

**REGUIDING No. 6 AND No. 7 COMPARTMENTS OF No. 5
SHAFT, CROWN MINES, LIMITED, WITH 30 FT.
STEEL RUNNERS.**

D. MACNIVEN,

Acting Manager, Eastern Section (No. 5 Shaft), Crown Mines, Ltd.

These notes on the preparation for and reguiding of Nos. 6 and 7 compartments of No. 5 Vertical, seven-compartment shaft may interest members of this Association.

At the beginning of 1933 it became clear that the old steel guides, which had seen about 12 years' service, would have to be replaced from the collar of the shaft to 19 station, 3,240 ft. in all.

To appreciate the importance of carrying out these repairs in the minimum of time owing to its bearing on the output of the whole mine, an outline of the major duties of this vertical shaft is given :—

Total tons of rock hoisted, January to December, 1932	...	3,333,352
Total tons of rock hoisted, January to December, 1932, 6 and 7 compartments	... ..	1,182,235
Proportion of total rock tonnage through 6 and 7 compartments	... ..	35·6%
Total gallons of muddy water bailed	... ..	27,067,000
Total gallons of muddy water bailed 6 and 7 compartments	...	13,535,500
Proportion of muddy water bailed 6 and 7 compartments	...	50·0%
Average number of Europeans going on shift daily	... ..	378
Average number of natives going on shift daily	... ..	3,214

It was decided to commence the reguiding at midnight of the first Saturday/Sunday in February, but before the actual job could be started much preparatory work had to be done.

Preparatory Shaft Work.—The number of guides to be replaced was 216 in each compartment, i.e., 108 30 ft. steel runners (Fig. 26) on each side of both compartments, making a total of 432.

- (1) The first operation was to clean down all accumulated dirt resting on the two dividers and the end plates in order to have easy access to the chair bolts when the actual replacements commenced. As so much mud is bailed through the shaft, this work took about 120 hours to complete.
- (2) After cleaning down the two compartments, all badly worn chairs, dividers and end plates were renewed. Extra bell wires were installed as a precaution against breakdown in communications.
- (3) The next operation was the marking off of the chair bolt holes for the new guides, and on the accuracy of this work depended very greatly the speed of fixing the new guides. The measurements were taken by means of wooden laths, 30 ft. by 2½ in.

— Crown Mines Ltd. —



Eastern Section

Details of Guides, Fish-Plates etc.

As used in re-guiding Nos. 6 & 7 Compartments of No. 5 Shaft

Weight of a Guide = 1160 lbs

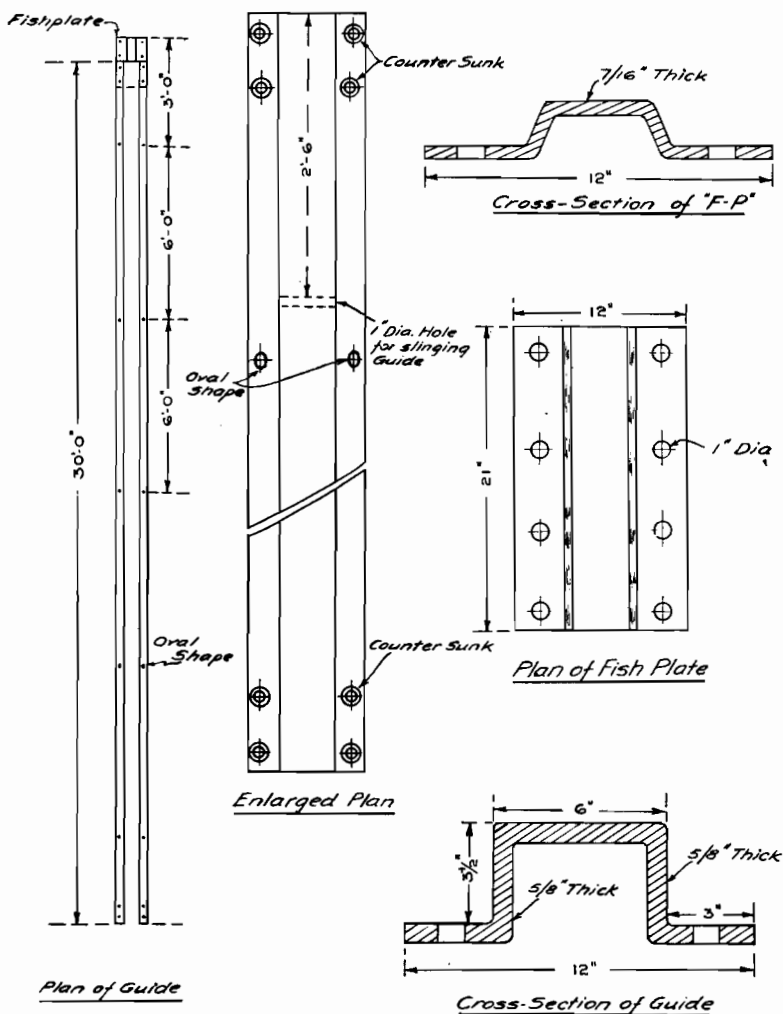


FIG. 26.

by $\frac{1}{2}$ in. thick. Twelve laths at a time were taken down the shaft in the long man cage. Each lath was then nailed to the face of the dividers or end plate, as the case may be. The laths were secured tightly against the edge of the old guides, each being butted as close as possible to the one below; the centres of the chair holes were transferred to the corresponding lath and the guide number marked upon it. The guides were numbered from the top down, NNI and NSI, being top guides of No. 6 compartment, north and south side respectively, while the marking of holes is done from the bottom up.

Preparatory Surface Work.—

- (1) To transfer the centres of the chair bolt holes from the laths to the new guides, as many of the latter as possible were fish-plated together. The laths were held tightly against the edge of the new guides by four native helpers, care being taken to have the laths butted together. The hole centres were squared across the new guides and the hole marks stamped by means of a special gauge. As each guide was marked with its holes, it was numbered to correspond with the lath from which it was marked.
- (2) The guides, now marked for the chair holes, were unbolted from the fish-plates and taken to a machine, and holes for $\frac{7}{8}$ in. cup-headed, oval-neck bolts were punched. The guides were then taken to the bank and stacked in numerical order.

The whole of the guides were arranged in four piles, one for each side of each compartment with its No. 1 guide at the bottom and No. 108 on the top. The series letters were NN, NS, SN, SS, corresponding to north side, south side, of No. 6 compartment and north side, south side, of No. 7 compartment. Every guide was marked on the face and on the back.

- (3) The necessary stores were then accumulated. There are 10 2 in. $\frac{7}{8}$ in. oval-neck cup-headed chair bolts, 4 counter-sunk $\frac{7}{8}$ in. fish-plate bolts and 14 extra large $\frac{7}{8}$ in. steel washers for each guide.

$\frac{7}{8}$ in. cup-head 2 in. bolts	5,000
$\frac{7}{8}$ in. counter-sunk bolts	2,000
$\frac{7}{8}$ in. extra large steel spring washers	7,000
Cold sets	36
Cold chisels	60
Fixed $\frac{7}{8}$ in. spanners	24
Large bucket lamps	12
Boilermaker's drifts	12
Bull nose chisels (for jamming worn bolts while un-screwing nuts)	12
1-ton chain blocks	2
Guide shackles (Fig. 27)	10
Hemp rope	
$\frac{1}{2}$ in. chain	
Air winches complete with wire rope and shackles ...	2

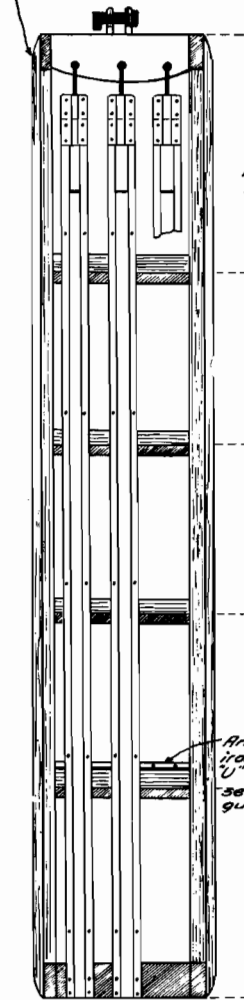
Crown Mines Ltd.



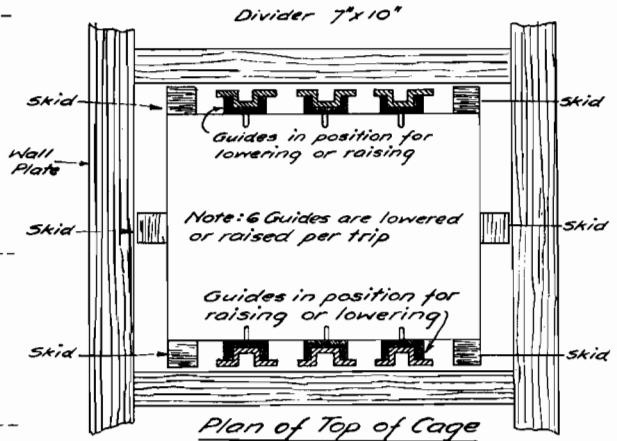
Eastern Section.

Method used in re-guiding at No. 5 Shaft
As used in re-guiding Nos. 6 & 7 Compartments of No. 5 Shaft.

Skids are of Pitch Pine
shod at ends with 1/16" Plate

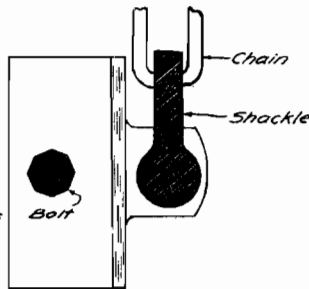


Elevation of Cage

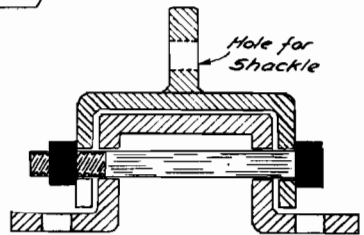


Plan of Top of Cage

Showing position of guides when slung.



Side View



Section of Clamp

Showing how guides are slung.

Showing guide held by Clamp.

FIG. 27.

Reguiding Cage.—The runners were put in by means of a special skeleton cage (Fig. 27.). This cage is made with six skids of pitch pine bolted to an angle-iron frame with five sheet-iron decks, the latter corresponding to the centres between dividers. The same cage was used to remove the old guides. Old guides were removed from the top down, and the new guides fixed from the bottom up.

Six guides are conveyed in the shaft at a time, three on each side ; one pair of the guides is removed simultaneously, slung on to the roof of the cage by the chains and special shackles, then the cage is lowered to the next pair until the load of six guides is made up.

DUTIES OF PERSONNEL ON THE CAGE.

No. 1 or Top Deck.—One European, the leading hand, and two natives who take out or put in four chair bolts from those on opposite sides of the compartment. They attach the guides to the holding chains by means of the special shackle (Fig. 27) and lift them into the proper position by the chain blocks. Two chain blocks are provided, one each side of the cage. The guides, having been lifted into position, are roped together to steady them for conveyance through the shaft.

Nos. 2 and 3 Decks.—One European and two natives in each who take out or put in the four bolts in the two opposite chairs and assist in guiding the runners into position.

No. 4 Deck.—One European and two natives who take out and put in four chair bolts from opposite sides. These men are responsible for securing the guides to the side of the cage by means of special “ U ” bolts which are bolted through the angle-irons provided, for the transport through the shaft.

No. 5 Deck.—Here there are two Europeans and two natives who work on the four chair bolts and the eight fish-plate bolts. Fish-plate bolts in old guides generally require to be cut out with the cold sets. The men working on this deck have to be very quick and hard working as they perform the most manual labour.

Surface Arrangements for the Reguiding.—Two small air winches, one for each line of runners, were placed at convenient positions on the bank, and by means of snatch blocks fixed in the headgear the guides were manoeuvred to or from the cage for disposal. One European fitter attended to the winches and was responsible for changing the cage from one compartment to the other. A handyman was also stationed on the bank who personally supervised the raising and lowering of the runners to the cage, saw that the new guides went down in the correct sequence and generally kept the bank clear of obstructions.

Distribution of Labour.—The details of the labour required for the work of reguiding was as follows :—

In the shaft : Three 8-hour shifts of 6 Europeans and 10 natives, *i.e.*, 18 Europeans and 30 natives.

On surface : 3 winding engine drivers, working 8 hours each.
 2 fitters working 12 hours each.
 2 handymen working 12 hours each.
 30 natives in shifts of 15 for 12 hours each.

For the duration of the work, all the Europeans were paid at their ordinary rates of pay with a minimum of 20s. a shift. A sliding scale bonus was also put into operation in which the time limit to complete was 264 hours, over which time no bonus was earnable. The full bonus would be paid if the work were completed in 192 hours or less. In addition, a bonus was offered if no serious accident took place during the work. It was one of the conditions of payment of a bonus that the work should be carried out with due regard to the requirements of the Mines and Works Act and Machinery Regulations and to the general satisfaction of the management.

Leading hands were paid 5s. per shift in addition to their earnings from the above outlined bonus scheme.

Removing the Old Guides and Replacing with New Ones.—This work was commenced at midnight on the 4th/5th February, 1933, and the first skip of rock was hoisted at 12.45 p.m. on the 11th February, 1933, so that the work was completed in $156\frac{3}{4}$ hours or $35\frac{1}{2}$ hours less than the minimum estimated time (192 hours). The total time was made up as follows :—

No. 6 compartment—Removing 216 old guides	...	...	37 hrs.
No. 6 compartment—Installing 216 new guides	...	...	42 ,,
Changing skeleton cage from No. 6 to No. 7 compartment	...	...	$2\frac{3}{4}$,,
No. 7 compartment—Removing 216 old guides	...	...	$32\frac{3}{4}$,,
No. 7 compartment—Installing 216 new guides	...	...	$35\frac{1}{2}$,,
Burning 10 holes for junction with headgear guides, removing skeleton cage and affixing Humble hook to skip. Final examination of both compartments	...	...	$6\frac{3}{4}$,,
TOTAL TIME	...	...	<u><u>$156\frac{3}{4}$ hrs.</u></u>
Average time taken to remove the old guides to surface	...	...	9.7 min.
Average time to install new guides	...	...	10.8 min.
Average overall time for the 432 guides	...	...	21.8 min.

No. 6 compartment of the shaft was stripped of the old guides from the top down and then the new guides were installed from the bottom up. The work having been completed in that compartment, the same procedure was adopted in No. 7.

During the whole of the reguiding operations, the other compartments of the shaft were working to their full capacity, and the job was successfully concluded with no accidents more serious than a few torn finger nails.