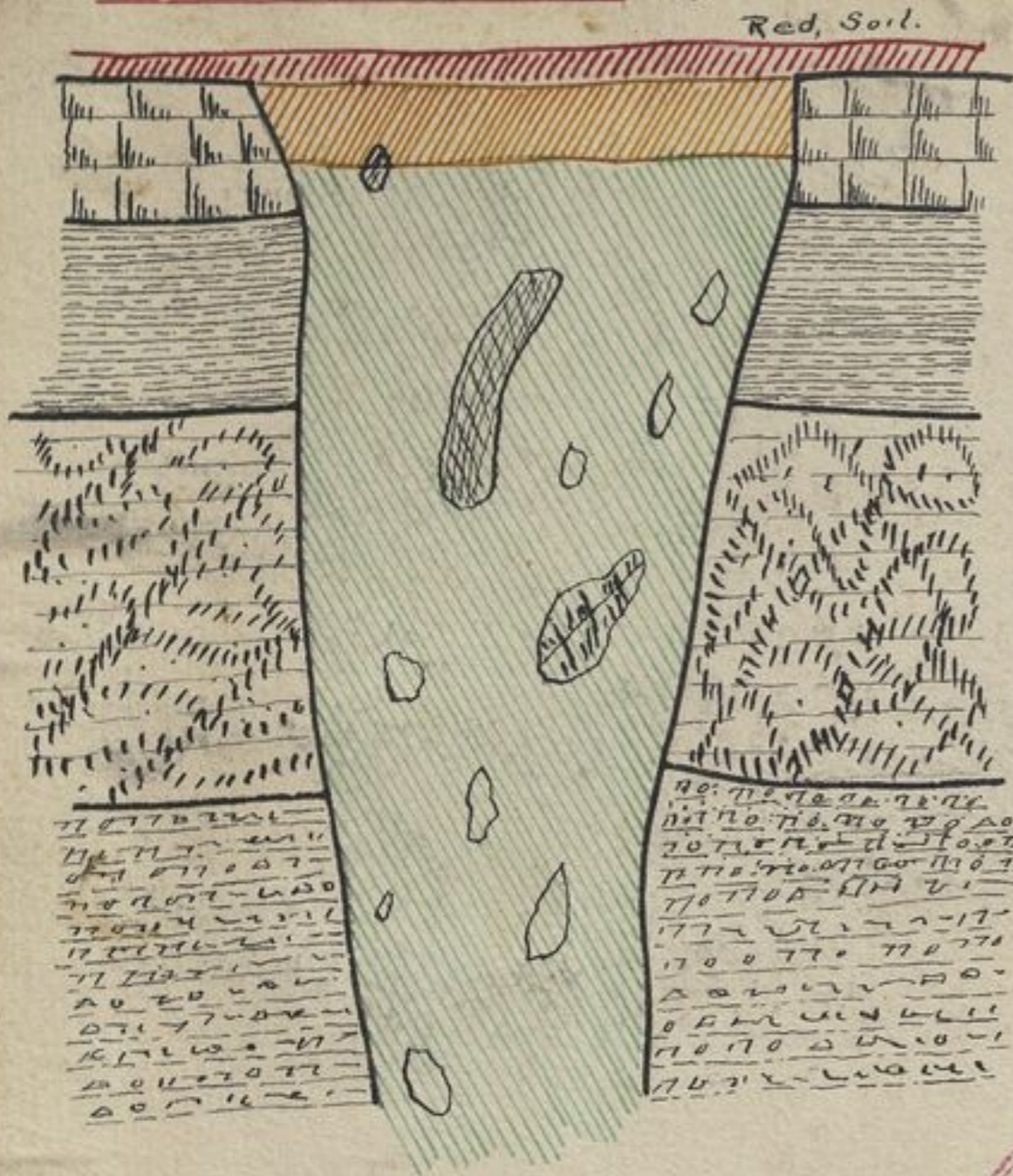
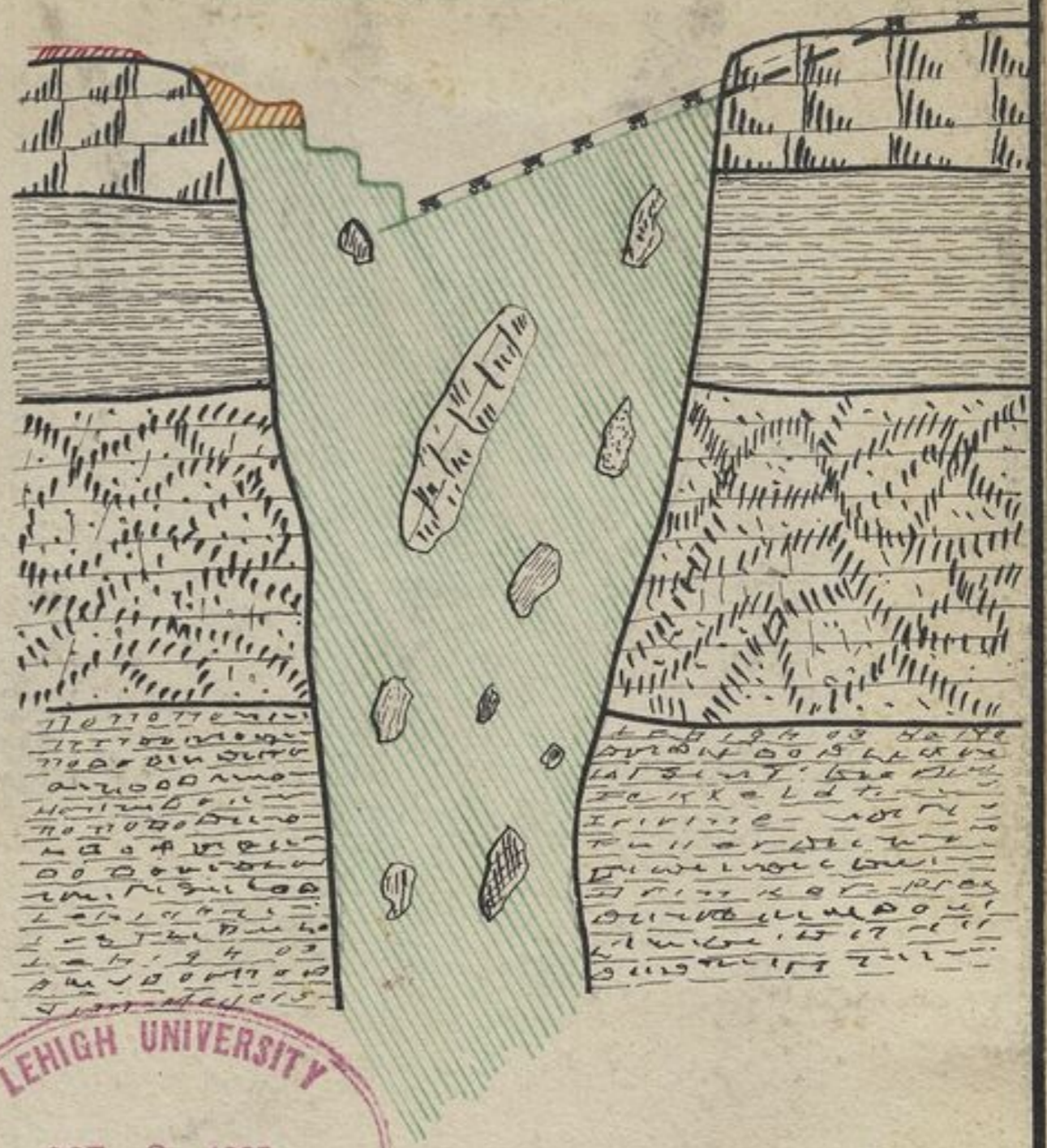


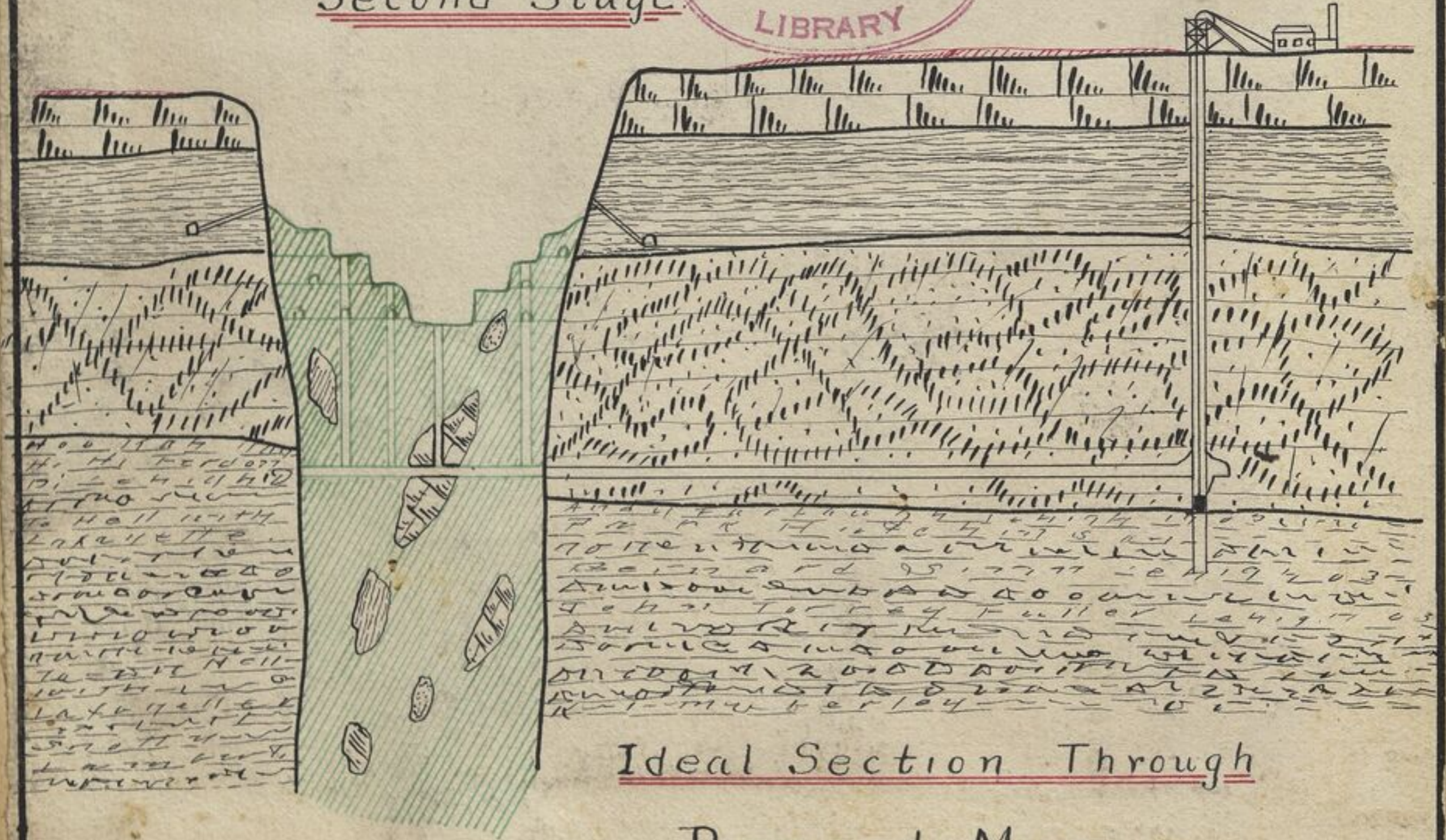
Before Discovery.



First Stage.



Second Stage.

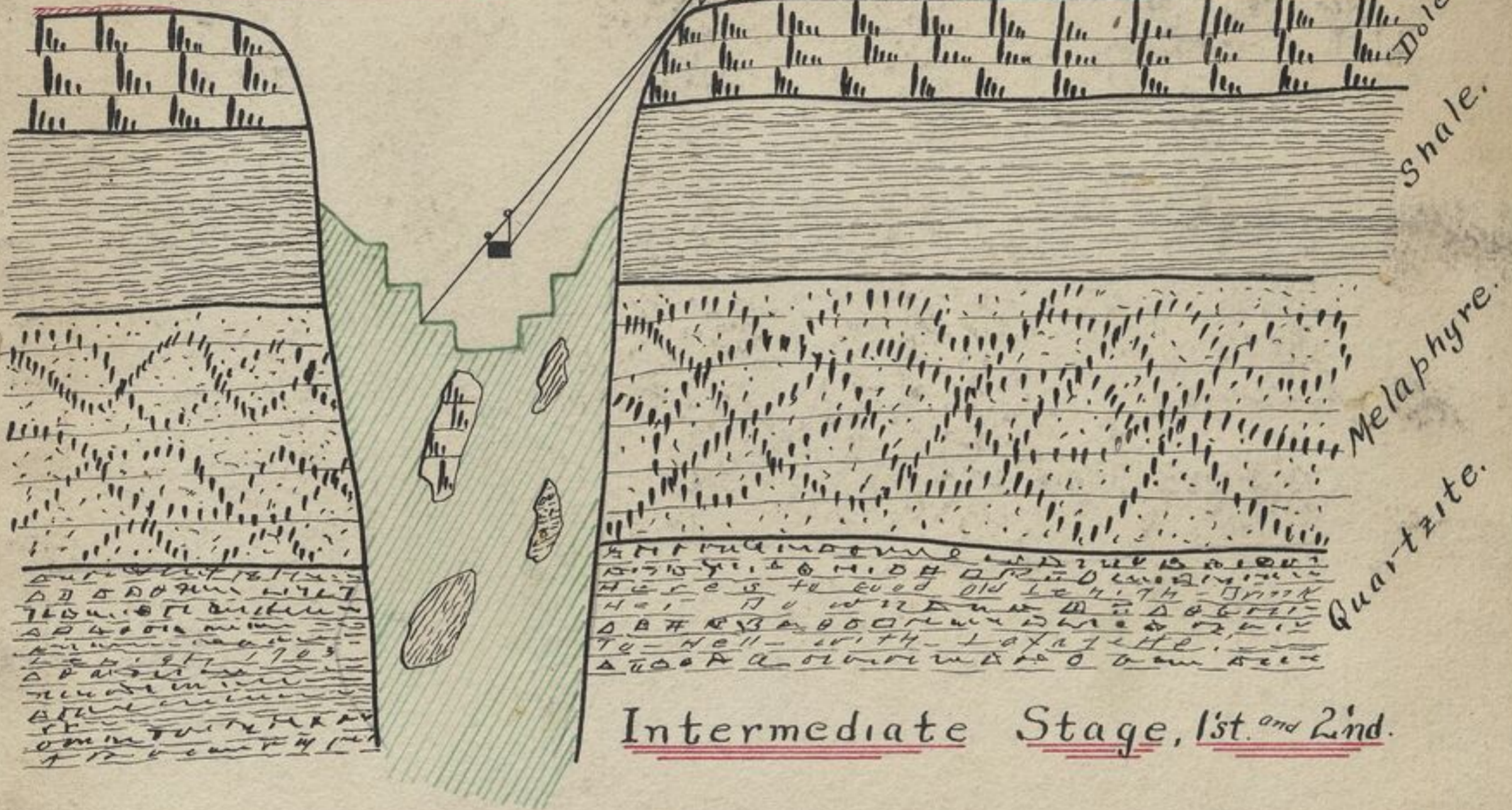


Ideal Section Through

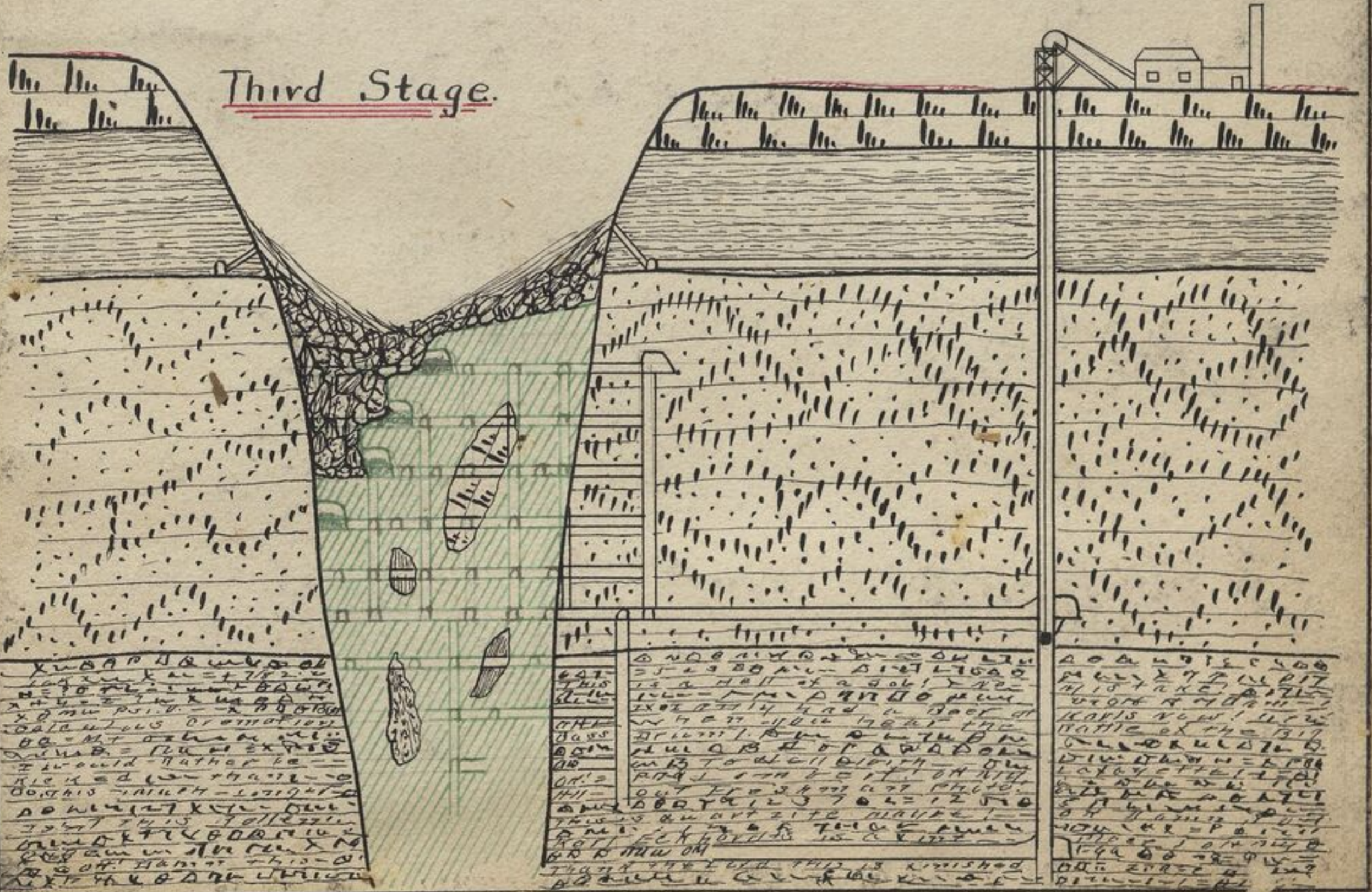
Diamond Mine.

LEHIGH UNIVERSITY
 OCT 3 1963
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Ideal Section Through
Diamond Mine.



Intermediate Stage, 1st. and 2nd.



Third Stage.

OFFICIALS

MINES DEPARTMENT

D. B. C. M. Ltd.

Alpheus F. Williams. General Manager.
University of California.

* C. M. Henrotin. Manager, Kimberley Mine.
Cornell University.

A. F. Brigham. Manager, Wesselton Mine.
Lehigh University.

John T. Fuller. Manager, Dutoitspan Mine.
Lehigh University.

H. T. Dickinson. Manager, De Beers Mine.
Columbia University.

T. J. Woodburne. Manager, Bultfontein Mine.

x Resigned.

VIEWS
OF THE MINES AND WORKS
OF
THE DE BEERS CONSOLIDATED MINES LTD.
KIMBERLEY
SOUTH AFRICA

PRESENTED TO
DEPARTMENT OF MINES
LEHIGH UNIVERSITY
BY

John T. Miller

SC 0230.1



WESSELTON MINE

View of Open Mine showing incline to surface.

Wesselton Mine at this stage is a good example of a Diamond Mine approaching the completion of its first stage

The Head-gear shown at the top of the picture shows that the Main Rock Shaft has been sunk in preparation for the second stage.

0230.02



WESSELTON MINE.

View of Open Mine, showing clearly the method of working
in terraces.



SC 0230.03

WESSELTON OPEN MINE.

View showing face of a Bench or Terrace 50' high.

The two tunnel entries shown in the view are 40' (vertically) apart

At the top right hand corner is shown the gap through which the $\frac{1}{2}$ °
incline used to pass.

The view shows this mine in the second stage of working in which the
ground is tipped through winzes, at a lower level and hoisted
through a Vertical Shaft.

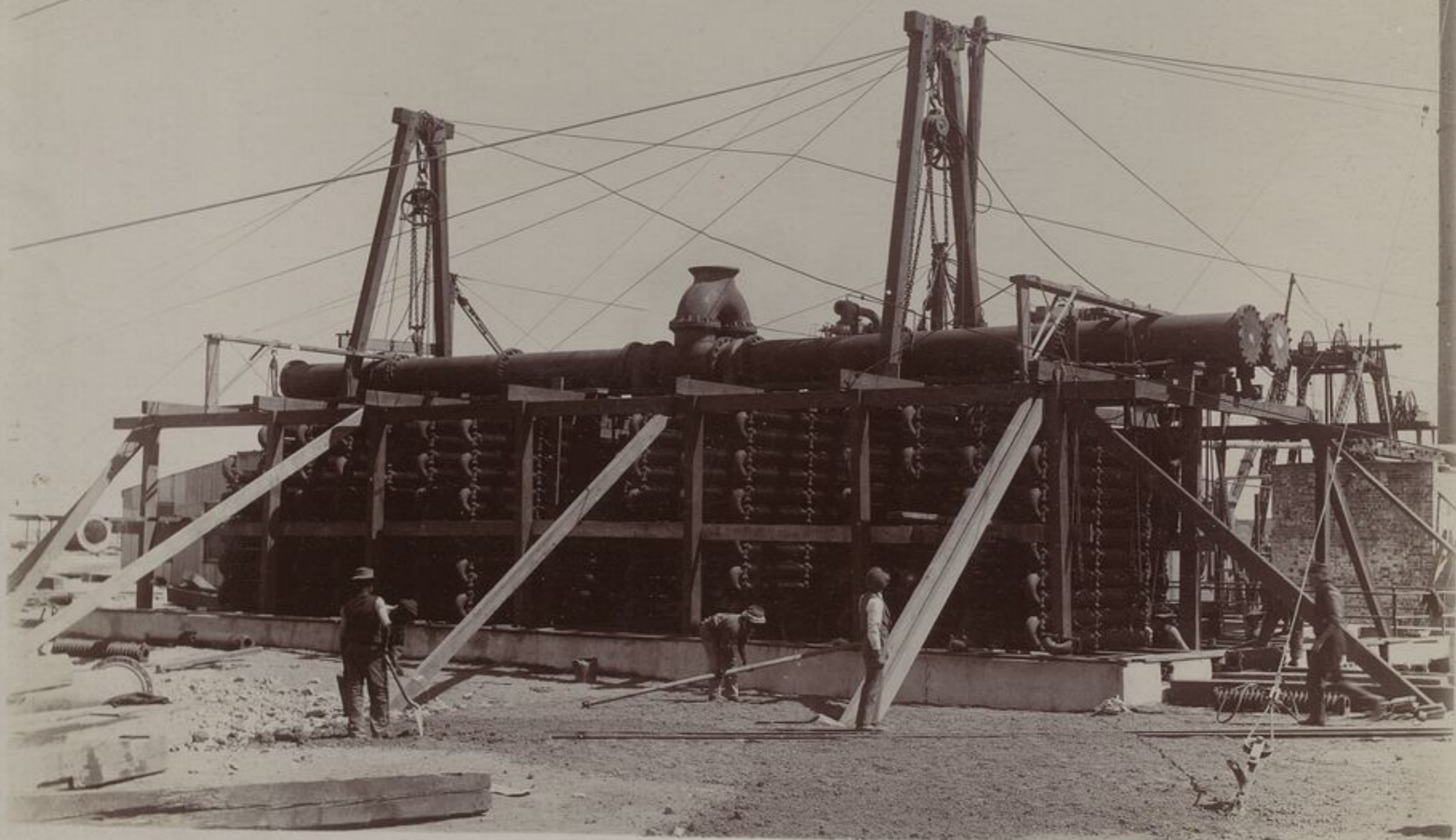


WESSELTON OPEN MINE

View looking up $1/20$ incline.

Here the gap shown in right hand corner of previous view is distinctly shown

The boundary of the Crater is indicated by the framework shelter which is on the edge of the mine.



SC 0230:05

TEDWARD'S PATENT EVAPORATIVE CONDENSER at Wesselton Mine
during course of erection.



5 C 02.30.06

STEEL HEAD-GEAR. over 5 compartment Vertical Rock Shaft at Wesselton mine.

This head-gear may be taken as representative of the first class of steel head-gears erected by this Company. Similar head-gears are at Kimberley, De Beers, & Bultfontein Mines.

The Gear is built of Steel lattice work posts, & Back braces, with Channel iron cross bracing.

General dimensions, :- Height, 82' to centre of sheaves, Base 43' - 7½" x 19' - 6" Stretch of back braces from foot of back posts 101'. Diameter of sheaves 14' Winding rope 5" cir.

Man-cage rope 3½" cir.

This view also shows the Boiler & Engine house, Store, and Change-house.



5C0230.07

DUTOITSPAN MINE HEAD-GEAR. Steel head-gear over No 1 Rock shaft

5 Compartment. General dimensions, :- Height 90' to centre of sheaves Dimensions of base 45' x 75', Sheaves 14" diameter

Steel Σ bar legs & back stays, Channel iron cross bracing.

This represents the latest design of steel head-gear adopted by this Company.



SC 0230.08

DUTOITSPAN MINE.

View showing head-gear, Mine end of Rope haulage to Floors, Haulage Engine house, Change-house, & Main Engine housed.

Blue ground hoisted from shaft is loaded in 20 cu.ft. steel trucks which then proceed to floors by endless Rope haulage.



SC 0230.09

DUTOITSPAN MINE

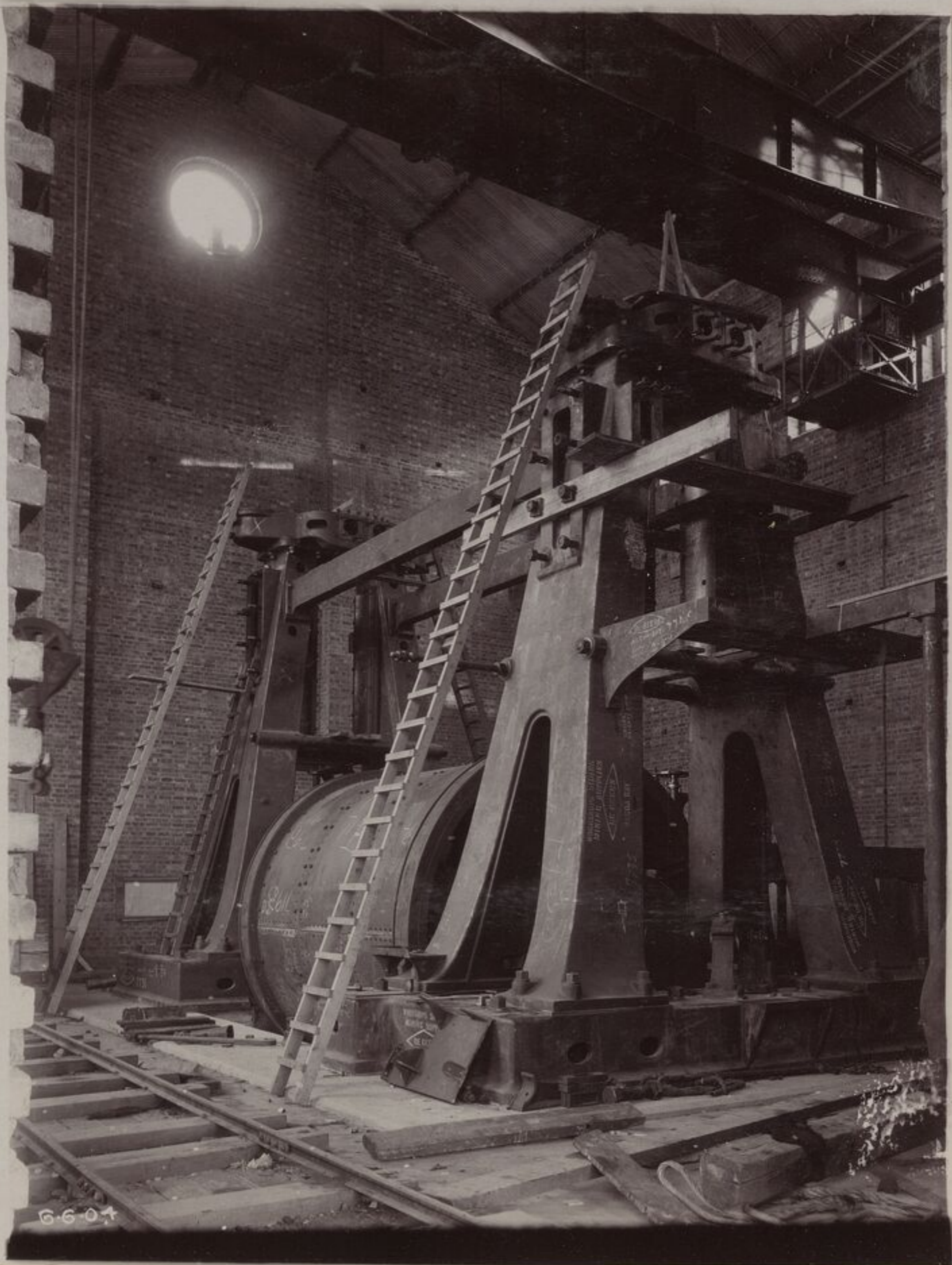
View showing Boiler house, Main engine house, Store, Offices,
Change-house, Haulage engine house, & Head-gear.



SC0230.10

DUTOITSPAN MINE.

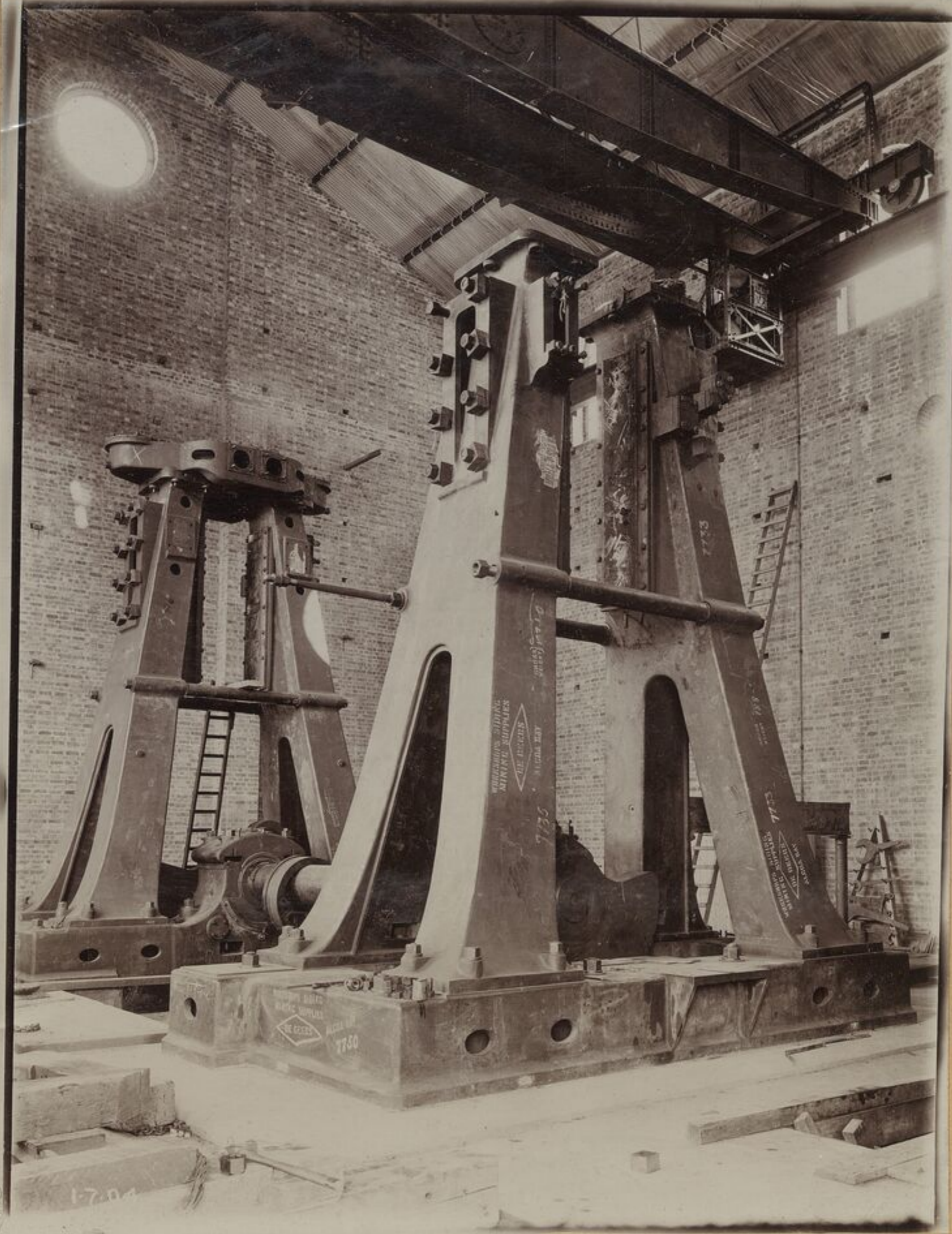
View showing interior of Boiler house during erection of boilers
Plant, :- 5 Babcock & Wilcox Water tube boilers with chain grate,
Mechanical Stokers.



DUTOITSPAN MINE.

5C 0230.11

Winding engine during erection, 1904. Engine designed by T. J. Seymour, Built by Yates & Thom, England I.H.P. 1.800.
CYLINDERS 35" x 54" x 60" TYPE Vertical cross compound.
Dia. Drum, 12', Winding capacity of drum 3.000' Hoists two skips of 8 tons capacity each Present hoist is 850'.
This is the largest steam engine on the African continent.



HOISTING RECORDS made with this engine.

SC 0230.12

For 8 hours.	5,240. loads.
" 12 "	7,470. "
" 24 "	11,565. "
" 48 "	27,305. "
" 72 "	42,360. "
" 144. "	61,883. "



5C 0230.13

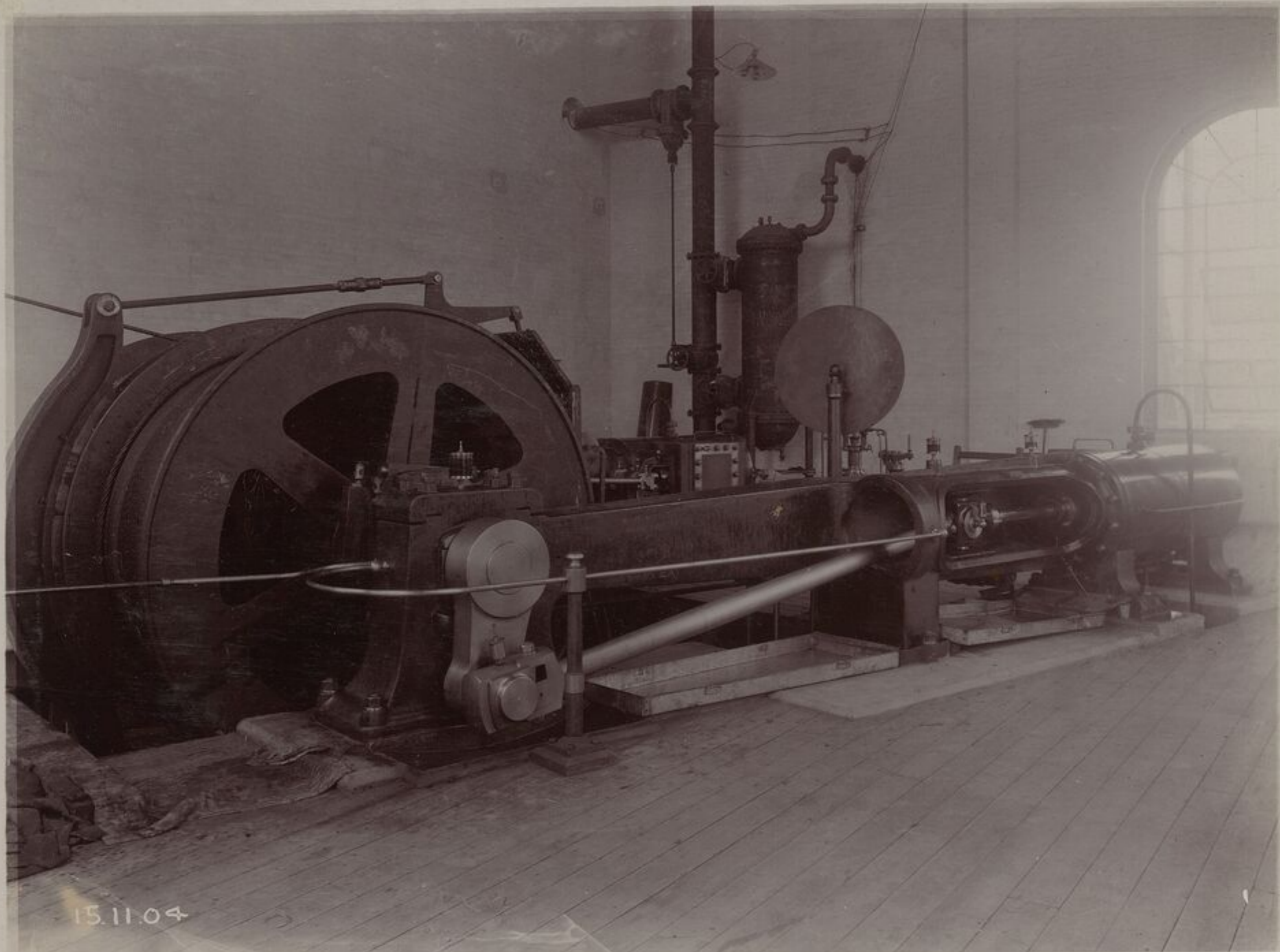
DUTOITSPAN MINE

MAIN UNDERGROUND HAULAGE. 750' level.

Baldwin-Westninghouse 5 ton locomotives.

Load 24 tons.

220 volts.



SC 0230.14

DUTOITSPAN MINE.

MAN-CAGE ENGINE. No 1 Rock shaft, Makers, - James Cochrane & Co.
I.H.P. 600. Cylinders 16" & 16" x 42" Type. Horizontal Duplex.
Two balanced double-decked cages holding 24 men each.



SC 0230.15

DUTOITSPAN MINE

MINE COMPOUND for native labourers.

Capacity 6.000.



SC 0230.16

DUTOITSPAN MINE.

View of open pit in 1903.

After work was abandoned in the Open Mine, due to falls of Reef, a number of years elapsed before the mine was taken over by De Beers and systematic underground work commenced. In the meantime the open pit gradually filled with water. This water reached a depth of 150'. Before underground work could be commenced, this water had to be pumped out.



DUTOITSPAN MINE.

View of open pit showing method of de-watering. Pumping was done in two stages. First a large centrifugal pump was erected on a raft. This pump was connected up with a second centrifugal pump mounted on the narrow strip of ground dividing the two bodies of water.



DUTOITSPAN MINE.

PUMPS USED IN DE-WATERING.

Mather & Platt, High lift centrifugal, direct connection to
Electric motor.

Floating set.

Pump, 2 chamber 12" suction, 10" delivery. Rated to pump
1,000. gallons per min. against a head of 120'.

75 h.p. Induction motor, 3 phase 50 cydl. 220 volts.

Fixed pump.

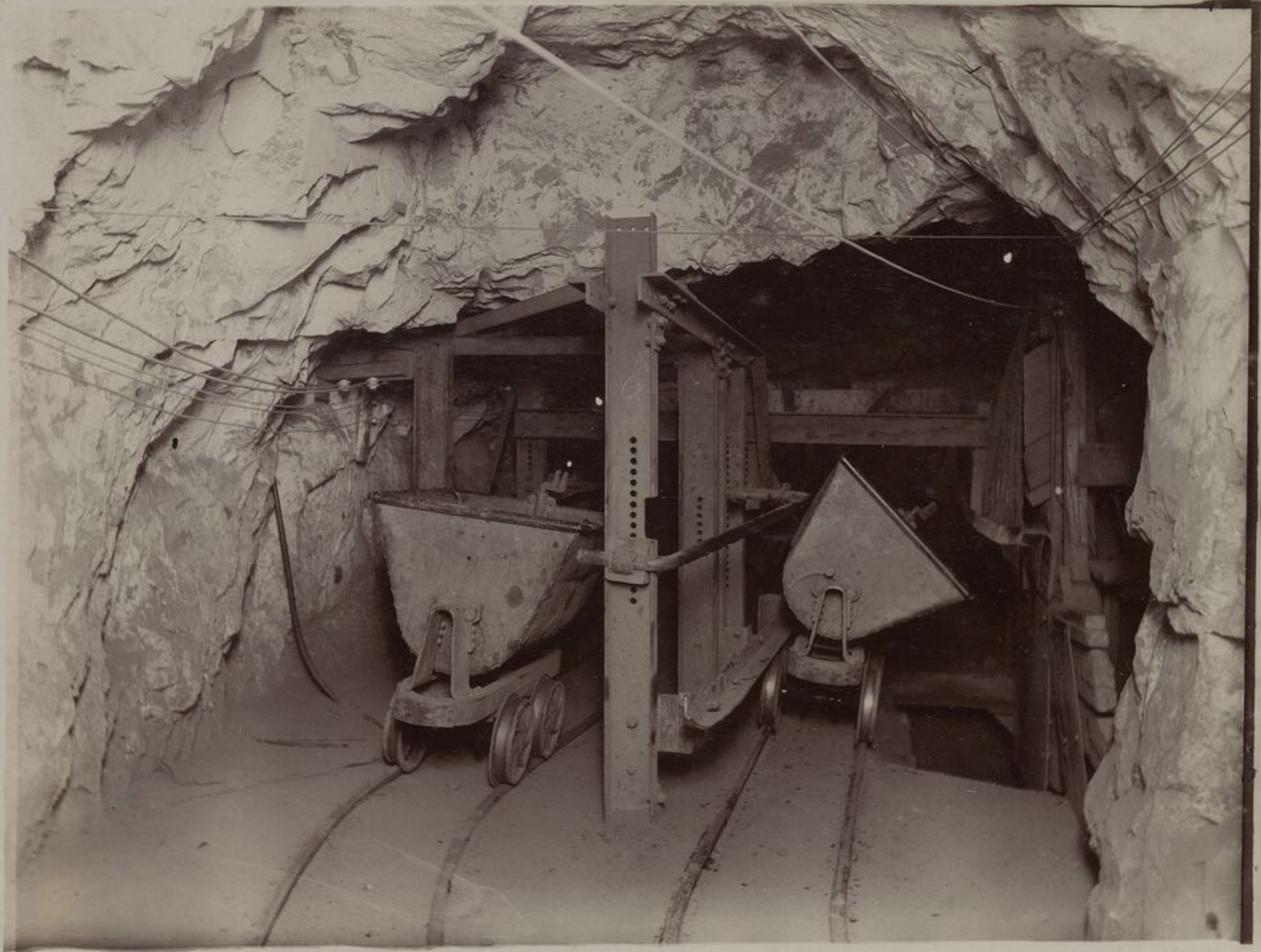
4 chamber, 12" suction 10 in. delivery, 1,000 gallons per min.
against 320' head.



SC 0230.17

DUTOITSPAN MINE.

View of Open Pit practically pumped dry.



SC 0230.18

KIMBERLEY MINE.

View of 2.160' level showing Automatic Tip. The 20 cu.ft. trucks containing the Blue Ground, run past the shaft by gravity, where they are automatically tipped into the Shaft Bins by the bent rail shown in the view. When they are past the Bins they are automatically righted by another bent rail.



KIMBERLEY COMPOUND.

50.0230.19

KIMBERLEY MINE.

Interior of Compound for natives, showing wire netting overhead,
intended to prevent natives from throwing diamonds over compound
enclosure to accomplices outside.

Capacity of compound, about 2,600.



SC 0230.20

DUTOITSPAN MINE.

View showing endless Mechanical Rope Haulage conveying weathered
Blue Ground from Dutoitspan floors to washing machine.



DIAMOND GROUND DEPOSITING FLOOR - DEBEERS -

DE BEERS MINE DEPOSITING FLOORS.

View showing Blue Ground deposited on floors for "weathering"
The Blue is brought from the mines to these various floors, which
are simply large areas of the veldt levelled off. Here it is dumped
and allowed to remain for, from 3 to 6 months (depending on its
hardness) exposed to the sun & rain. At the end of that period it
is practically pulverised and is then re-loaded & conveyed to the
washing machines.



5C 0230.22

DE BEERS MINE DEPOSITING FLOORS.

View showing method of dumping the Blue on the floors,

Each mine has its own floors, and the ground from the various mines is never mixed

The total area of all floors is about 4,500. acres . There are at present deposited on these floors about ten million tons of Blue Ground.



DEPOSITING FLOOR - STEAM HARROWING.

DE BEERS MINE DEPOSITING FLOORS.

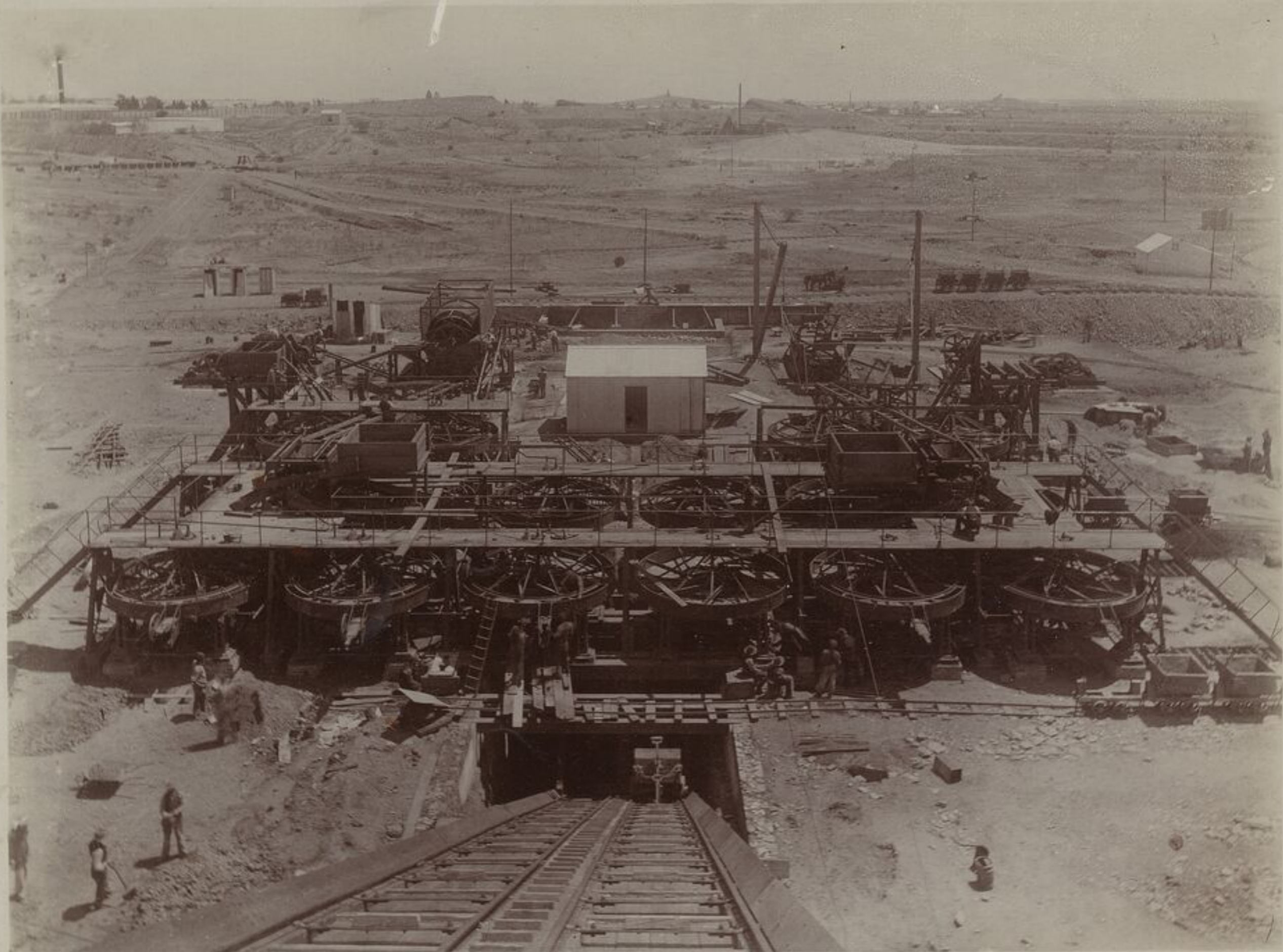
View showing method of harrowing the Blue during the weathering period. The Blue is constantly harrowed by means of ~~heavy~~^{heavy} harrows drawn backwards & forwards over the floors by wire ropes operated by heavy traction engines. In this way ~~new~~ fresh faces are presented to the air, and greatly increases the rapidity of disintegration



5C 0230.24

DE BEERS MINE DEPOSITING FLOORS.

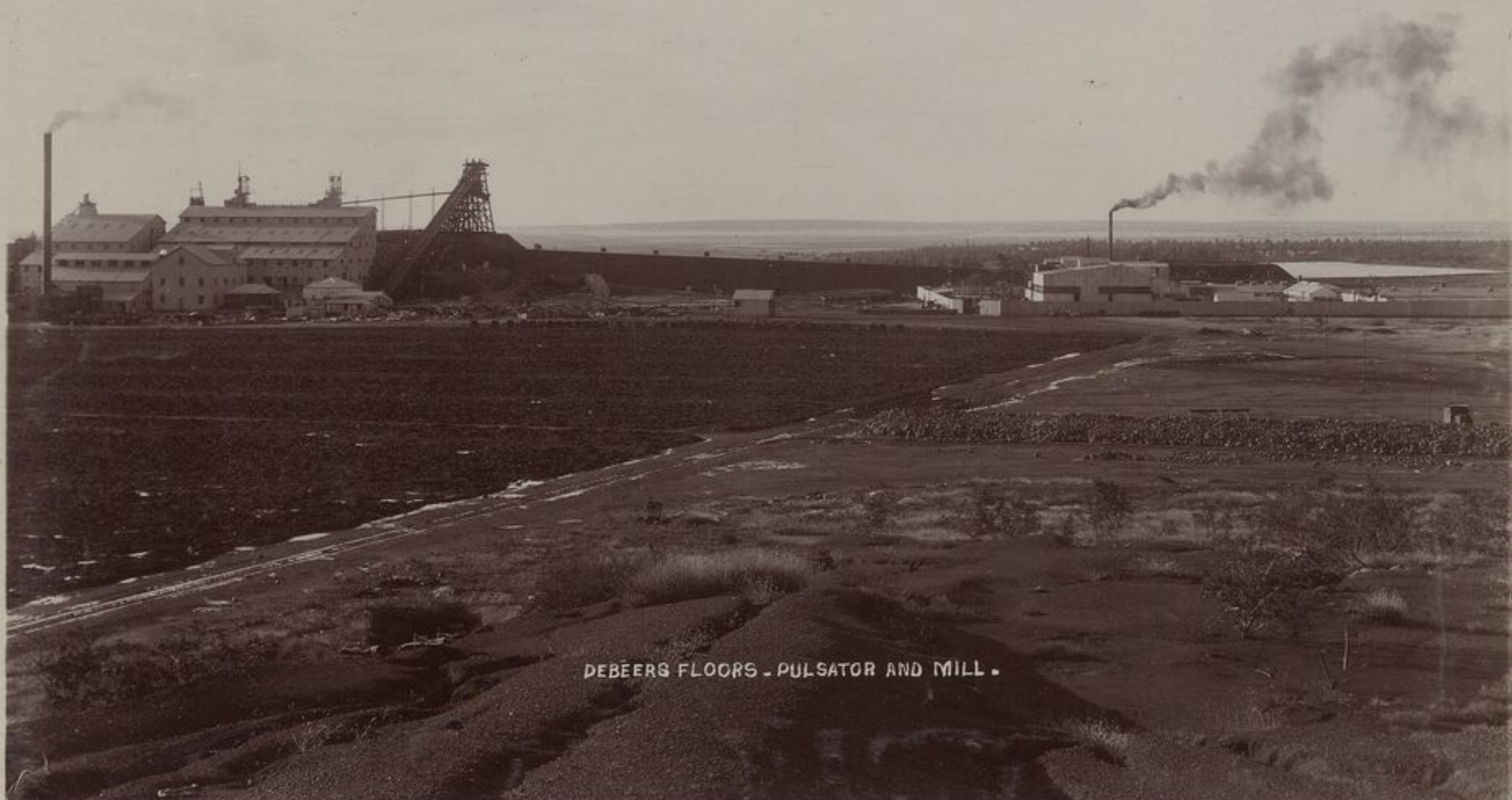
View showing the process of re-loading Blue from the floors after "weathering" The large lumps shown consist of large boulders of rock which are found embedded in the Blue, and extra hard lumps of Blue called "cylinder lumps". After the pulverised ground has been cleared up, the boulders are loaded & taken to the waste dump. The hard Blue lumps are taken to the Crushing Mill.



SC 0230.25

WASHING MACHINE.

The above view shows one of the numerous washing plants operated by The Company. The Blue is brought to the machine from the floors. The Blue is passed through crushers, sieves and screws^{ens}, and is finally passed into the rotary washing pans. The concentrate from the pans containing the diamonds and other heavy substances, such as quartz, garnets, olivius^{nes}, etc., is tapped off at regular intervals and allowed to run into locked trucks standing beneath the pans. In these it is then conveyed to the Pulsator, where the concentrate from all the mines receives the final treatment.



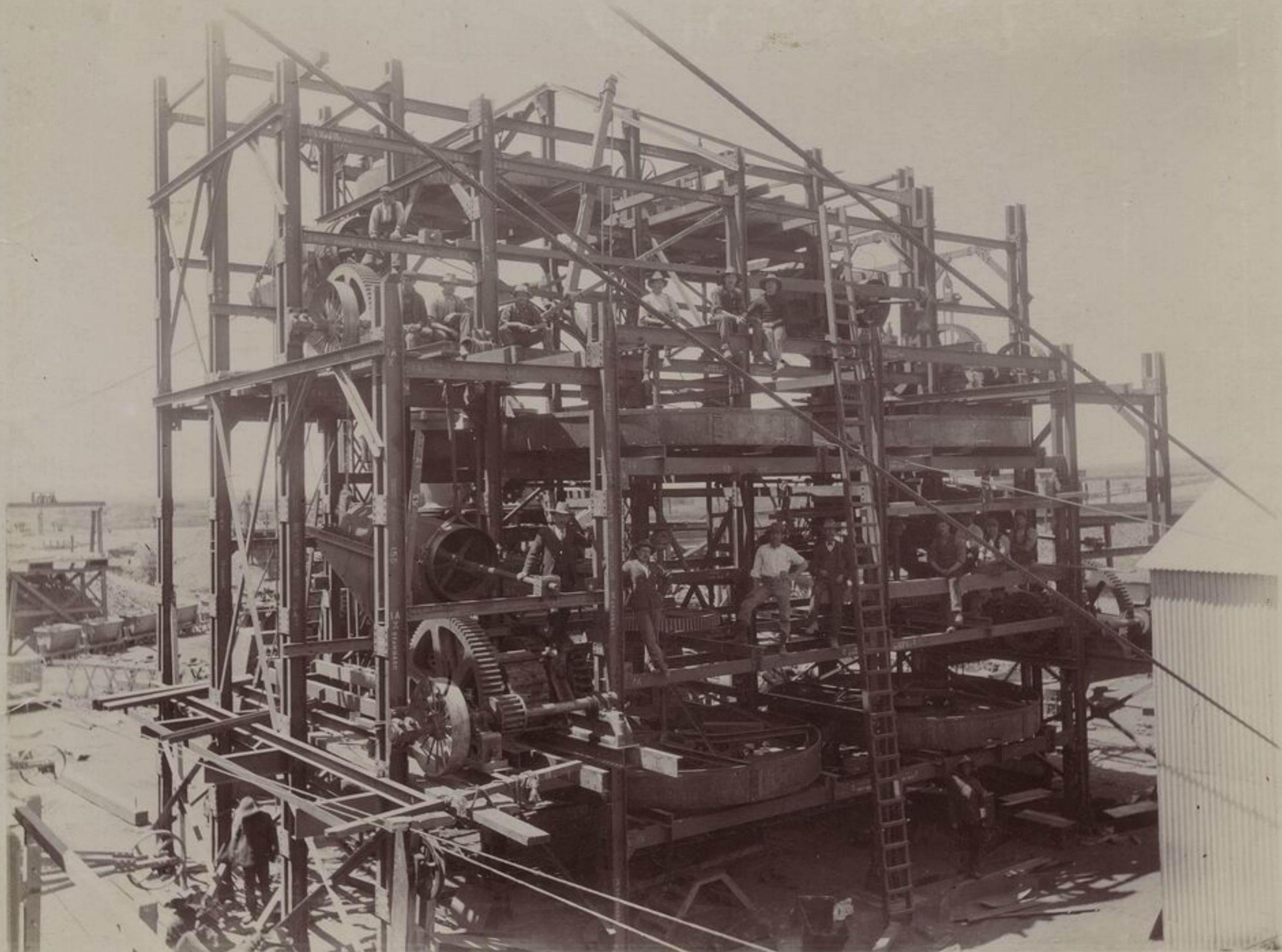
DEBEERS FLOORS - PULSATOR AND MILL.

50 02 30.26

PULSATOR AND CRUSHING MILL.

Crushing Mill on left, Pulsator on right, To the pulsator is conveyed the concentrate from the various washing machines in locked steel trucks hauled by small steam locomotives. The concentrate is then passed through Jigs, which separate everything from the Diamonds except the various heavy crystals associated with them. the concentrate from the jigs then passes over patent oscillating Grease Tables. It is the peculiar property of the diamond, that it attaches itself to the grease, while the other crystals pass over.

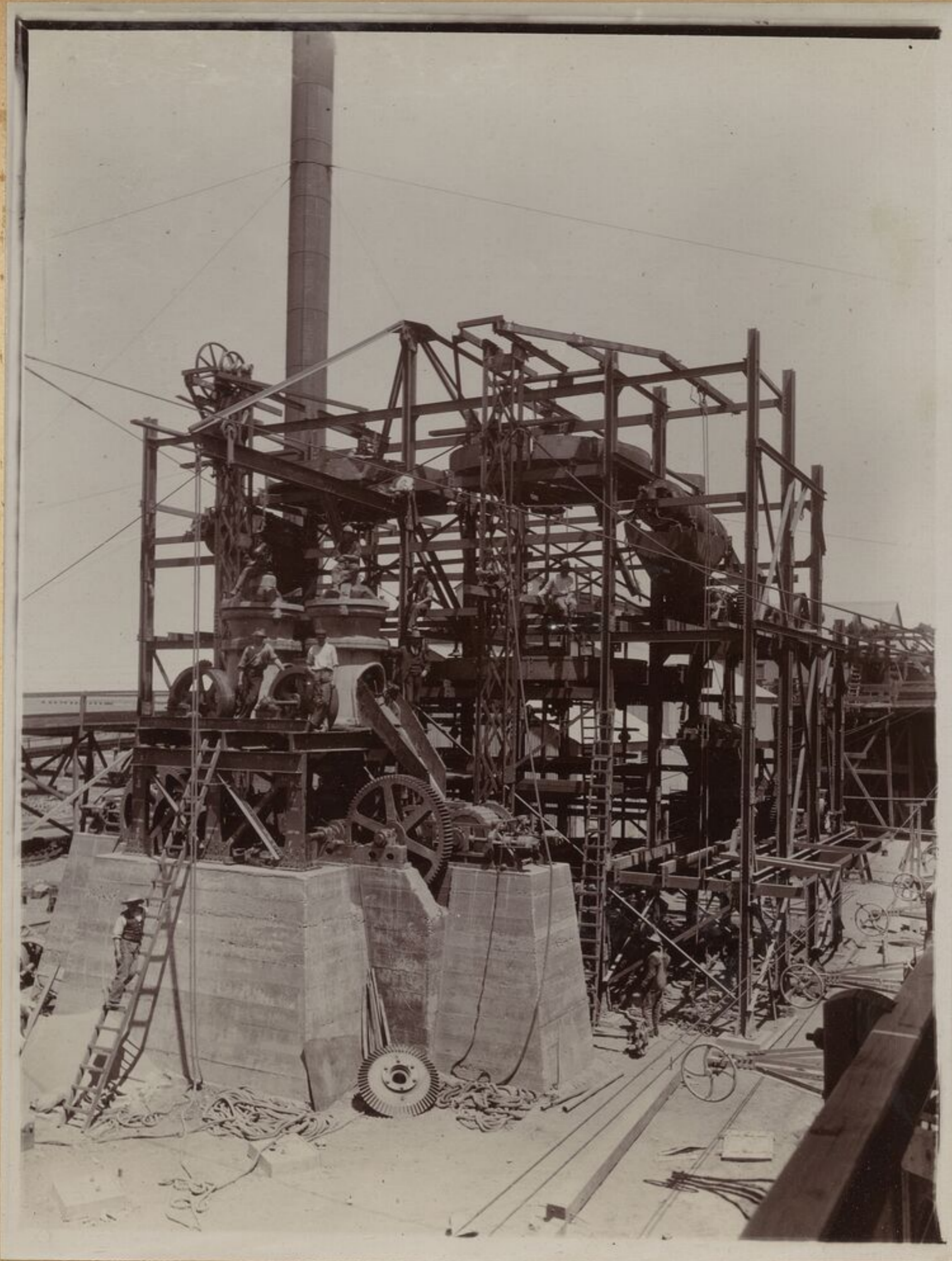
At regular intervals the diamonds are picked from the tables, and boiled, to free them from the grease. They are then thoroughly cleaned, weighed, sorted & sent to the Head Office for valuation and sale.



SC 0230.27

WASHING PLANT.

Views showing combined washing & crushing plant during erection. Blue is fed, first to large gyratory crushers, thence to crushing rolls, from rolls to screws oversize, back to rolls undersize to washing pans.



SC 023028

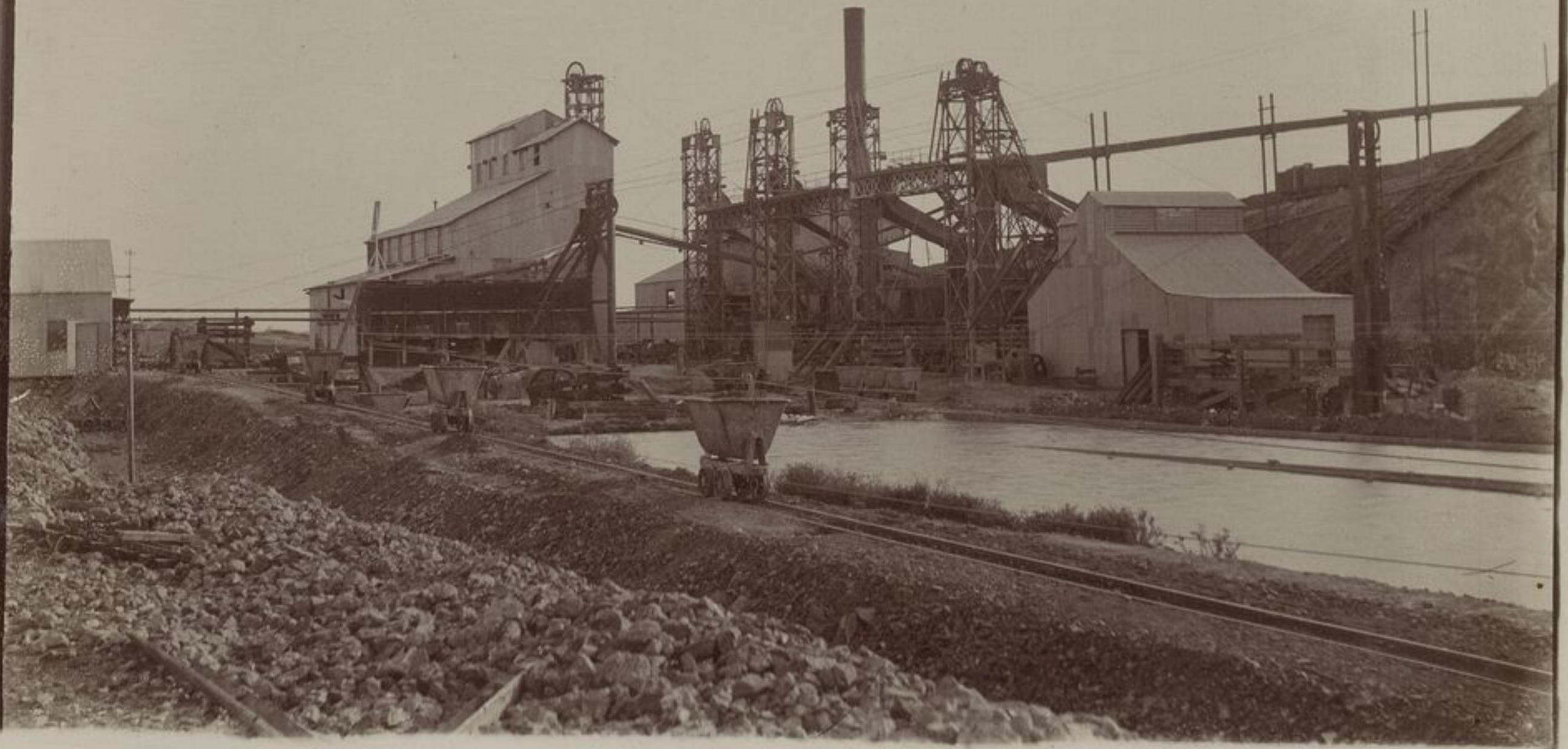
WASHING AND CRUSHING PLANT.



SC 0230.29

CRUSHING MILL.

The above view shows the main crushing plant to which the cylinder lumps from the various floors are conveyed for treatment. After crushing, the Ground passes through the same process as the pulverized ground.



SC 0230.30

CRUSHING MILL.



WET SHOOT OF WASHING MACHINE

SC 0230.31

TAILING STACKS.

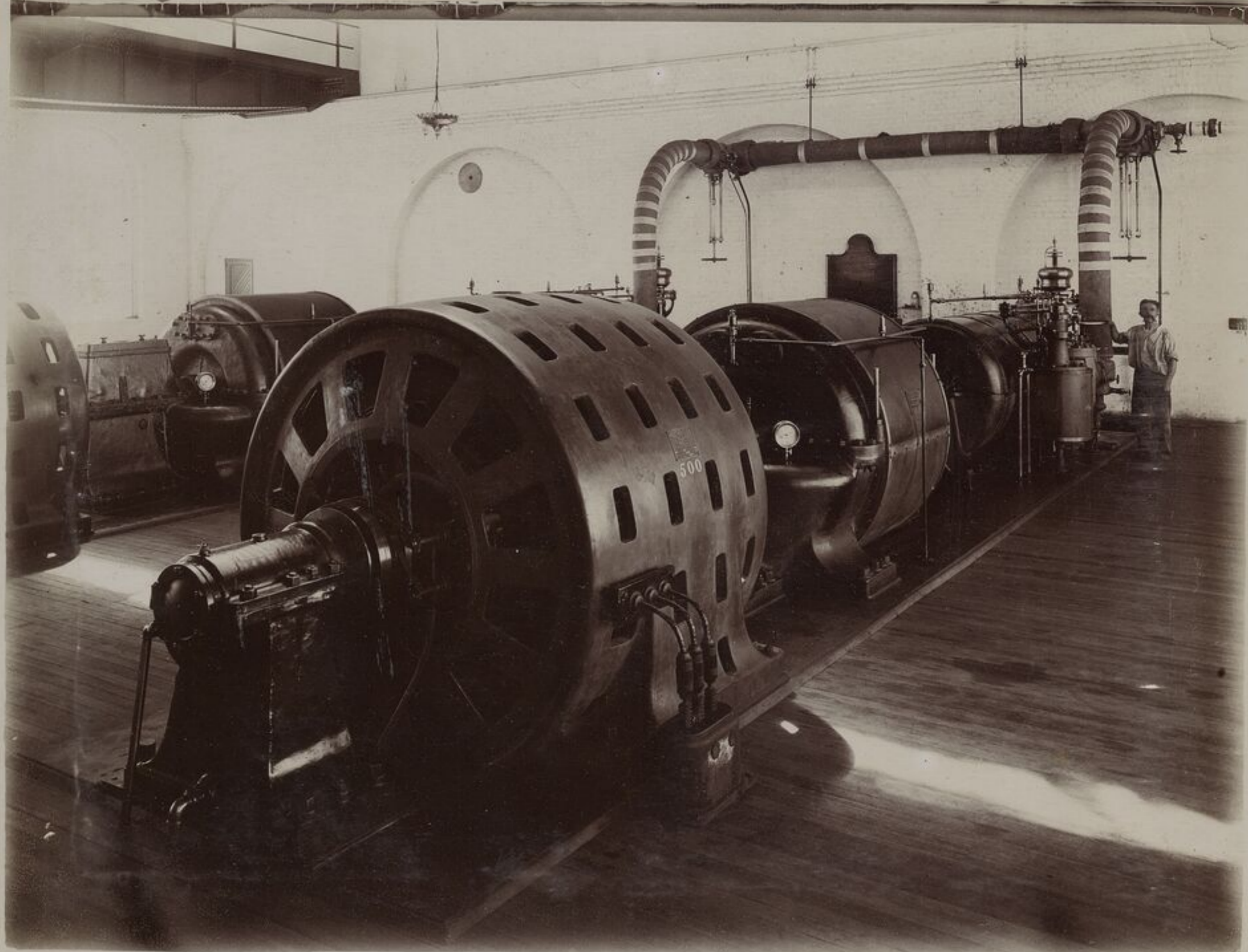
The tailings from the washing machines is conveyed by large mud skips to the top of a high trestle, where it is dumped, gradually forming high piles, which are as much a feature of the scenery about Kimberly as are the Culm piles in the Anthracite coal region of Pennsylvania.



SC 0230.32

CENTRAL POWER STATION.

All the power for the mines is generated at one central power station which supplies current for pumping, hauling, lights, etc., The mines underground are lighted throughout by electricity. This station also supplies light to the towns of Kimberley and Beaconsfield, and power for two surface tram lines.



SC 0230-33

INTERIOR CENTRAL POWER STATION.

EQUIPMENT.

GENERATORS.

3 - 1,500. K.W. 5,000. Volt. 3 Phase 50 cyl. 6,000.
alternations 1,500. R.P.M. Westinghouse alternators with
rotating fields. four pole.

TURBINES.

3 - Parson-Westinghouse multiple expansion parallel flow type.
direct coupled to Westinghouse alternators.

EXCITERS.

2 - 50 H.P. 220 volt. A.C. motors direct coupled to 2 - 37½
K.W. 110 volt. D.C. generators.

Cont. over.



Contd.

SC 0230.34

SWITCHBOARD

3 - High tension machine panels. 12 H.T. feeder panels
1 " Station panel 6 Low tension local
distributing panels, all supplied by the General Electric Co.

AUXILIARY SET.

1 - 125 H.P. Bellis-Morcom engine 1 - 75 K.V. Westinghouse
alternator used for starting up station.

BOILERS.

12 Babcock & Wilcox, each 3,580 sq. ft. of heating surface set
in three batteries, pressure- 150 lbs. sq. in. with chain
grate stokers. Induced draughter being used.

CRANE.

1 - 15 ton electric crane in engine room. 28 Sub-Stations.



SC 0230-35

DE BEERS CONSOLIDATED MINES Ltd.

HEAD OFFICE.

The head office is in Stockdale Street Kimberley.



SC 0230.36

DIAMOND IN MATRIX.

The above shows a photograph of a diamond(weight $89\frac{3}{4}$ carats)
embedded in the Blue ground, exactly as it occurs in the mine.

SC 025081



A DAYS DIAMOND WASH OF DEBEERS CO.

52 0250.38

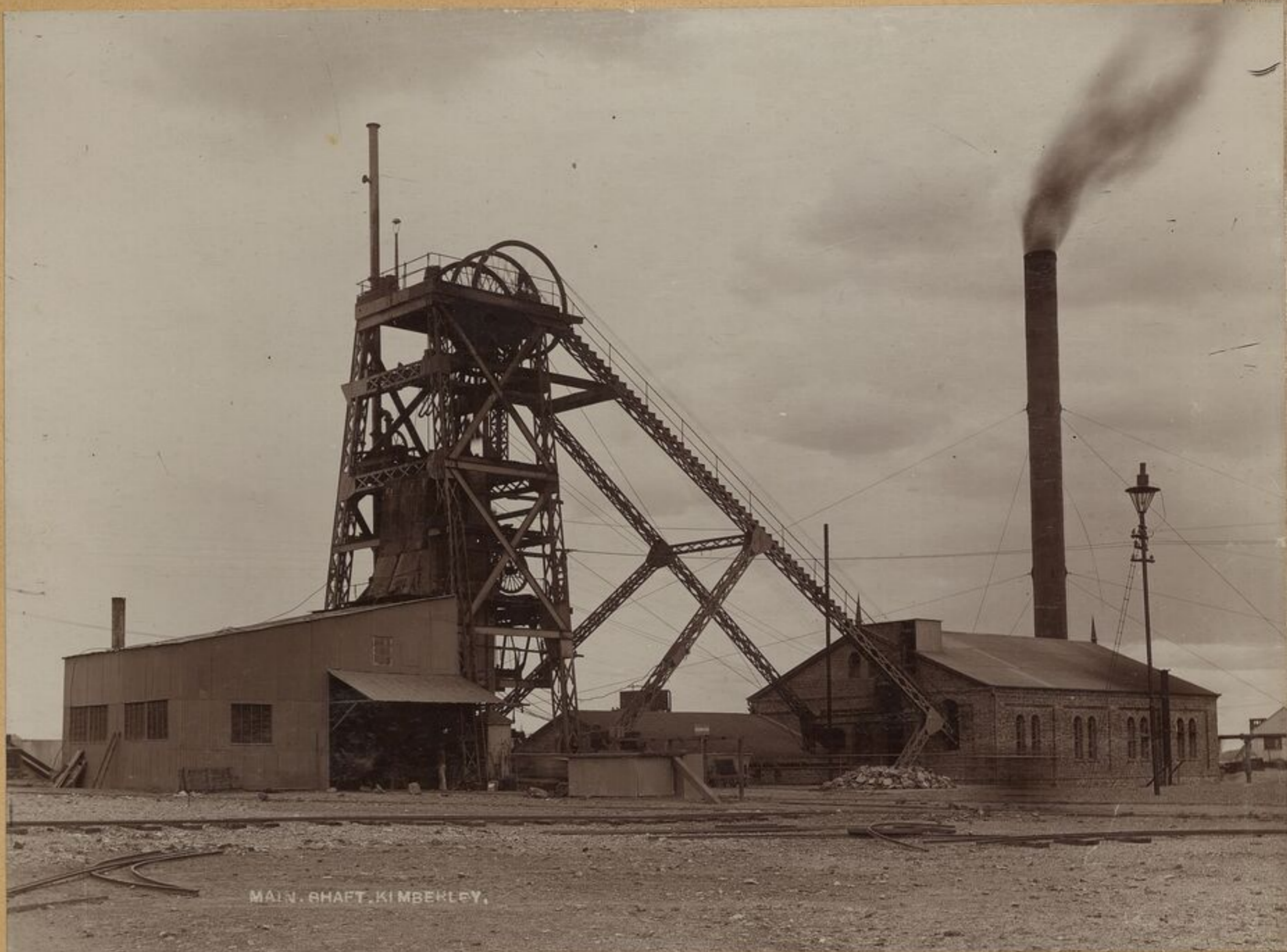


BULTFONTEIN MINE.

The above view shows one of the Aerial Gears used in the intermediate stage of Diamond Mining

The construction is clearly shown in the photograph.

SC 0230.39



KIMBERLEY MINE.

View showing Head-gear over Main Shaft and Engine house
The above frame is of the same type & construction as that
at Wesselton Mine.



DE BEERS MINE.

View showing Main Rock Shaft, Engine rooms & Head-gear.

This photograph was taken during the Anglo-Boer war and shows the conning tower erected on top of the head-gear, from which the movements of the Boers were watched, at the time of the siege of Kimberley.

SC 023041



DEBEERS OPEN DIAMOND MINE.

DE BEERS MINE.

This view, and the one of Kimberley Mine opposite, shows the appearance of a Diamond Mine when the third stage is reached and all the workings are underground.

These large open pits are constantly getting deeper as the Blue ground is extracted beneath them.

This view shows distinctly the way the sides of the mines cave away and fall into the open pit.

500230.42



KIMBERLEY OPEN DIAMOND MINE. DEPTH 840 FEET.

KIMBERLEY MINE.

View of the Open Pit. Mine working at the third stage. The Open pit at the Kimberley Mine is looked upon as one of the wonders of the World.

This view shows the almost round & pipe like contour of the Mine.

50 0230.45



Destruction of Mount Ararat, Bultfontein Mine.



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