June 30, 1942. H. B. FAIRBANKS 2,288,185

SAND POINT

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Fig. 1.

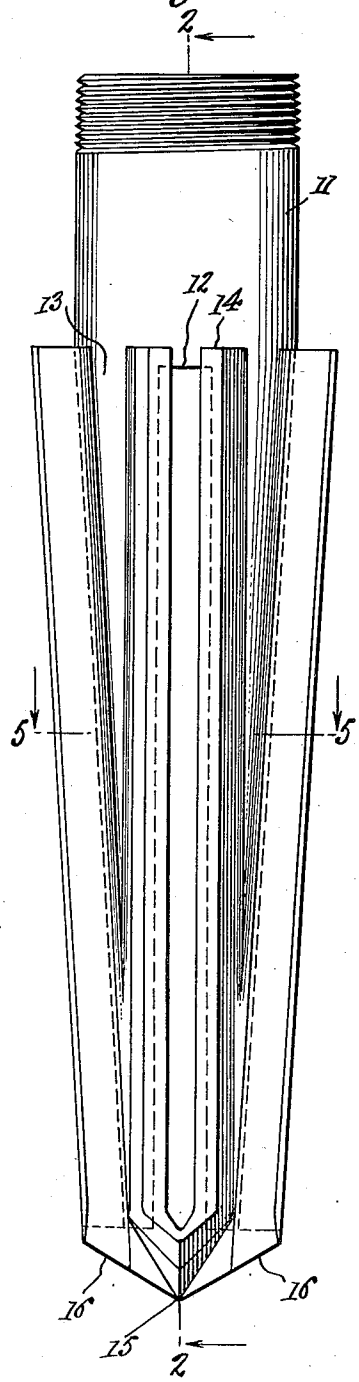


Fig. 3.

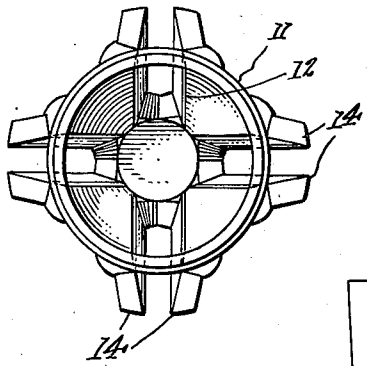


Fig. 5.

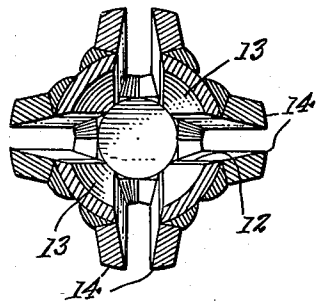


Fig. 4.

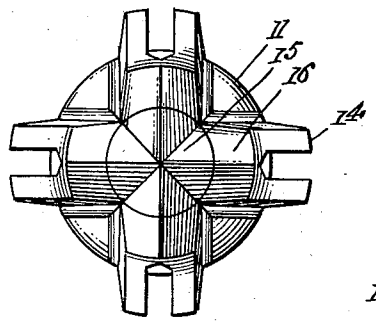
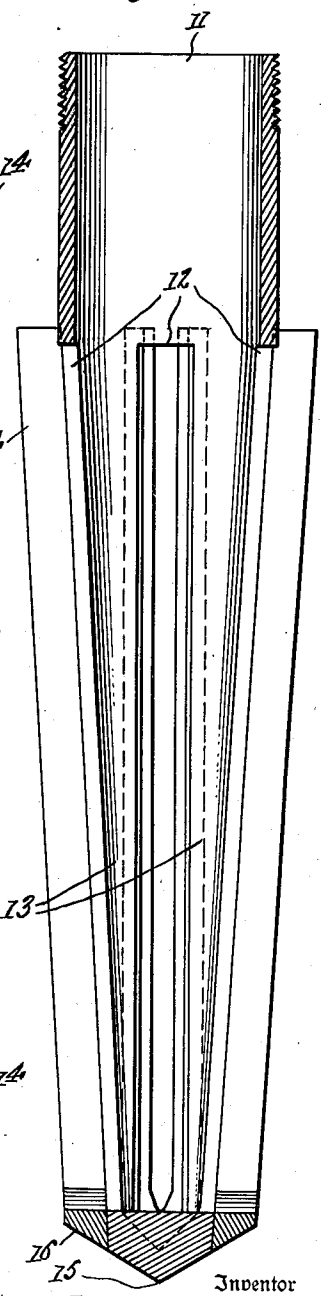


Fig. 2.



Inventor

Harlan B. Fairbanks

By Wilkinson & Mawhinney

Attorneys.

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Fig. 6.

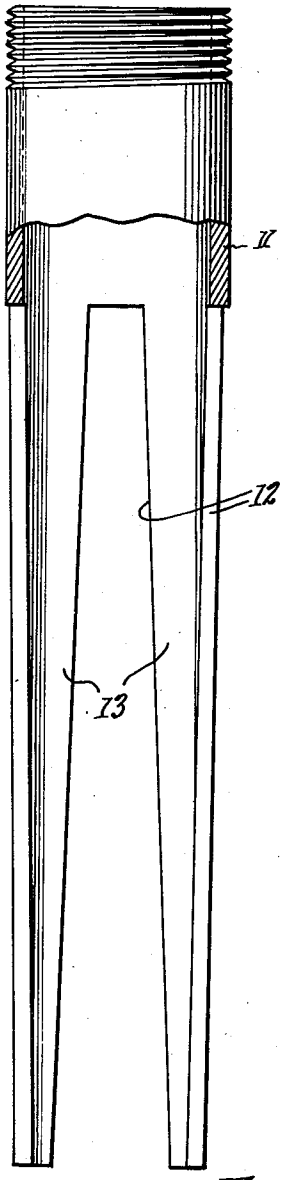


Fig. 8.

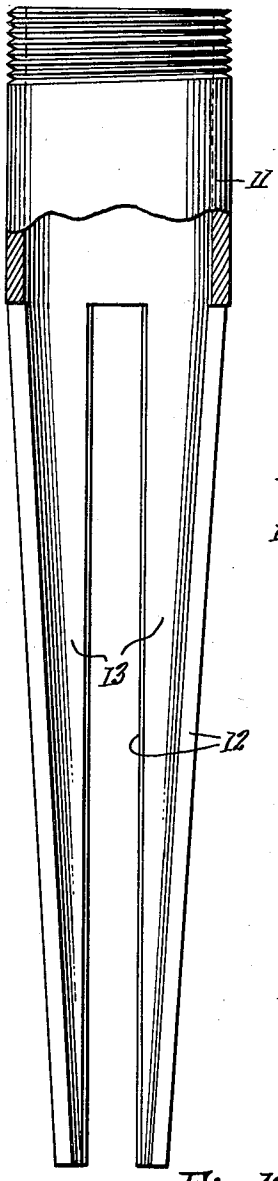


Fig. 9.

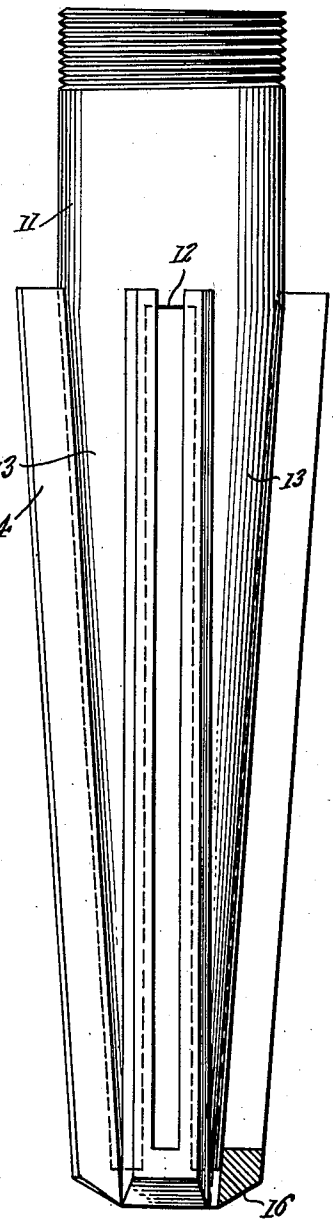


Fig. 7.

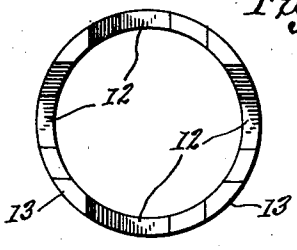
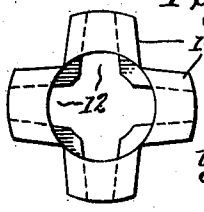


Fig. 10.



Inventor
Harlan B. Fairbanks
by Wilkinson & Mawhinney
Attorneys.

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UNITED STATES PATENT OFFICE

2,288,185

SAND POINT

Harlan B. Fairbanks, Yakima, Wash.

Application November 18, 1940, Serial No. 366,171

7 Claims. (Cl. 37—58)

The present invention relates to sand points or suction nozzles which are particularly but not necessarily adapted for the removal of mineral bearing deposits from basins or crevices in bedrock. In placer mining, it is customary to provide the end of the suction line with a nozzle known as a sand or extraction point through which the liquid and accompanying deposits may enter and be driven out through suitable piping for subsequent separation. Typical apparatus of this kind are shown in the Dailey et al. Patent No. 1,597,580 dated August 24, 1926, and in the Yedd Patent No. 2,028,580 dated January 21, 1936.

Heretofore in the use of these nozzles, considerable difficulty has been encountered due to the nozzle becoming clogged particularly where the operations are taking place in deposits which contain considerable foreign material such as dirt, roots, grass, clays, etc. This clogging of the nozzle not only materially limits the output but frequently requires the suction line to be raised and the nozzle cleaned with the attendant loss of time. A further disadvantage has been the failure of the nozzle to work its way through the deposits when an obstruction was encountered which tended to block the path of the nozzle.

An object of the present invention is to provide a suction nozzle which will be capable of being operated under the most adverse circumstances without becoming clogged.

A further object of the invention is to provide a nozzle which will at all times tend to dig and work its way into the deposit and pass over or around any obstructions which tend to block its path.

A further object of the invention is to provide a nozzle which will prevent the wedging of obstructions within the inlet openings.

A still further object of the invention is to provide a nozzle which should one or more of the openings become covered, the remaining openings will be sufficient to take care of the requirements of the suction line.

Still another object of the invention is the provision of a nozzle or point which is of very strurdy construction, having a long lift and easy and inexpensive to manufacture and operate.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views.

Figure 1 is a side elevation of a nozzle or sand point embodying the present invention.

Figure 2 is a central vertical sectional view on the line 2—2 of Figure 1.

Figure 3 is a top plan view thereof.

Figure 4 is a bottom plan view thereof.

Figure 5 is a horizontal sectional view taken on the line 5—5 of Figure 1 and looking in the direction of the arrows.

Figure 6 is a longitudinal sectional view, parts being shown in elevation, of the nozzle tube blank during the process of construction and showing the form when the slots have been cut therein.

Figure 7 is a bottom plan view thereof.

Figure 8 is a view similar to Figure 6 showing the tongues between the slots bent into their operative positions.

Figure 9 is a view of the nozzle with the slot ribs in place thereon, and

Figure 10 is a bottom plan view thereof.

Referring more particularly to the drawings, the numeral 11 designates a pipe or tube which is to constitute the body of the nozzle or sand point, and which is threaded at its upper end to engage the pipe line from the pump, as is usual in this type of apparatus. In forming the nozzle, the pipe or tube 11 is provided with four longitudinal slots 12 extending from the lower end of the tube to a point adjacent but spaced from its upper end.

The slots 12 are considerably wider at their open lower ends than at their upper ends. For example, in a tube having about a two inch inside diameter, the slots would taper from about one and one-quarter inches at the lower end of the slot to about one-half inch at the upper end of the slot. It will be seen that cutting of the slots 12 produces four longitudinal tongues 13 which are widest at their upper ends and narrowest at their lower ends, as seen in Figure 6. The next step in producing the nozzle of this invention is to heat the upper portions of tongues 13 and draw them in at their lower ends to contract the slots at their lower ends and thus form the slots of equal width throughout their length, as indicated in Figure 8. The slotted portion of the tube thus formed tapers from the top of the slots to the bottom of the tube.

The next step is to provide ribs 14 for the sides of slots 12. These ribs are formed from bars of steel bent into a U-shape and welded to the tongues 13 at the sides of slots 12 with the closed portion of the rib U being disposed at the bottom

of the tube. These ribs 14 extend outwardly from the surface of the tongues and are tipped inwardly at their outer ends to produce a slot at the outer edges of the rib which is narrower than the slot 12. The ribs 14 form a continuation of the sides of slots 12 which converge outwardly and extend above the tops of the slots 12.

While the nozzle may be made in various sizes, using the size nozzle referred to above and having an internal diameter of two inches, the following dimensions may be taken as illustrative, although variations may be obviously made. The ribs 14 will have a width of about one-half of an inch extending outwardly from the tube, a thickness of about one-quarter of an inch, and the ribs will be tipped inwardly towards each other about one-eighth of an inch. With these dimensions the slot 12 will be one-half of an inch wide and due to the ribs 14 will converge to a width of one-quarter of an inch at the outer edges of the ribs. It will be seen that the slot space between the ribs 14 is closed at its lower end but open at its upper end and extends one-fourth inch beyond the upper end of slot 12 to permit particles which jam in the slot to work their way out of the open upper end as the nozzle is worked downwardly in operation.

The ribs 14 are securely welded to the tube as illustrated in detail in Figure 5, while a hard pointed tip or point 15 is built onto the lower end of the tube and securely welded to the lower ends of the tongues 13 and to the lower ends of the ribs 14 and closing the bottom of the tube.

After being welded to the tube, the outer faces of the ribs 14 are rounded off and tipped with a suitable hard substance such for example as "Stelite" while the lower ends of the ribs are shaped to form pointed ribs 16 which are carried out to the tip of the point 15 and provide a ribbed, penetrating point at the end of the tube. The point 15 may be formed of some suitable hard material such as "Stelite."

The finished nozzle seen in Figure 1 will be seen to taper towards the point 15 and to have the hard tipped longitudinal ribs 14 at the sides of the slots 12, which assist in the drilling action of the nozzle as it is worked by an oscillating motion into the deposit, and loosen materials at the sides of the nozzle.

An important feature of this invention is that the slots will not become clogged and interfere with the suction within the tube. This is because the combined area of the slots is made considerably greater than the cross-sectional area of the top of the tube 11 and the pipe or shaft to which it is attached. In practice, the area of the slots should be approximately three times that of the shaft.

In operation, the nozzle is connected to a suitable pump to create a suction in the nozzle. The nozzle is worked down by the operator in a twisting and oscillating manner in which the point 15 and tipped ribs 14 assist in loosening the material of the deposit. Small particles of the deposit loosened by this action are sucked through the slots and up through the nozzle for separation. Removal of these particles assist in the further penetration of the point. The downward movement of the nozzle will move any particle jammed between the ribs 14 out through the open upper end thereof, while any particles which pass the outer edges or lips of the ribs 14 will pass readily into the tube due to the inward flaring of the slots formed by the sides of the ribs.

Accordingly it will be seen that the present nozzle may be readily used for removing deposits without the usual difficulties encountered due to clogging of the nozzle slots and subsequent interference wtih the suction lift within the nozzle.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims:

What is claimed is:

1. A suction nozzle of the character described comprising a tube having elongated longitudinal slots therein, longitudinal ribs disposed at each side of each slot and projecting outwardly beyond said tube to form continuations of the side walls of the slots, a point secured to the end of the tube, the ribs of each slot being connected at the leading or lower end of each slot and extending beyond the other trailing or upper end of the slot to provide an opening through which particles jammed between the ribs may work out and escape from the ribs and slot.

2. A suction nozzle of the character described comprising a tube having elongated longitudinal slots therein, longitudinal ribs disposed at each side of each slot and projecting outwardly beyond said tube to form continuations of the side walls of the slots, a point secured to the end of the tube, the ribs of each slot being connected at the leading end of each slot and extending beyond the other end of the slot to provide an opening through which particles jammed between the ribs may work out and escape from the ribs and slot, said ribs converging outwardly to produce an opening therebetween which flares inwardly to the interior of the tube.

3. An extracting device for hydraulic mining comprising a hollow body portion having a pointed end, said body portion having a series of inlet openings communicating with the interior of the body portion, means disposed at each side of each opening and projecting outwardly beyond said body portion to form continuations of the side walls of the openings, said means of each opening being connected at the leading end of each opening and extending beyond the other end of the opening to provide an opening through which particles jammed between said means may work out and escape from said means and opening.

4. A device of the character described comprising a hollow body portion having inlet openings in the surface thereof communicating with the interior of the body member, means disposed at each side of each opening and projecting outwardly beyond the body portion to form continuations of the side walls of the openings, said means of each opening being connected at the leading end of each opening and extending beyond the other end of the opening to provide an outlet through which particles jammed between said means may work out and escape from said means and opening, said means converging outwardly to produce an opening therebetween which flares inwardly to the interior of the tube.

5. A suction nozzle of the character described comprising a tube having an elongated longitudinal slot therein, a longitudinal rib disposed at each side of the slot and projecting outwardly beyond said tube to form a continuation of the side wall of the slot, a point carried by the leading end of the tube, the ribs of the slot extending beyond the trailing end of the slot to provide an

opening through which particles jammed between the ribs may work out and escape from the ribs and slot.

6. A suction nozzle of the character described comprising a tube having an elongated longitudinal slot therein, a longitudinal rib disposed at each side of the slot and projecting outwardly beyond said tube to form a continuation of the side wall of the slot, the ribs of the slot being connected at the leading end of the slot and extending beyond the trailing end of the slot to provide an opening through which particles jammed between the ribs may work out and escape from the ribs and slot.

7. A suction nozzle of the character described comprising a tube having an elongated longitudinal slot therein, a longitudinal rib disposed at each side of the slot and projecting outwardly beyond said tube to form continuations of the side walls of the slot, and a point disposed at the leading end of the tube, the side walls of the slot and the inner walls of the ribs converging outwardly to produce slot openings which flare inwardly to the interior of the tube.

HARLAN B. FAIRBANKS.