March 6, 1962 J. DESVAUX ET AL 3,023,820

BORE-HOLE DRILLING INCLUDING TUBING OF THE DRILLED HOLE

Filed May 13, 1957

FIG:2

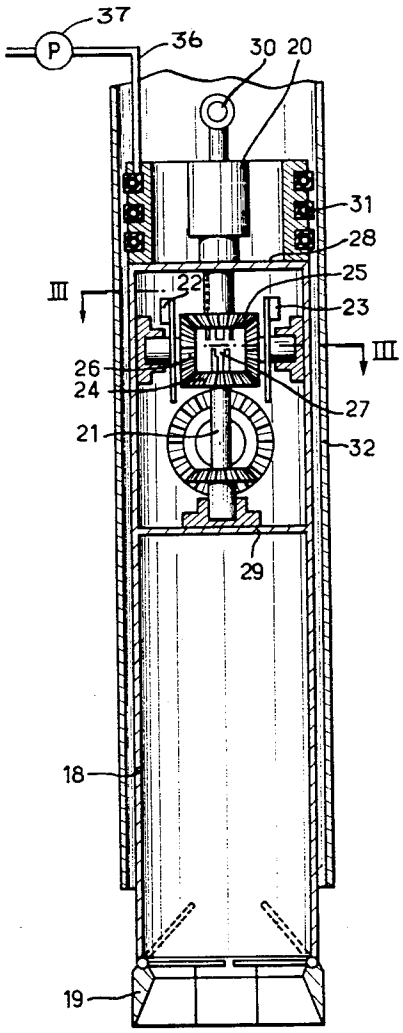


FIG:1

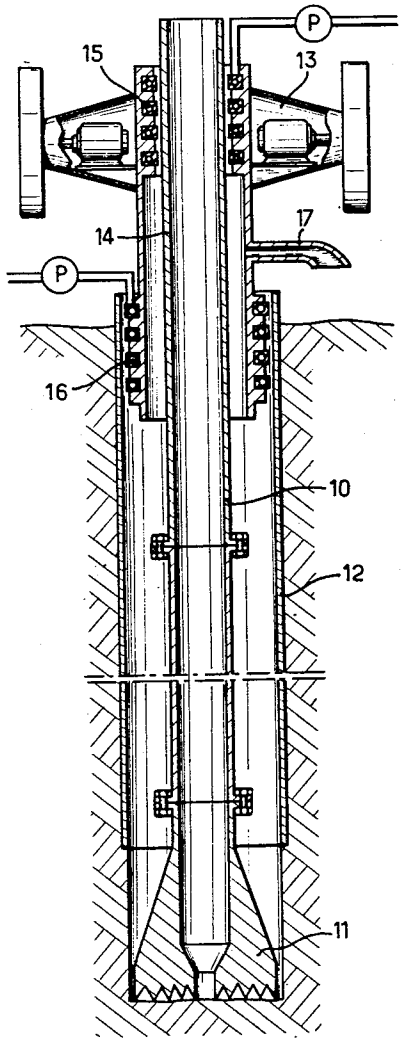
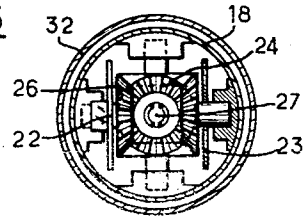


FIG:3



INVENTORS

JACQUES DESVAUX

FRANÇOIS BERTHET

By Thomson & Thompson

ATTY.

United States Patent Office 3,023,820 Patented Mar. 6, 1962

3,023,820

BORE-HOLE DRILLING INCLUDING TUBING OF THE DRILLED HOLE

Jacques Desvaux, 17 Ave. du Colonel Bonnet, Paris, France, and Francois Berthet, 16 Rue Voltaire, Houilles, France

Filed May 13, 1957, Ser. No. 658,785
Claims priority, application France May 16, 1956
6 Claims. (Cl. 175—55)

The present invention has for its object improvements in the operation of bore-hole drilling, including tubing of the drilled hole.

When exploratory or other drilling operations are effected, and in particular in the case of drillings made prior to the preparation of piles molded in the ground, in very many cases it becomes essential to tube the holes which are drilled.

The tubing operation thus made necessary is in general facilitated by the use of mechanical means arranged on the drilling platform. It may be carried out during the course of the progress of the drilling action proper, or after a certain prior advance of the drilling. The mechanical means by which the tubing is effected are generally separate from those which serve to carry out the drilling or the extraction of the earth. Alternatively, if use is made of the same mechanical means, the motion of the latter is transmitted in a manner different and distinct to the drilling member or the earth extraction member and to the tubing.

In accordance with the present invention, the movement of the drilling member and that of the driving of the tubing are effected, either in a separate manner or simultaneously, directly by the same impulse driving device operating in the same manner which is rigidly coupled alternately or simultaneously with the driving and tubing member.

The driving device thus being employed directly for driving the tubing and the drilling or earth extraction member, may be of any desired type. It is however an advantage to employ a generator of directed balanced impulses with eccentrically-weighted fly-wheels, such as described in the U.S. Patent No. 2,743,585, and in the U.S. patent applications Serial Nos. 542,006 of October 21, 1955 now Patent No. 2,867,984 and 547,720 of November 18, 1955, now Patent No. 2,942,427.

The driving device may be mounted on a support element separate from the drilling or earth extraction member and from the tubing, and it may be rigidly coupled with these latter, either separately or simultaneously. Alternatively, the driving device may be mounted on one of the members to be driven with means for rigidly coupling it to the other and for disengaging it from the first. In particular, the driving device may be fixed to the drilling and rubble extraction member, and it is then this element which may be rigidly coupled at will to the tubing in order to effect the driving of the latter after a previous drilling operation.

The improvements in accordance with the invention enable the power employed in drilling work to be reduced. The mechanical means employed do not in fact any longer have to overcome during drilling and during driving of the tubing, the whole of the lateral friction over the entire height of the tubing and of the resistance to penetration by the drilling or earth extraction member. The power employed may be applied successively in its totality to the drilling or earth extraction member and to the tubing for the driving of the latter.

The accompanying drawings show by way of examples, forms of embodiment of the invention.

FIG. 1 is a view in longitudinal cross-section of a drilling device associated with a tubing.

FIG. 2 is a view in longitudinal cross-section of a drilling and rubble extraction device associated with a tubing.

FIG. 3 is a transverse cross-section taken along the line III—III of FIG. 2.

In FIG. 1, the device is composed of a retaining means including a system of rods **10** which carries at its base the drilling member **11**. The drilling effected by the member **11** can then be tubed by driving down the tubing **12**. With this assembly is associated a driving device **13**. This may especially be of the type having suitably arranged motor-driven eccentrically-weighted fly-wheels adopted to rotate in synchronism. This driving device **13** is mounted on a tubular element **14** provided with two means for rigidly coupling it at **15** and **16**, respectively with the drilling device and with the tubing. These rigid coupling means **15** and **16** are preferably elastic members inserted in helicoidal grooves in the tubular element **14**.

The system of rods **10** may be hollow so as to permit of the injection of water or of mud to facilitate drilling, these being evacuated with the rubble through the conduit **17** provided on the element **14**.

With this arrangement, the driving device **13** is coupled at **15** with the system of rods **10**, which drives the drilling member **11**. When the drilling has advanced sufficiently, or when the nature of the soil makes tubing necessary, the driving device **13** is coupled at **16** with the tubing **12**. This coupling may also be made with or without continuation of the drilling. The tubing is then brought into position inside the drilled portion which has previously been completed.

In this way, the operations of drilling and tubing can be carried out without interfering with each other, each using the power of the driving device. They can also be actuated at the same time by the simultaneous coupling of the means **15** and **16** with the system **10** and the tubing **12**.

In the embodiment shown in FIGS. 2 and 3, the drilling device **18** is of the type with rubble extraction associated with the tubing **32**, with a sinking-drum **19**. To this member **18** is fixed the driving device, formed for example by eccentrically-weighted fly-wheels, as in the previous case. It comprises the motor proper **20**, the shaft **21** of which actuates, through the medium of a set of pinions, pairs of eccentrically-weighted fly-wheels **22** and **23**, mounted on two horizontal axes spaced apart in height and at right angles to each other.

In the arrangement shown, the pinions **24** and **25** engage with the pinions **26** of the fly-wheels **22**, and rotate freely on the shaft **21**. They may be rigidly coupled to this shaft by means of a dog **27** sliding on a castellated portion of the shaft **21**. In this way, it is possible to drive the pair of fly-wheels in one direction or the other by actuating them either by the pinions **24** or by the pinions **25**. Any other arrangement may also be provided in order to obtain the combinations of movements described in the U.S. patent application No. 542,006 of October 21, 1955 now Patent No. 2,867,984.

The assembly of the eccentrically-weighted fly-wheels and their driving members may be enclosed in a fluid-tight manner in the tubular element **18**, between the platforms **28** and **29**. A lifting ring is provided at **30**.

This assembly is provided at **31** with a coupling member for the tubing **32**, this member being for example of the expandable or inflatable type which is inflated or expanded by means of a compressed gas or fluid through pipe means **36** and a pump **37**.

With this arrangement, the various phases of the operation of drilling and tubing are as follows:

Drilling by driving the bucket **18** alone;

Lifting the bucket **18** for the extraction of the earth;

Driving the tubing **32** into the bore-hole which has just been cut, by coupling together the tubing **32** and the bucket **18** at a suitable height, by means of the inflatable fitting **31**;

A fresh drilling operation by the bucket **18**, disengaged from the tubing, and so on.

The cutting drum **19** may be constituted by knives **33**, fixed in a detachable manner to the foot of the member **18** by means of pivotal shafts **34**. These knives are free to move laterally during the drilling operations and can drill a hole with a diameter greater than that of the tubing **32** which is to be driven down. During the operation of lifting the member **18**, which forms at the same time the extraction bucket, the knives **33** pivot inwards if necessary, in order to pass inside the tubing **32**. The lower part of the bucket **18** may be provided with hinged flaps **35**.

By virtue of the coupling member **31**, either the whole of the available power of the motor **20** can be employed for driving the bucket element **18** by its sinking drum **19**, or alternatively this power can be employed for driving the tubing **32** into a hole already drilled by the sinking drum **19**, or again the ensure the simultaneous driving of the bucket element and the tubing **32**, the latter passing into the hole drilled by the sinking drum **19** as and when the hole is drilled.

It will of course be understood that the arrangements described and shown have no restrictive character and may be provided with all alternative forms of construction falling within the scope of the appended claims.

What we claim is:

1. A machine of the class described comprising a drilling member for drilling holes, a retaining means connected to said drilling member, tubing means for reinforcing the hole dug by said drilling member, a driving device producing impulses at least in a vertical direction, a tubular element mounted on said driving device, said tubular element surrounding the upper end of said retaining means of said drilling member, a portion of said tubular element being positioned within said tubing means, coupling means mounted on said tubular element, and means to actuate said coupling means for rigidly coupling said tubular element to said retaining means of said drilling member and to said tubing means to drive said drilling member and tubing means by said driving device respectively and simultaneously.

2. A machine of the class described comprising a drilling device for drilling a hole, a device for extracting rubble mounted on the drilling device, a driving device mounted on said drilling device and producing impulses at least in a vertical direction, tubing means for reinforcing the hole dug by said drilling device and surrounding said drilling device, coupling means mounted on said drilling device, and means to actuate said coupling means for rigidly coupling said drilling device and tubing means and for driving said tubing means into the hole dug by said drilling device.

3. A machine of the class described comprising a drilling member for drilling holes, a retaining means connected to said drilling member, tubing means for reinforcing the hole dug by said drilling member, an impulse-driving device having motor-driven eccentrically-weighted fly-wheels, a tubular element connected to said impulse-driving device, said tubular element surrounding the upper end of said retaining means of said drilling member, a portion of the tubular element being positioned within the tubing means, coupling means mounted on said tubular element, and means to actuate said coupling means for rigidly coupling said tubular element to said retaining means of said drilling member and to said tubing means to drive the drilling member and tubing means by said driving device respectively and simultaneously.

4. A machine of the class described comprising a drilling device for drilling a hole, a device for extracting rubble mounted on said drilling device, an impulse-driving device having motor-driven eccentrically-weighted fly-wheels mounted on said drilling device, tubing means for reinforcing the hole dug by said drilling device surrounding said drilling device, coupling means mounted on said drilling device, and means to actuate said coupling means for rigidly coupling said drilling device and tubing means and for driving said tubing means into the hole dug by said drilling device.

5. A machine according to claim 2 in which said coupling means include expandable members, and said means to actuate said expandable members include pipe means and pump means connected to said expandable members to supply a medium to said expandable members for expanding them.

6. A machine of the class described comprising a drilling member for drilling holes, a retaining means connected to said drilling member, tubing means for reinforcing the hole dug by said drilling member, a driving device producing impulses at least in a vertical direction, a tubular element mounted on said driving device, said tubular element surrounding the upper end of said retaining means of said drilling member, a portion of said tubular element being positioned within said tubing means, expandable means mounted on said tubular element, and means connected to said expandable means to supply a medium thereto to expand said expandable means to rigidly couple said tubular element to said retaining means of said drilling member and to said tubing means to drive said drilling member and tubing means by said driving device respectively and simultaneously.

References Cited in the file of this patent

UNITED STATES PATENTS

758,781	Roelofson	May 3, 1904
872,093	Stewart	Nov. 26, 1907
2,165,666	Tilly	July 11, 1939
2,554,005	Bodine	May 22, 1951
2,667,932	Bodine	Feb. 2, 1954
2,741,093	Riker	Apr. 10, 1956

FOREIGN PATENTS

1,000,115	France	Feb. 8, 1952