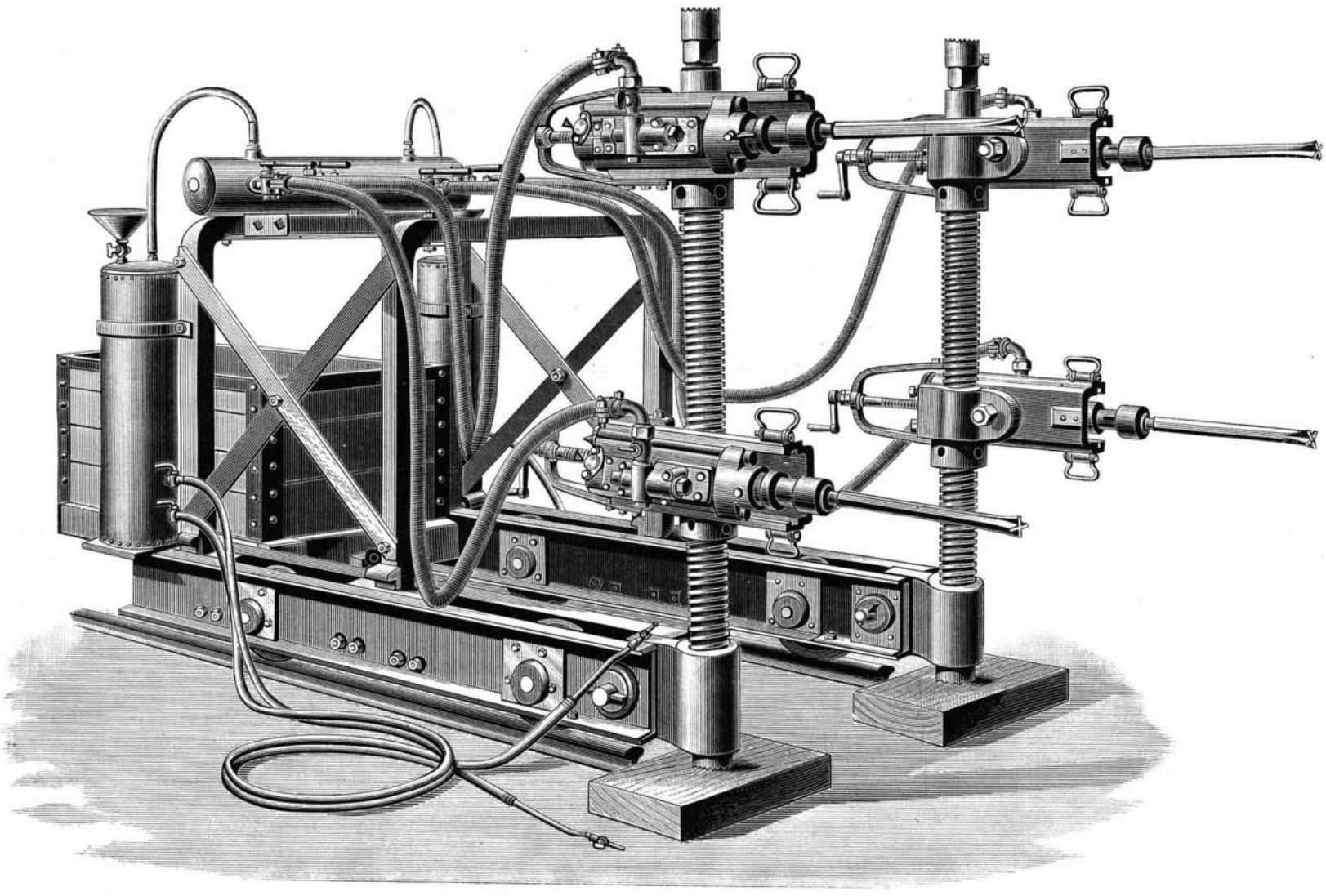
IMPROVED ROCK DRILLING MACHINE.

We illustrate below a carriage designed by Mr. Richard Schram, London, to carry four of his drilling machines, and which is intended for use in driving a tunnel 2½ miles long on the Khivaja-Amran branch of the Quetta Railway. The carriage carries two stretcher bars, each of which supports two drilling machines, the arrangement of the carriage and bars being such that trucks for the removal of debris, etc., can be run right through it, so that it is unnecessary to provide any sidings in which to run the carriage when the removal of spoil becomes necessary. This arrangement has the further advantage that the drilling machinery can be brought up to the working face before all the debris has been removed, thereby economizing time. In cases where timbering is necessary, and the stretcher bars have to be lowered to clean up, arrangement is made whereby these, with their machines, can be turned back down on to the carriage.

The small receiver shown on top of the carriage is for the distribution of air, and it has two inlets and four outlets, corresponding to the number of drills. The tanks shown on each side are the water injectors, the injection being effected by admitting air under pressure above the surface of the water. The tunnel for which the machines are designed will be driven not only from each end, but by sinking a shaft midway two additional working faces will be provided, making a total of four points of attack. The four sets of tunneling plant required have all been supplied by Messrs. Schram, and amount *in toto* to eight locomotive type boilers, four air compressors, with their receivers, four carriages of the type just described, and thirty-two rock boring machines, with all the accessories necessary for opening out the tunnel, the whole of the machinery being carried out under the inspection of Sir Alexander M. Rendel.

We understand that Messrs. Schram are also supplying a complete installation for the driving of a tunnel one mile long in connection with the Perigar project for the Madras public works. In this, however, a turbine will be used in supplying the power to the compressors.—*Engineering.*



IMPROVED ROCK DRILLING MACHINERY.

A Small City on a Block.

Work has been commenced on what may very well be called a small city, to be built on the block bounded by 10th and 11th Avenues and 66th and 67th Streets, New York. John Ruck intends erecting there 64 tenements, 48 being without and 16 with stores. The former will accommodate 10 families in each building, and counting 6 persons to the family, the total would be 2,890. The latter will accommodate 8 families in each building, or a total of 768, making a grand total for the block of 3,648; or putting the matter in another way, the density of population at that spot of the city will be 912 to the acre. The *Real Estate Record* thinks it is possible that these figures may be increased by building four of the houses on the streets extra deep, so as to accommodate 144 additional persons. For the sake of obtaining light and plenty of fresh air, an unusual arrangement of the buildings has been decided upon. Those on the avenues will be 25 × 65, with the exception of the corner ones, which are 71 feet deep. Between these houses and the side walls of the buildings on the streets an open space 29 feet at the narrowest part and 35 feet at the broadest will be left, so that a passer-by turning off from either of the avenues on to the streets would find, where the corner building terminates, an open space (usually occupied by a structure) between it and the first of the houses on the street. The capital necessary for the undertaking will be furnished by the Equitable Life Assurance Company, and we hope to be able to present illustrations and further description of this gigantic building enterprise in a future issue of the ARCHITECTS AND BUILDERS EDITION of the SCIENTIFIC AMERICAN.

Reclaiming an Arid Region.

Late in March an act of Congress was signed by the President requiring the Geological Survey to study the practicability of building storage reservoirs for water in the arid portion of the country for the purpose of reclaiming an immense area of waste lands by irrigation. This question has already received much attention from the director of Survey and from other competent authorities, and no further inquiry is needed to convince Dr. Powell of the feasibility of using the waters of the upper Missouri and of its tributaries to impart fertility to an enormous region. The work now before the Survey is to locate and explore the various drainage areas and to reach an approximate idea of the cost of the proposed irrigation works, obtaining exact information with regard to facts already known in a general way.

When Dr. Powell gave his testimony before the joint commission of the Senate and House in 1886, he asserted that the greatest engineering problems in America are the protection of the flood plain of the lower Mississippi from overflow and the reclamation of the great Western plains from their desert condition. These problems, he believed, were practically one, for the engineering process which should spread the surplus waters of the rivers over the arid area would relieve the burdens of the lower Mississippi. He was also of the opinion that for every acre redeemed from overflow in the South two or more acres could be restored to fertility on the great plains.

The problem, then, is to retain in the regions where they originate the great floods of the upper Missouri that now pass uselessly into the Gulf of Mexico, inflicting great damage on their way upon the fertile lands of the lower valley. It is Dr. Powell's opinion that the cost of utilizing all this surplus water for irrigation will be greatly reduced by diverting each of the little streams that contribute to the upper Missouri. To divert the water from the Missouri itself would imply great hydraulic works—an expense that would be considerably lessened by gathering the waters at their sources.

The scheme appears to include the idea of building great dams across the canons through which pour the melted snows and heavy rains from the mountains. These dams are to be large and strong enough to hold back the waters, which may then be let down as they are needed for the benefit of the reclaimed lands. The cost of these irrigation works will be very great, but it will be only a small fraction of the value of the land reclaimed. It is believed that by wisely utilizing the surplus waters in the drainage area between the one hundredth meridian and the eastern slopes of the Rocky Mountains, an unproductive region equal to at least four times the area of New York State may be restored to fertility. The decided success of irrigation works in California, Utah, and Colorado indicates the methods by which we are still further to reduce the profitless area which we formerly designated as the Great American Desert; and the entire country cannot fail to feel the benefits of improvements of such magnitude as to add many millions of acres to our area of fertility and free the Mississippi lowlands south of Cairo from the great hinderance in the way of their prosperity.

It is said that two years will be required for the necessary surveys and the preparation of the plans, and it is hoped that funds for the preliminary investigations will be included in this year's appropriation for carrying on the work of the Geological Survey.—*N. Y. Sun.*

Distillation of Mercury at Ordinary Temperatures.

W. Hallock, in a note to *Science,* says: In the physical laboratory of the United States Geological Survey, Washington, a normal barometer hangs in a window jamb about 35 centimeters from the glass of the window. As the window faces east, it has the sun until noon. The barometer tube at and above the upper surface is 25 millimeters in diameter, and extends 6 centimeters above the mean position of that meniscus. It was observed that during the summer small globules of mercury covered the inner wall of the tube above the column, on the side farthest from the window. In the winter they collected upon the side nearest to the window. An inspection showed that the radiation from the tube was greatest toward the cool room in the summer and toward the window and out of doors in the winter, thus keeping the side of greatest radiation slightly cooler than the mass of the reservoir, and condensing upon it some of the vapor of mercury of the Torricelli vacuum. In this way several grammes were condensed and fell back in a single month—a fact which seemed quite interesting when it is remembered that the vapor tension of mercury at even 30° C. (86° F.) is only 0·06 of a millimeter. Of course, by bending the top of the tube over and downward toward the cooler side, the distillate could be collected and measured.