Dec. 8, 1931. C. J. COBERLY 1,835,378

APPARATUS FOR PRODUCING SLOTS

Filed July 12, 1929

Fig. 1.

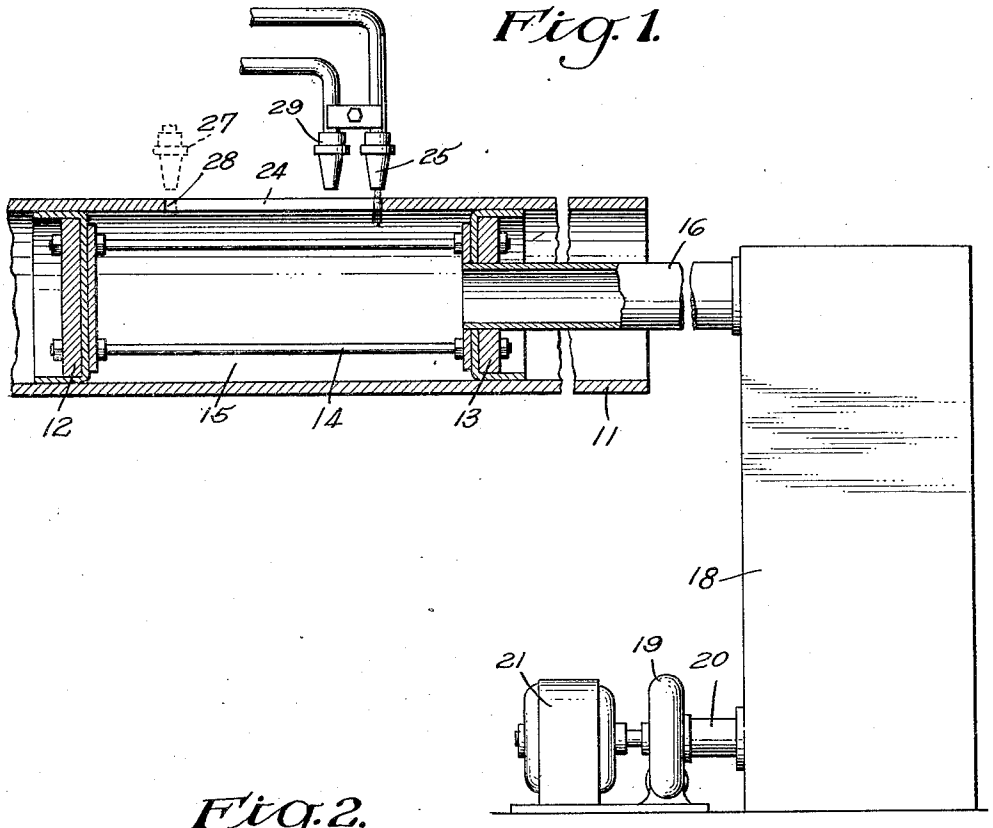
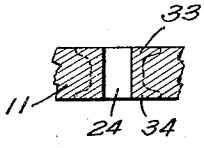


Fig. 2.



INVENTOR:
CLARENCE V. COBERLY.
By Fred W. Lamb
ATTORNEY.

Patented Dec. 8, 1931 1,835,378

UNITED STATES PATENT OFFICE

CLARENCE J. COBERLY, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO KOBE, INC., OF HUNTINGTON PARK, CALIFORNIA, A CORPORATION OF CALIFORNIA

APPARATUS FOR PRODUCING SLOTS

Original application filed January 5, 1925, Serial No. 737. Divided and this application filed July 12, 1929. Serial No. 377,715.

This invention relates to an apparatus for producing slots in metal, having hardened walls, this apparatus being very valuable in the production of screen casings for wells, the invention presented being a division of my application entitled Method of and apparatus for producing slots, filed January 5, 1925, Serial No. 737, which terminated in United States Patent No. 1,799,614 of April 7, 1931.

My invention is of a character which renders it capable of producing a variety of types of slots having hardened surfaces. It is advantageous in the various arts where the walls of slots are subjected to wear to have their walls or faces hardened so that they will resist wear and not be rapidly enlarged to a greater size. One example of the utility of a slot of this character is found in the oil industry. When a well has been drilled and the oil bearing strata reached, a well casing is lowered therein for supporting the wall of the well and for excluding ground water. At the lower end of the well casing there is attached a screen casing or strainer comprising casing having comparatively narrow slots provided therein. The oil and very small particles of sand contained therein flow through the slots into the casing, the larger particles being excluded by these slots.

The small abrasive particles of sand passing through these slots tend to wear away the surfaces and enlarge them, thus allowing larger particles to enter the well casing, which they will gradually clog. It is desirable that the walls of the slots resist wear so that they will retain their proper size and prevent entrance of larger destructive particles of sand or gravel.

It is an object of this invention to provide an apparatus for producing slots in metal, these slots having hardened walls.

It is another object of the invention to provide an apparatus for producing slots in a metal and hardening the walls thereof simultaneously.

My invention is capable of heating an area of metal, cutting a slot in the heated area, and hardening the heated area of metal around the slot. It is preferable to heat and cut the metal by the use of a cutting torch having a preheating flame which preheats the metal and having a metal removing stream of oxygen which produces the slot. There are various means which I may employ for hardening the walls of the slots and the area adjacent thereto. I may rapidly cool the heated walls of the slot by rapidly drawing cool air through the slots while the metal therearound it still hot, thus chilling and hardening the walls of the slot.

Another means of hardening is by adjusting the heating flame of the cutting torch to have an excess of carbonizing material. This supplies carbon to the heated walls. The walls are then rapidly cooled as before, thus efficiently hardening the previously carbonized area.

Another means of hardening the walls of the slots is by providing an extra supply of carbonizing material as acetylene, ethylene, and cyanogen. Such carbonizing material, carbonizing the heated walls, has a case hardening effect.

I may also accomplish the hardening of the walls of the slots by supplying a concentrated solution of liquid hardening agent such as potassium cyanide to the heated walls, this solution giving up carbon and producing case hardening. A slot having the walls thereof hardened in this manner offers a great resistance to wear and functions effectively for a much longer period of time than the usual walls of slots which are not hardened.

It is a still further object of the invention to provide an apparatus for producing screen casing.

Other objects and the specific advantages of my invention will appear in the following description.

Referring to the drawings in which I show my invention adapted to produce screen casing, this particular adaptation being shown solely for illustrative purposes,

Fig. 1 is an essentially diagrammatic view illustrating a form of apparatus adapted to carry out my invention.

Fig. 2 is an enlarged section taken through

a slot showing the case hardened area thereabout.

As shown in Fig. 1 of the drawings, a metal member which is to have slots provided therein is shown in the form of a pipe or casing 11. Inside the casing 11 I provide a pair of heads 12 and 13 which are connected together by rods 14 in spaced relation. These heads 12 and 13 are arranged to provide a closed chamber 15 inside the casing 11 and between the heads 12 and 13. Extending from the head 13 is a suction pipe 16 which communicates through the head 13 with the chamber 15. The pipe 16 is connected with a slag box 18, this slag box 18 having an exhaust pump 19 connected therewith by a pipe 20. The exhaust pump 19 is driven by a suitable motor 21 and is for the purpose of creating a vacuum or suction in the slag box 18. This draws air from the chamber 15 through the pipe 16, creating a partial vacuum in the chamber 15.

After the apparatus, just described, has been installed, a slot (as indicated at 24) is cut in the wall of the casing 11 enclosing the chamber 15. The slot 24 is cut by means of a cutting torch 25 which is of a standard design. The torch 25 is first positioned, as indicated by the dotted lines 27, directly over a small hole indicated at 28 which has been drilled through the wall of the casing 11 to start the cut. When the heating flame has heated the area around the hole 28 to the desired temperature, a stream of oxygen is also sent out of the torch 25, and the torch is moved along the pipe, producing the slot 24.

During the formation of the slot 24, air is drawn through the slot, and the heated walls thereof are rapidly cooled. This rapid cooling serves to chill and harden the walls of the slot. The slag formed by the cutting of the slot 24 is drawn with the air through the pipe 16 to the slag box 18 where it collects and may be disposed of at intervals.

As previously mentioned, the heating flame of the torch 25 may be adjusted so as to possess an excess of carbonizing material. Cutting torches in common use generally use acetylene and oxygen as a fuel. In this case, the flame would be adjusted so as to have an excess of acetylene. As the metal is heated and the slot cut, the excess of acetylene in the heating flame carbonizes the heated metal around the slot 24, and this metal when rapidly cooled is very hard. It will be seen that this treatment produces a case hardening effect on the walls of the slot 24.

If desired, I may provide a carbonizing material head 29 which may be employed in conjunction with the torch 25. As the torch 25 is drawn along the casing 11, heating the metal and cutting the slot, a carbonizing material may be supplied to the walls of the slot by the head 29, thus carbonizing these walls. A case hardening effect is thereby obtained when the walls are cooled.

I may supply any well known case hardening or carbonizing material through the head 29 such as acetylene, ethylene, cyanogen, or any other hydrocarbon gas. Any of these gases supplies carbon to the heated area around the slot, which carbonizes and case hardens the surfaces when they are cooled. Instead of supplying any of these hydrocarbon gases, I may supply through the head 29 a liquid hydrocarbon or any well known carbonizing liquid such as a solution of potassium cyanide. This liquid, as it contacts with the heated walls of the slot 24, gives off carbon thereto and cools them in a manner to produce the desired case hardening effect.

In Fig. 2 it will be seen that both the inner and outer faces 33 and 34 of the casing 11 are hardened around the slot 24 as well as the walls of the slot. The hardening of the walls of the slot and the area adjacent to the slot provides a slot which will withstand considerable frictional wear and will have a long life, owing to the fact that the abrasive particles carried in the oil will have little effect thereon.

I claim as my invention:

1. An apparatus for producing slots in a metal, comprising: a cutting torch adapted to move along the metal, said cutting torch producing a slot and heating the area around said slot; and means for sucking air through said slot.

2. An apparatus for producing slots in a metal, comprising: a flame for heating an area of metal; cutting means for cutting a slot in said area; and means for sucking air through said slot.

3. An apparatus for producing slots in a metal, comprising: a cutting torch adapted to be moved along the metal, said cutting torch producing a slot and heating the area around said slot; and means for establishing a difference in pressure on the opposite sides of the metal to cause a flow of air through the slot.

4. An apparatus for producing slots in a metal, comprising: a flame for heating an area of metal and cutting a slot in said area; and means for establishing a difference in pressure on the opposite sides of the metal to cause a flow of air through the slot.

5. An apparatus for producing slots in a metal casing, comprising: a cutting torch adapted to be moved along the metal casing, said cutting torch producing a slot and heating an area around said slot; means for forming a chamber in said casing; and means for creating a suction in said chamber to cause air to be sucked through said slot.

6. An apparatus for producing slots in a metal casing, comprising: a cutting torch adapted to be moved along the metal casing, said cutting torch producing a slot and heat-

ing an area around said slot; heads forming a closed chamber in said casing; a slag box; a pipe connecting said chamber and said slag box; and means for establishing a difference in pressure on the opposite sides of the metal to cause a flow of air through said slot and chamber, said means sucking slag from said chamber into said slag box.

7. An apparatus for producing slots in a metal casing, comprising: a cutting torch adapted to be moved along the metal casing, said cutting torch producing a slot and heating an area around said slot; means forming a closed chamber in said casing; a slag box in communication with said chamber; and means for establishing a difference in pressure on the opposite sides of the metal to cause a flow of air through said slot and chamber, whereby slag is sucked into said slag box.

8. An apparatus for producing slots, comprising: means for producing a flame for heating an area of metal; cutting means for cutting a slot in said area; and means for sucking air through said slot for cooling the hot area around said slot so as to harden said hot area.

9. An apparatus for producing slots in a metal, comprising: a cutting torch adapted to be moved along the metal, said cutting torch producing a slot and heating the area around said slot; and means for sucking air through said slot for cooling said hot area in a manner to harden same.

10. An apparatus for producing slots in a metal, comprising: a cutting torch adapted to be moved along the metal, said cutting torch producing a slot and heating the area around said slot; and means for sucking a stream of air through said slot for cooling said hot area in a manner to harden same.

11. An apparatus for producing slots in a metal, comprising: a cutting torch adapted to be moved along the metal, said cutting torch producing a slot and heating the area around said slot; and means for drawing a hardening material through said slot for cooling said hot area to harden the walls around said slot.

12. An apparatus for producing slots in a metal casing, comprising: a cutting torch adapted to be moved along the metal casing, said cutting torch producing a slot and heating an area around said slot; means forming a closed area within said metal casing; a slag box; a pipe connecting said closed area with said slag box; and means for sucking air through said slot, and slag into said slag box.

13. An apparatus for producing slots in a metal casing, comprising: a cutting torch adapted to be moved along the metal casing for producing a slot and heating an area around said slot; means forming a closed area within said metal casing; a slag box; means establishing communication between said closed area and said slag box; and means for sucking air through said slot, and slag into said slag box.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 3rd day of July, 1929.

CLARENCE J. COBERLY.