The duty per man in picking, shoveling, and wheeling varies with the individual and his working conditions but may be 75 to 125 wheelbarrow loads per eight-hour shift, or 20 to 40 square feet of bedrock mined to a height of 5 or 6 feet, the average being about 25 square feet, or 5 cubic yards.

BUCKET HOIST

Several types of shaft buckets are used, but that in most general use is the Fairbanks self-dumping type made in sizes holding 3 to

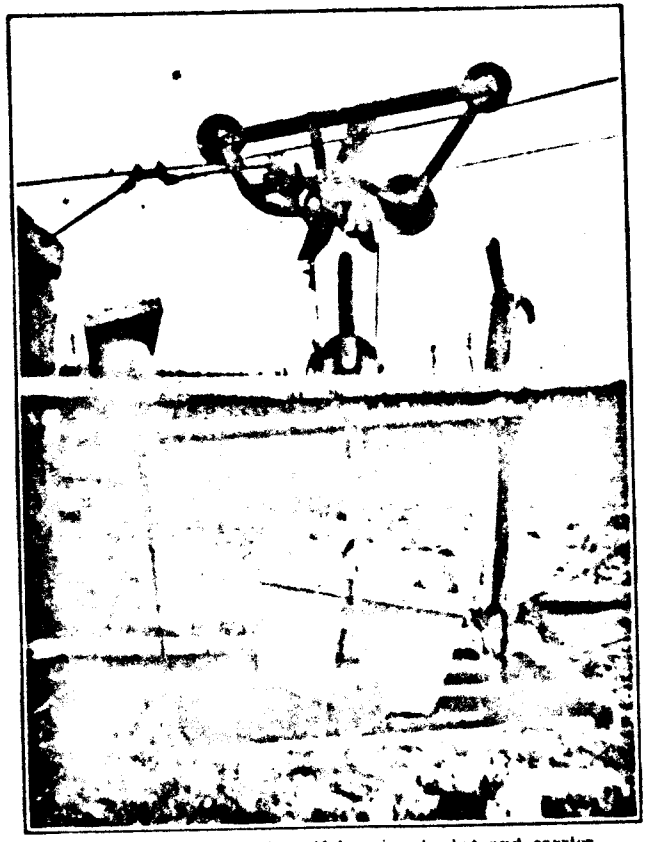

FIGURE 35.—Fairbanks self-dumping bucket and carrier

8 wheelbarrow loads. Such a bucket with carrier is shown in Figure 35. The bucket has a swinging bail and is hoisted by a cable winding through a sheave on the bail and the sheaves on the carrier suspended from the incline-track cable on the surface. A slip ring, which is attached to the bucket by a chain sling, travels along the guide or trip cable. On reaching the carrier the bucket engages a catch and is automatically locked to the carrier. Both are then pulled up the incline-track cable to a point over the dump, where the ring guide encounters a stop on the trip cable, releasing

and upsetting the bucket. This procedure is shown in Figures 33 (p. 118) and 36. Returning to the collar of the shaft by gravity, the carrier strikes a trip and releases the bucket, which is then lowered down the shaft. Men and all supplies are also carried by the bucket. At many plants the bucket when hoisting "dirt" can make a complete trip in one minute, which is much faster than the material is usually delivered.

SLUICING

At the summer mines the material as hoisted is generally sluiced at once, but the time for sluicing may be regulated by the water supply. At some mines the small amount of material mined can be sluiced in a few hours after shift. The sluicing arrangements at most mines comprise a dump box and sluice boxes set on trestles to provide the necessary grade and dump; at other mines the dump box

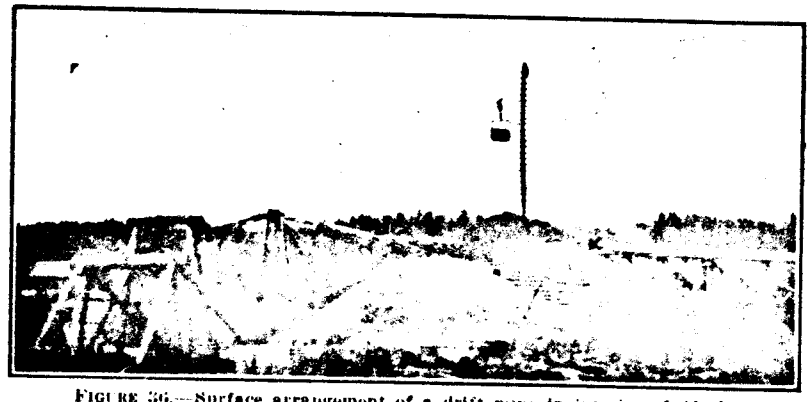

FIGURE 36.—Surface arrangement of a drift mine in interior of Alaska

and head of the sluices are often set up on an old waste dump. The dump box has a timber apron, or the sides may be built up with waste to form a chute for guiding the material from the bucket into the box. The dump box may be 20 to 52 feet long and 2½ to 4 feet wide, set on grades of 12 to 14 inches to 12 feet. The sluice boxes are 12 to 16 inches wide and are set on grades of 7 to 12 inches, sometimes more if available. Pole riffles set lengthwise are commonly used and may be shod with strips of iron or steel. Several sets of such riffles may sometimes be placed crosswise. Undercurrents of the same width as the sluices, made of punched steel plate placed several inches above cocoa matting, may be added at the end of the sluices, but refinements for saving fine gold are often lacking.

At many drift mines clay in the gravel or on the bedrock adds to the sluicing difficulties and usually causes a loss of gold. The dump-box man forks out the large rocks, puddles the clay, and tries

to disintegrate the lumps before the material passes to the sluice. Most of the gold is usually recovered in the dump box and the first or second sluice boxes, but much lumpy unwashed clay goes through the sluices to the dump, carrying some of the gold. The best method is to store on the dump such clayey material and then cut it up and wash it well by a small stream of water under pressure before it is permitted to enter the sluice (fig. 37).

As previously mentioned, water for sluicing is usually obtained by gravity flow from a ditch, but at many mines it must be lifted by a pump. Although pumping increases the cost of sluicing, it provides a steadier water supply and may save costly ditch construction and maintenance. As the season of sluicing is closed dur-

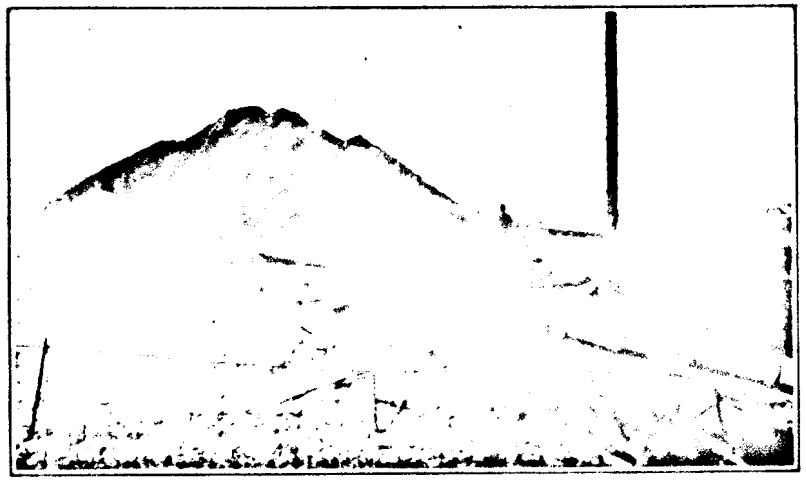

FIGURE 37. Sluicing the dump by nozzling

ing hard freezing weather, attempts have been made to sluice during the winter by pumping warm water, but the added cost and difficulties make this inadvisable. At the average drift mine enough water for sluicing is generally available from the latter part of April to the end of September, and the quantity used ranges from 30 to 100 miner's inches.

The hoisted "pay dirt" may be stored in large dumps for sluicing, as for winter dumps; then the sluices are supported on heavy trestles and covered with boards or poles, and the material is dumped on top. When water is available, the boards are withdrawn as the material is caved, shoveled, scraped, or hydraulicked into the boxes. Unless they are hydraulicked, the winter dumps must be thawed before they can be sluiced.

COST OF SLUICING

When the material is comparatively free of clay and a steady supply of water is available from a ditch line, sluicing costs are comparatively small. Under average conditions a dump-box man is necessary; then the cost of sluicing will range from about 15 to 45 cents per cubic yard, depending on the amount of material handled and the method used. At one mine in the Ruby district about 30 cubic yards of clayey gravel are mined per day of one shift. This gravel is stored on the dump for three days, then one man hydraulics it and puts it through the sluices in one shift at a cost of 20 cents per cubic yard. The water for the 1-inch nozzle used is pumped. In the Fairbanks and other interior districts the average cost for sluicing is considered by many of the operators to be about 10 per cent of the cost of drift mining.

THAWING

In the first placer mining in Alaska frozen gravel was thawed with wood fires or hot rocks, and this method is still used at a few small isolated mines. Hot water was later used at a number of mines. With these few exceptions, the thawing in drift mines is done with steam under pressures of 90 to 110 pounds at the boilers. The steam is conducted down the shaft and to the workings through pipes from which connections are made to the various crossheads or batteries with pipe and steam hose. Each crosshead delivers steam to 4 or 5 points; a valve and hose connect to each point.

STEAM POINTS

The steam points are made of extra-heavy hydraulic steel pipe $\frac{3}{4}$ to 1 inch in outside diameter and 6 to 20 feet long. Lengths over 12 feet are now seldom used at the face, partly because the short points can be handled with greater ease and thaw the ground more evenly. There are many kinds of points, differing in the type of drivehead, steam connection, and form of the bit. The lighter points are fitted with a heavy T, with a tool-steel plug for a drivehead and a pipe nipple for the steam connections, but the standard point has a heavy tool-steel head with the nipple welded to it or fastened by special attachments. A hole is usually drilled through the solid head for inserting a small bar for turning the point while being driven.

The points may have either round-pointed, diamond-shaped, chisel, or cross bits, the kind used being governed by the character of the ground. The round-pointed or straight bit is most commonly used. With a small amount of steam turned on, the point is driven into the face, and where two men work together one drives with a heavy