fore being discharged into the river. The government evidently considered this a fairly satisfactory solution of the smoke and fume question at this particular smeltery.

A New Design of Undercurrent Grizzly

By F. H. Hazard*

The idea of an undercurrent grizzly with rocking bars was first tried out in one of the hydraulic mines of northern California where much difficulty had previously been experienced in keeping the grizzlies from clogging with pebbles and wedge-shaped slabs of rock from the gravel bank and bedrock. The practicability of such a grizzly for undercurrent sizing was clearly proved, but, in this particular instance, the grizzly was not an entire success on account of poor design and construction.

The clogging of grizzlies has always been a serious problem in undercurrent practice since the bars cannot be cleaned by hand while the mine is in operation. The sluice is in constant service weeks or months at a time and even a partial clogging is the cause of serious loss and greatly lessens the advantage gained by the use of the undercurrent.

The ill effects caused by the presence of clogged material in the spaces between the grizzly bars are twofold:

(1) The space occupied by the clogged material is rendered useless for passing the gold-bearing sands. In order not to rob the sluice of that water necessary to carry the coarse gravel and boulders to the dump, grizzlies must of necessity occupy only a limited length in one of the boxes of the sluice line. It is evident, therefore, that increasing the length of grizzly surface in the sluice, to provide for space lost by any clogging which may take place, is not feasible.

(2) Clogged material on the grizzly bars makes a rough surface on the floor of the sluice box. This roughness not only causes a swirl or eddying movement in the water that raises considerable quantities of the sand from the bottom of the sluice, but also causes a large proportion of the sand to be thrown upward by its impact upon the clogged material. Large quantities of sand are thus lifted by both these means into the upper currents of the sluice stream, the water of which here passes over the bars of the dump. Thus any sand contained in these upper currents is swept over the bars and lost for undercurrent treatment. The heavier black sand, with which the greater proportion of the fine and rusty gold travel, naturally hugs the bottom of the sluice and anything that tends to disturb this condition, particularly at the point where the sand is to be drawn off, will occasion loss. Clogged material on the bars frequently is the cause of mine wash becoming banked at the grizzly and if banking does occur here all the sand coming down the sluice is lost either by being swept over the now totally ineffective grizzly or over the sides of the sluice.

The accompanying description and drawings are of a rocking bar grizzly embodying the main features of the California installation already referred to, but with details of construction modified considerably by me. These modifications, I believe will overcome the principal weak points discovered in the operation of the grizzly.

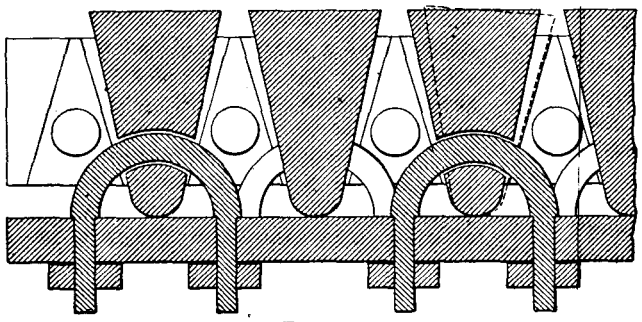

FIG. 1

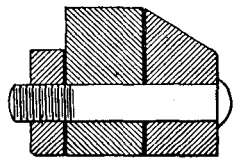

FIG. 2

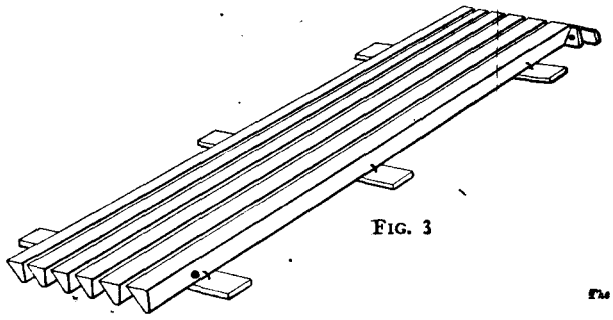

FIG. 3

A ROCKING BAR UNDERCURRENT GRIZZLY

The undercurrent grizzly as shown consists of a series of parallel steel bars six feet in length, 2¾ in. in depth and 1½ in. wide across the top. In cross-section each bar tapers inward from the top down and at the bottom is rounded to a semicircular shape, as shown in Fig. 1. Through the thin part of the bars holes are drilled to receive U-bolts, the bends of which are semicircular. These bolts hold the bars in place on steel cross plates upon which the bars rest. The diameter of the holes through the bars is slightly larger than the diameter necessary to take the U-bolts in order that the bars will not bind on the bolts but have ample play to rock freely in a sideways direction. The points of contact of the bars on the cross plates act as pivots and each bar may swing sidewise on the arcs of circles of which these pivots are the centers. At the upstream end of the undercurrent a steel bar shown in Fig. 3 is placed crosswise to the grizzly bars and attached to the framework of the sluice box. This bar butts up close to the ends of the grizzly bars. Upon it are bolted lugs as shown in Fig. 1 which extend into the spaces between the grizzly bars for a distance of about an inch. The object of the lugs is to limit the sidewise swing of the grizzly bars. The upstream end of the grizzly is overlapped by the bottom boards of the sluice for several inches to shield these lugs from sand and small pebbles which otherwise might have a tendency to lodge between the lugs and the bars and stop the rocking of the bars.

When the sluice is in operation the grizzly bars receive a sidewise oscillatory motion from the force of the water, gravel and boulders passing over them. This rocking motion does not to any notable degree prevent pebbles and rock slabs from becoming lodged as these materials are constantly filling the spaces between the bars. However the movement of the grizzly bars produces an action similar to that of a shaking screen which keeps the oversize in motion and traveling forward and thus the oversize, although occupying the surface of the screen, is prevented from rendering the screening surface useless.

In its trial at the California property the grizzly proved a great success as a prevention against clogging. It was found that as much sand and water passed to the undercurrent box after several weeks constant operation as passed a few minutes after piping started and the sluice was carrying its normal capacity of mine wash.

Its chief difficulty lay in the fact that it allowed much coarse gravel to pass

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and the old screens have proven effica- lining. The flame from the burner is liability of setting fire to the mixture. A