excavated by the use of stoping drills. The centre prism is also removed in the same manner.

The plan immediately to the right of this section illustrates the cross-bar used for mounting the drills in the heading. The heading is 8 feet high and 11 feet wide; the centre part is 4 feet high and 27 feet wide, and the bottom part or bench is 9 feet high and 8 feet wide.

In the heading a bar 5 inches in diameter and 10 feet in length is fixed horizontally across the tunnel. Jack screws, located in each end of this bar, serve to adjust it to proper lengths, and to fix it rigidly against the walls. Three water Leyner drills are mounted on this bar, and the upper holes are first drilled. Then the bar is lowered to a point nearer to the bottom of the heading, and the lower holes are drilled.

Because of the use of these light-weight drills, which do not kick hard against their mounting, it is possible to employ this bar in place of the usual columns. Columns with arms are mainly used in America, because drills of the percussion type require a very rigid mounting. It is obvious that the use of the horizontal bar facilitates the

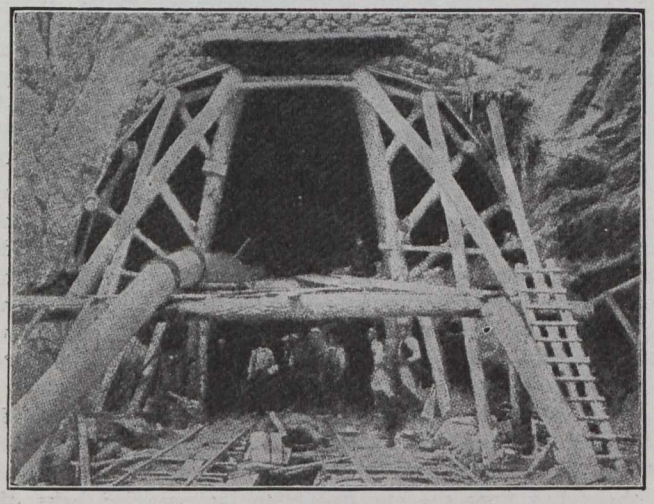

**Fig. 2.—Tunnel Portal.**

handling of the drills, and makes it possible to set up after a blast quicker than by the use of columns. The whole thing with the drills mounted is handled readily by a gang of men, who climb up over the muck, placing the bars in position and drilling the holes, while the muckers are at work below them.

The centre, or cut holes, are drilled to a depth of 8 feet, all the other holes being 7 feet in depth. Blasting is done by time fuse, which is admitted nowadays to be the best practice. Gelatine is placed in the bottom of the hole next the primer, over it is placed some gelatine and then 60 per cent. dynamite. Clay is used for tamping. Where the rock is hard, from 22 to 26 holes are drilled in the heading, but in softer rock this number is reduced to 16 holes in some cases, and in others as low as 12 holes. The rock in Mt. Ikoma is granite, usually hard, especially in the east end.

Progress in this tunnel has averaged over 10 feet of heading per day. Records have been made of 20 feet in 24 hours, single heading. This was on the west side where the rock is of moderate hardness. It usually requires 5 hours to drill 20 holes, 6 to 7 feet deep. The work of loading, firing and taking out the rock consumes about 3 hours, or a total shift of 8 hours. The work is done by the miners in 6-hour shifts, working day and night. One superintendent is in charge of each heading, with three drillers and three helpers.

Mine cars made of wood are used, carrying a capacity of 30 cubic feet, track 30-in. gauge, 25-lb. rail, the train of 10 cars being hauled by an electric locomotive.

For ventilation 50-h.p. Root blowers exhaust through a 20-in. stack. Ingersoll-Rand air compressors of 115-h.p. each furnish the compressed air at 100-lbs. pressure, the air being conducted to the heading through a 5-in. pipe.

The holes drilled are usually of about 2 ins. in diameter, and the progress of the drills is from 7 to 12 inches of hole per minute. Although water is fed into the bottom of the hole, the discharge of the cuttings is really effected by compressed air, which is forced in with the water, the minimum amount of water being used, and only for the purpose of laying the dust.

Power at the portals of the tunnel is transmitted electrically as a distance of 16 miles at 3,500 volts; 16-candle-power electric lamps are used for lighting.

Up to May 31, 1912, an advance was made in the east end of 2,127 feet, and in the west end 1,917 feet, or a total progress of 4,044 feet. The tunnel is to be lined with brick, about 1,000 feet being already completed.

## WORKMEN'S COMPENSATION IN ONTARIO

In connection with the Royal Commission appointed by the Ontario Government to consider the question of compensation to injured workmen, the commissioner, Sir William Meredith, is visiting England and the continental countries to investigate on the ground the systems in operation in these countries.

A plan may be proposed by which all workmen sustaining personal injuries by accident, arising out of and in the course of their employment, will receive compensation, irrespective of who was to blame. A Workmen's Compensation Act of such a nature would be only similar to those adopted in the other Provinces throughout the Dominion, as well as in England.

There is a suggestion in the interim report of the Commissioner that the manufacturers of Ontario are favorable to a scheme of State insurance. The details are not disclosed, but the scheme would probably be operated on an assessment plan.

Commenting on this, Mr. Alex. MacLean, manager and secretary of the London and Lancashire Guarantee and Accident Company of Canada, says: "State insurance is a movement towards paternalism of government, more far-reaching than any economic measure heretofore proposed. The adoption of such a plan commits one to a principle, which, if carried to its logical conclusion, means that any or all commercial industries may properly be conducted by the government to the exclusion of private enterprises.

"It is for the government to decide as to what form of legislation to place on the statute books in respect to compensation to injured workmen. That is one thing, but for the government arbitrarily to fix the rates that the employer must pay for his protection is taking away the inalienable right to purchase insurance, or protection, at the lowest possible cost.

"Any legislation that will eliminate law costs and provide adequate compensation to the injured workmen will be gladly welcomed by the insurance companies. Let the government pass such an act, and if necessary see that the liability companies are subject to the closest government inspection so that no injustice will be done the employer in the fixing of rates. It will be found that there will be a better feeling between the employer and employee than if arbitrary rates are fixed by the government under a system of State insurance and injured employees are compelled to look directly to the government for compensation."