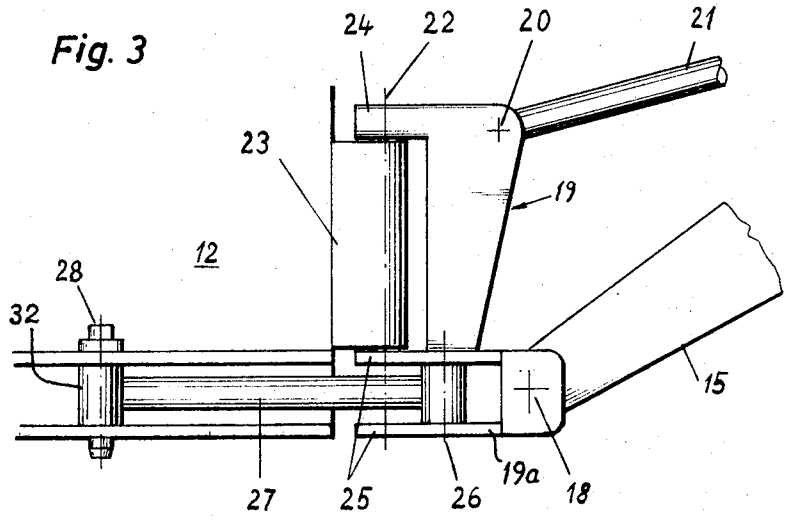
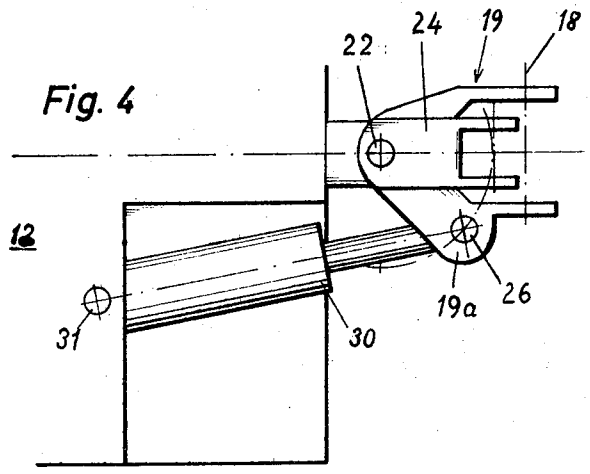


Fig. 4



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3,717,269

MOBILE SHOVEL EXCAVATOR

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Continuation of abandoned application Ser. No. 770,657, Oct. 25, 1968. This application Mar. 22, 1971, Ser. No. 126,974

Int. Cl. E02f 3/28

U.S. Cl. 214—138 R 1 Claim

ABSTRACT OF THE DISCLOSURE

A mobile excavator, in which the digging tool, shovel arm and jib are mounted on a superstructure for pivoted movement and in a common vertical plane, and the superstructure, is rotatably mounted on a wheeled or tracked vehicle for movement through a 360° arc. The jib is attached to the superstructure by means of a bracket which permits pivoted movement of the jib about either vertical or horizontal axis so that narrow trenches extending parallel to the jib may be dug adjacent walls and other structures.

RELATED APPLICATION

This application is a continuation of S. N. 770,657, filed Oct. 25, 1968, now abandoned.

BACKGROUND OF THE INVENTION

There are excavators presently used in which transverse suspended plates are situated at either the front or rear of the chassis, and which are removably mounted in a sliding carriage. The disadvantage of this type of apparatus is that they are limited to 180°–190° of rotational movement about their vertical axis, and can make use of only 90°–95° when working alongside a high wall.

There are also various well-known supplementary implements used on conventional excavators, which make possible the production of trenches oriented along the vehicle's axis and also about the rotational axis. In this type of apparatus, either the digging tool or the shovel arm are pivoted from the axis of the jib. It is also conventional to mount additional accessories at the side, between the shovel arm and digging tool or between the jib and shovel arm.

With these types of equipment, there is the disadvantage that when operating in a narrow ditch, the mass of the shovel or the length of the shovel arm at the end of which the sides of the trench are situated will hinder the deepening of the ditch. With this type of equipment it is impossible to produce trenches with perpendicular walls by the use of a pivotable shovel arm, because the raising and lowering of the jib causes the axis of the shovel arm to describe an arc and therefore to be pivoted out of the horizontal. A further important disadvantage of conventional mobile excavators lies in the fact that if a structure wall is higher than the excavator's body, then the counterweight, which is located some distance away from the vertical pivot axis on the superstructure, will strike the wall.

SUMMARY OF THE INVENTION

In order to eliminate these disadvantages the present invention provides a mobile excavator in which the jib pivots about a vertical axis mounted on the superstructure so that the jib may be rotated out of its normal working position (i.e., parallel to the longitudinal axis of the superstructure) to either side, in such a way that a line may be drawn parallel to the jib, through an outermost portion of the digging tool and tangent to the arc described by the point on the superstructure spaced furthermost from the vertical axis of the superstructure as it turns about its vertical axis upon the vehicle. In this way, although the jib, shovel arm and digging tool remain pivotable in their common vertical plane, large trenches can be produced close to or immediately beside any high wall when the jib is pivoted sideways out of its normal working position parallel to the longitudinal axis of the superstructure.

Of course, the further the axis of the jib is situated out of the arc described by the superstructure, the smaller will be the maximum possible sideways swivel angle of the jib. Therefore, since the reduction of the swivel angle is directly opposed to the object of placing the jib as closely as possible to the center turning point of the superstructure, in order to save balance weight, the maximum swivel angle of the jib out to either side of the superstructure's longitudinal axis should amount to approximately 45°.

In the present invention, the jib and its lifting cylinder are pivoted on a mounting bracket which is pivotally mounted for movement about a vertical axis situated on the superstructure and which is coupled through an outwardly extending ear to pivoting means. This mounting arrangement lends itself to the use of interchangeable couplings for various larger jibs and/or other apparatus. The pivoting means may take the form of a manually operated rod whose outer end is secured by means of a vertical pin through the outwardly extending ear of the mounting bracket, and whose inner end may be attached to the superstructure at any one of several different positions. In this way the position of the jib can be adjusted as desired. Alternatively, the pivoting means could also consist of a hydraulic cylinder whose ends are secured to the outwardly extending ear of the mounting bracket and the superstructure, respectively.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows an excavator mounted on a tracked vehicle, in accordance with the invention;

FIG. 2 is a plan view of the excavator of FIG. 1, in which the jib and trench digging tool are situated in the furthermost sideways position, for digging a trench beside a wall;

FIG. 3 is an enlarged schematic side view of the jib mounting with one of the means for side rotation of the mounting; and

FIG. 4 is a schematic plan view of an arrangement similar to FIG. 3 but wherein a hydraulic cylinder is used as the drive means.

DETAILED DESCRIPTION OF THE DRAWINGS

FIGS. 1 and 2 show a turning-ring **11** situated on a tracked vehicle **10**, which carries a superstructure **12** of a conventional type mobile excavator. The superstructure is mounted on bearings to turn through 360° about vertical axis **13**. The counterweight **14** attached to the superstructure serves as equalization for the jib **15**, shovel arm **16** and trench tool **17** at the opposite end of the superstructure during operation of the apparatus. The jib **15** is mounted at its lower end on a transverse axis **18** which allows it to have vertical pivotal movement. The horizontal axis **18** of the jib is situated at the lower portion of a mounting bracket **19**, at whose upper end **20** there is a lifting cylinder **21** which controls vertical movement of the jib. The mounting bracket **19** rotates on a vertical pin **22** mounted at the front end of the superstructure **12**. The journal **23** on the superstructure can consist of a vertical tube in which the pin **22** is arranged for rotational movement; the projecting ends of the pin

being secured to the tongues or flanges **24**, **25** on the mounting bracket **19**.

FIGS. 3 and 4 show an extension of the mounting bracket **19** forming an outwardly extending ear **19***a* to which the means for sideways movement of the jib is attached. In FIG. 3 this means is shown as a horizontal rod having a bearing pin **26** pivotally received in ear **19***a* and at its other end a collar **32**. A bolt **28** may be inserted in one of the openings **29** (FIG. 2) in the floor of the superstructure and through the collar **32**. In this case, the sideways placement of the jib is effected by means of the bolt, e.g. by hand. FIG. 4 shows a hydraulic cylinder **30** used as the drive for sideways movement, whose ends are held at **19***a* and **31** to the mounting **19** and superstructure **12**, respectively.

With reference to FIG. 2, it will be seen that with the mounting bracket at its outermost limit of travel a line T may be drawn parallel to the jib **15** through an outermost portion of the digging tool **17** and tangent to the arc H described by the point on the superstructure **12** (such as point P) spaced furthermost from the vertical axis **13** as the point P rotates about axis **13**. It will also be noted from FIG. 2 that the maximum swivel angle W of the jib should be limited to approximately 45°.

While certain preferred embodiments of the invention have been described for purposes of illustration it will be apparent that modifications thereof will occur to those skilled in the art within the scope of the appended claim.

I claim:

1. An excavator comprising:

(a) a superstructure pivotally mounted on a vehicle for movement about a first vertical axis;

(b) a jib pivotally attached to said superstructure for movement about a second vertical axis;

(c) a digging tool connected to said jib by means of a shovel arm, said digging tool having a width dimension;

(d) a counterweight attached to said superstructure opposite said jib;

(e) said jib having a central position wherein said jib is located in a first vertical plane coincident with both said first and said second vertical axes;

(f) said jib being pivotable to either side of said central position to its outermost limits of travel;

(g) said outermost limits of travel being defined by second and third vertical planes coincident with said second vertical axis and forming approximately a 45° angle with said first vertical axis;

(h) said width of said digging tool and the relative locations of said first and said second vertical axes being such that with said jib at said outermost limit of travel of approximately 45° a line may be drawn parallel to said jib through an outermost portion of said digging tool and tangent to the arc described by a point on said superstructure spaced furthermost from said first vertical axis as said point rotates about said first vertical axis.

References Cited

UNITED STATES PATENTS

3,121,503	2/1964	Lucas.
3,098,395	7/1963	Haganes.
3,173,561	3/1965	Brocklebank et al.
3,259,259	7/1966	Metailler.
3,167,194	1/1965	Davis et al.
2,903,142	9/1959	Wills.

FOREIGN PATENTS

971,028	9/1964	Great Britain ----- 214—138 C

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