A PICTURE STORY OF A TURNER VALLEY OIL WELL...

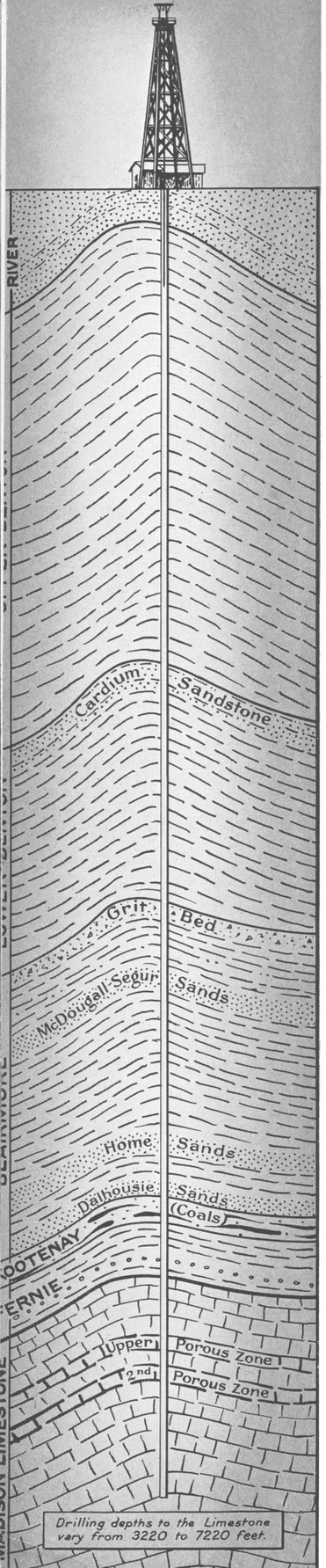
COUNTING the expense of moving hundreds of tons of heavy machinery, sinking concrete foundations for the drilling and pumping rigs, and pushing the drill down through 3,200 to 9,000 feet of sand and rock, a well in the Valley may represent an expenditure of from $100,000 to $250,000.

After geologists and engineers have discussed the matter from the angle of knowledge of the structure on the one part and the actual physical problems of drilling on the other, the location for the new well is chosen. The actual drilling usually takes from 130 to 150 days if no mishaps occur.

1 As in this case drilling is to begin in winter, the first steps taken are to thaw out the ground by means of gas lines as shown above.

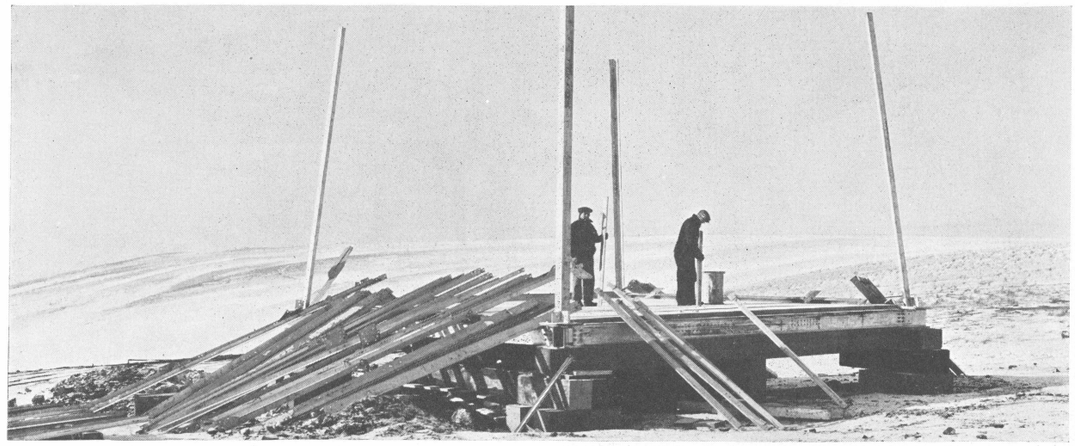
2 With the ground thawed a labor gang goes to work excavating for the derrick foundations.

3 Foundations for the derrick are the next order of business. The forms have been completed and the concrete is being poured.

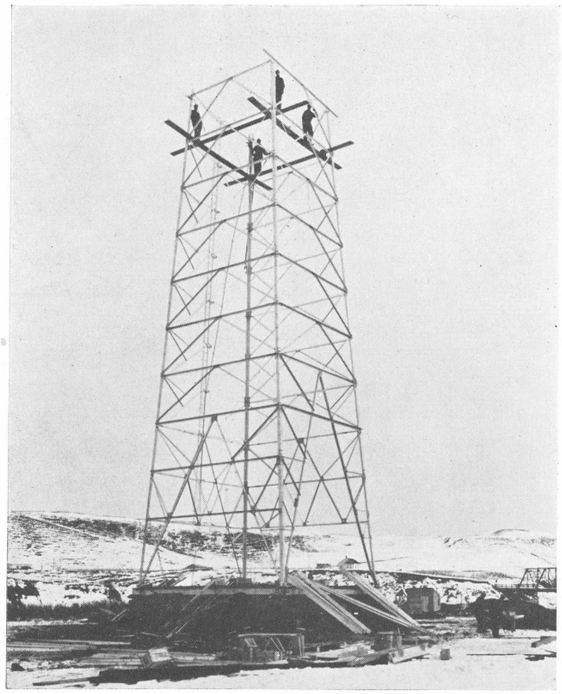


← Ideal section showing formations and producing horizons in the Turner Valley field. The disturbed nature of the strata causes great variation in the depths to the "top of the line"—the driller's ultimate objective—but on the famous "West Flank" the average is more than 6,000 feet.

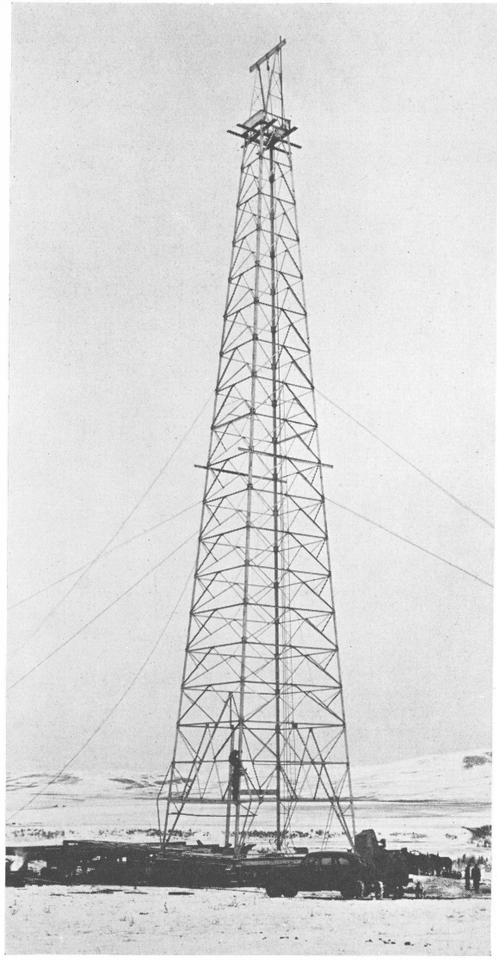
ERECTING THE DERRICK:

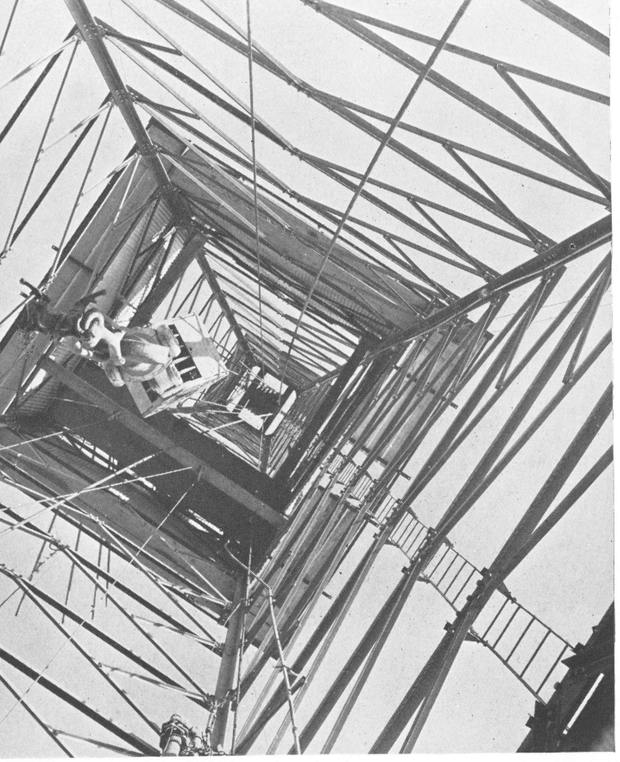


4 The derrick gets under way. The base is 30 feet square. The cost of such a derrick, unassembled, in the Turner Valley is approximately $7,800.



5 Unsteady nerves and vertigo have no place in this work. The completed derrick towers 136 feet above the ground. The next job will be to put the crown block in place at the top of the derrick. The crown block, which is really a huge pulley, weighs more than four tons and costs approximately $3,000.

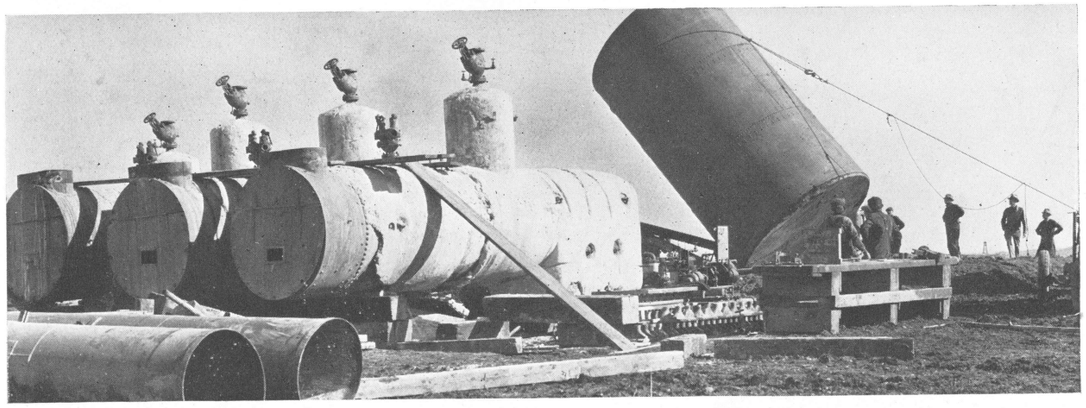


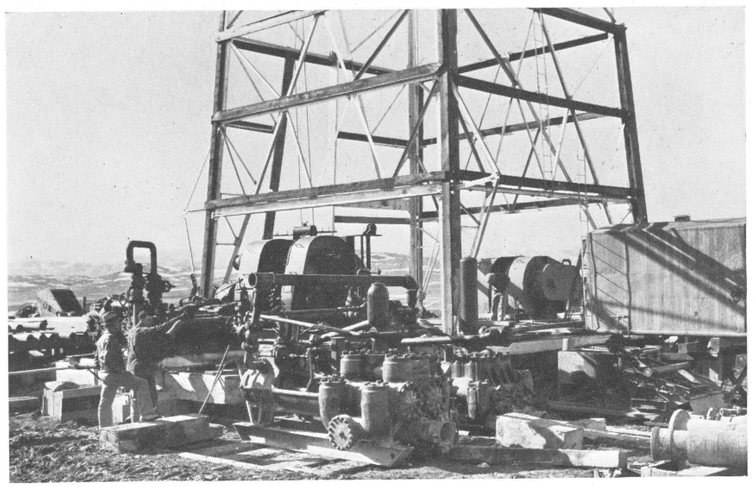


6 Meanwhile a sump is excavated as a reservoir for the mud, which will be circulated by the rotary drilling rig. (See Picture No. 13.)

7 An upward view of the derrick shows the crown block in place at the top and suspended from it the travelling block with a capacity of 260 tons. The travelling block itself weighs more than five tons and costs about $2,500.

BOILERS AND PUMPS:

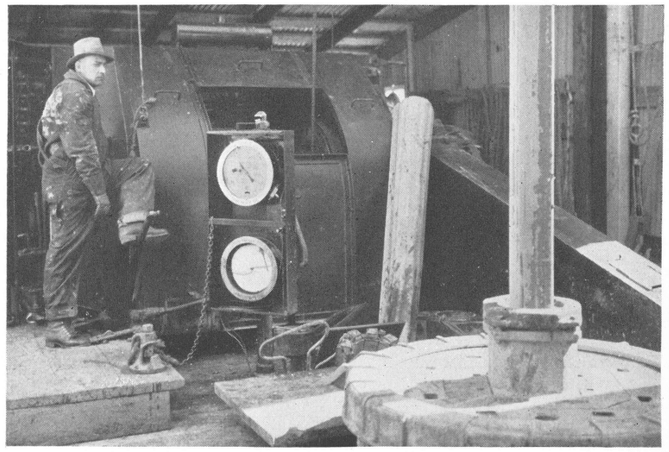




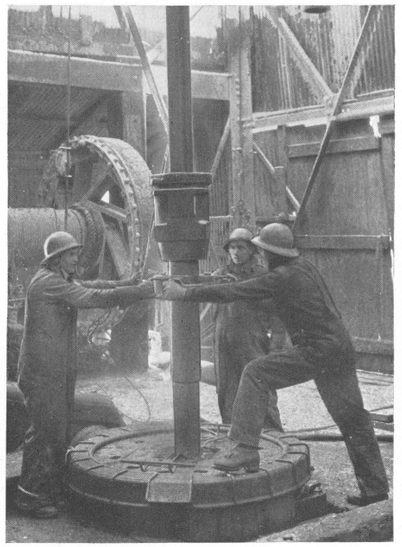
8 Boilers and water tanks are now moved in and will be used to generate steam for the drilling operations. These tanks and boilers will cost more than $10,000.

9 Here are some of the pumps and other equipment which will be used in drilling the well. Order will soon develop from the seeming confusion.

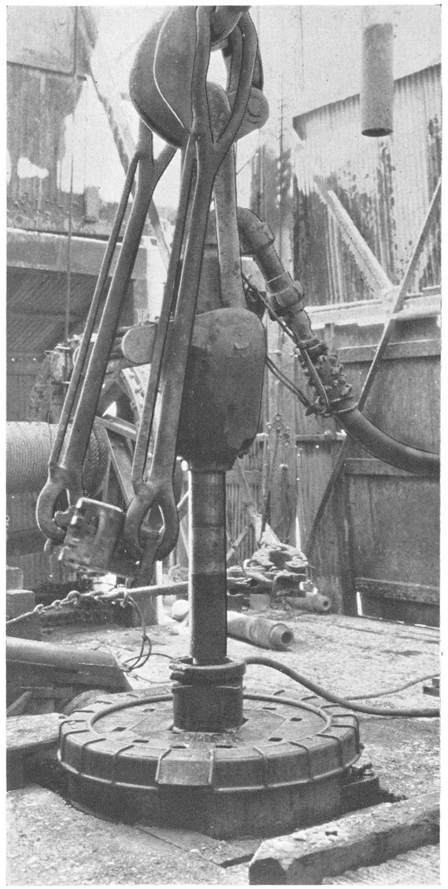
DRILLING BEGINS:

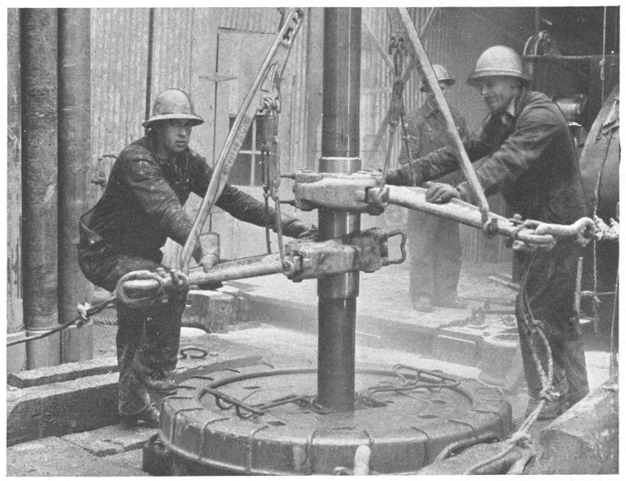


10 A mechanical marvel which has greatly increased drilling efficiency. The dials keep the driller advised at all times as to the pressure being applied by the bit and the progress being made. As the drill cuts away the formation it is automatically lowered to maintain a constant pressure. The draw-works beside which the driller is standing weigh some 23 tons and represent an investment of about $16,000.



11 Drilling is about to start. The "rough necks", as the workers on the derrick floor are known, are coupling up the drill stem. The drill is rotated by the turntable on the floor.

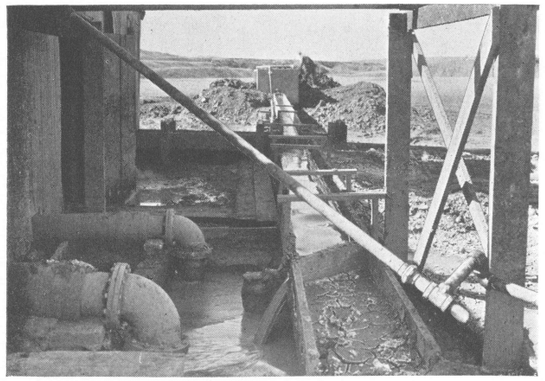




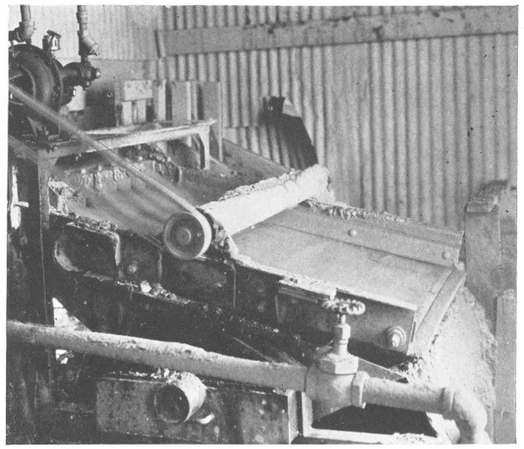
12 As the drill goes down lengths of drill stem have to be added. Here the crew are breaking a joint in the drill pipe. The two huge wrenches are operated by a steam winch. The 7,000 feet of drill pipe required for an average well in the Turner Valley weighs about 88 tons and costs approximately $13,500. Some 250 chrome nickel steel joints will be needed and these will cost even more than the drill pipe because of the very special quality of the steel and the other exacting needs governing their manufacture.

13 At all times when the drill is turning, mud is pumped down the hollow drill stem to flow out around the bit and make its way back to the surface carrying up with it the drilling debris and consolidating the walls of the hole so as to prevent caving. The mud is pumped through the hose which is seen at the left leading to the rotary swivel at the top of the drill stem. The swivel must be able to support as much as 150,000 lbs. of drill pipe and withstand 400 lbs. to the square inch of mud pressure and at the same time permit the drill pipe to rotate at speeds up to 200 r.p.m. The swivel weighs more than two tons and costs about $2,500.

DRILLING PROGRESSES:

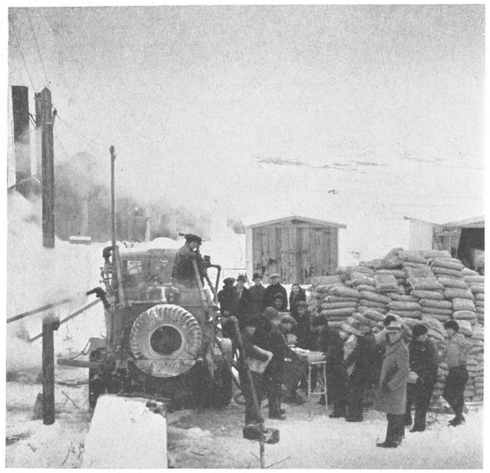


14 This is the drilling mud, flowing from a sluice into the sump whence it will go on another journey down toward the bowels of the earth. The mud is not "just mud". It is very carefully checked for viscosity, weight and other qualities.



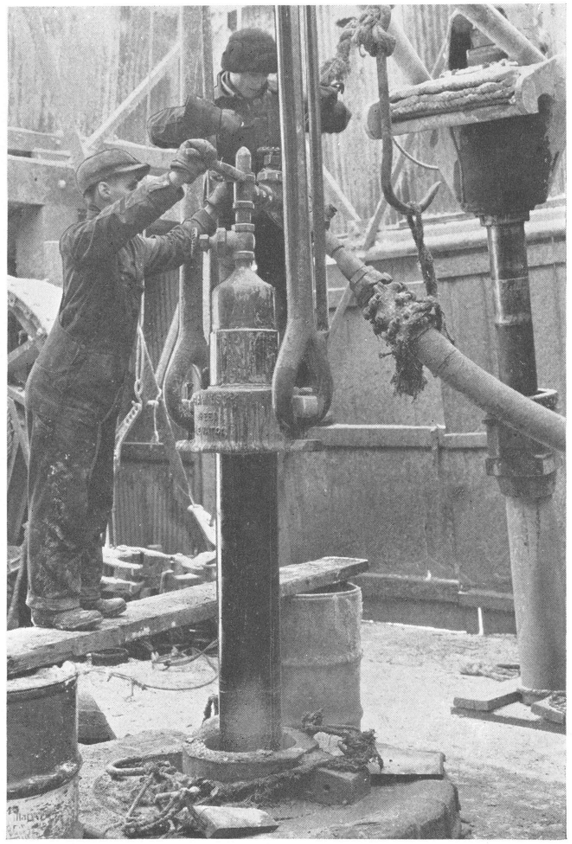
15 This is the mud shaker over which the mud flows after it returns to the surface. The shaker acts like a sieve and sorts out the larger particles of drilling debris and by microscopic examination of these the geologist can tell how the well is "logging".

CEMENTING THE CASING:

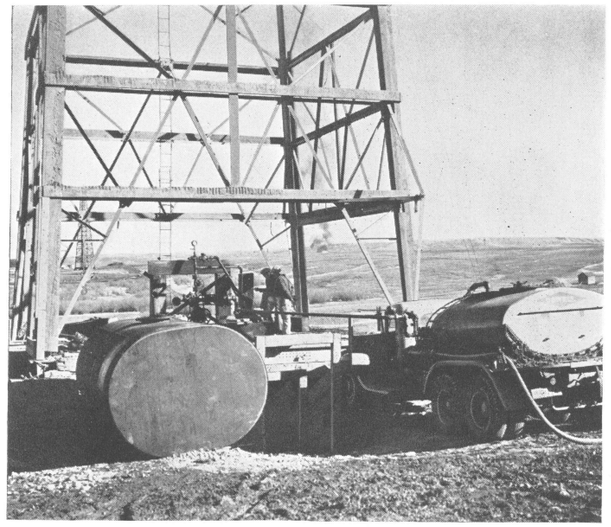


16 After the drill has reached the producing zone it is withdrawn and the casing is run. The casing is steel pipe usually 9 inches and 6 inches in diameter and makes a wall for the well. Cement is then pumped down the casing and flows up towards the surface between the outer wall of the casing and the sides of the well. As much as 1,000 bags of cement are used in cementing a well.

17 At right you see the casing and on the top of it a coupling through which the cement is being forced down to hold the casing in place. After sufficient time has been allowed for the cement to set and hold the casing in place, drilling is resumed and the bit goes into the productive zone. (It is hoped!)

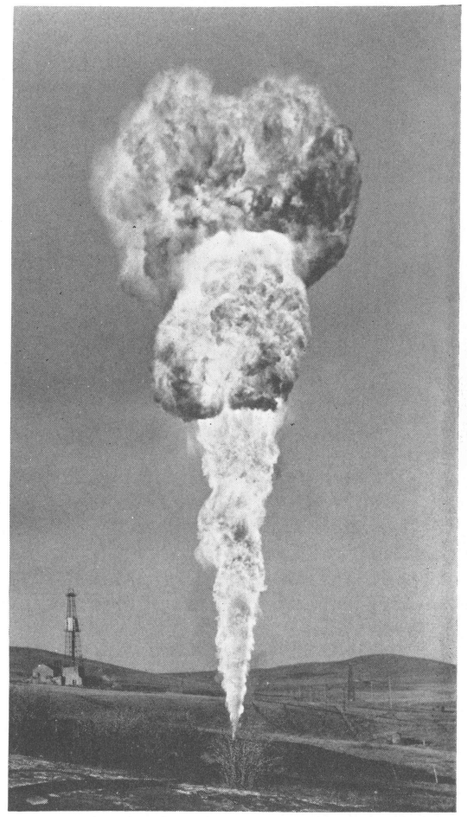


ACIDIZING:

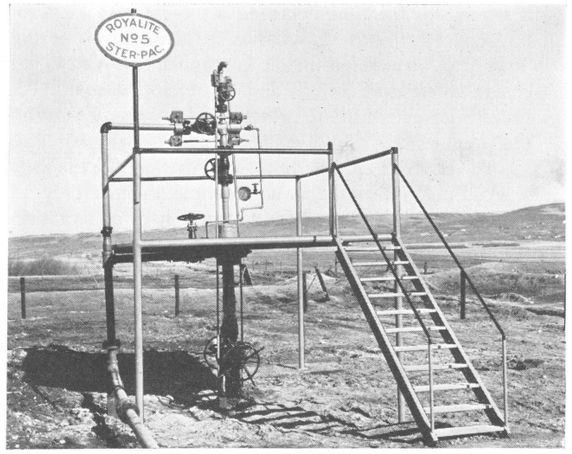


18 By lifting the mud out of the hole the driller determines whether he has struck a flow of oil. If so the next job in the Turner Valley is usually to acidize the well. From 5 to 10 thousand gallons of acid is brought to the well in tank trucks. The acid penetrates the oil-bearing rock and increases the flow.

19 After the acid is spent it is pumped out of the well and burned, as shown on the right. The next step is to put the well on production test to determine its potentialities.



PRODUCTION BRINGS NEW PROBLEMS:



20 A producing well. The derrick has been skidded to another location and this is all that marks an investment of approximately $100,000 to $250,000. The casing runs to the platform level and the smaller pipe protruding above it is the tubing through which the oil flows. The intricate arrangement of valves permits regulation of flow to the desired quantity.

21 The oil has to go to market and in a new field this means provision of transport facilities. Here a section of pipe line is being laid to carry Turner Valley production from the field to Calgary. The steel pipe is first welded together and then lowered into a ditch.