# SCIENTIFIC AMERICAN

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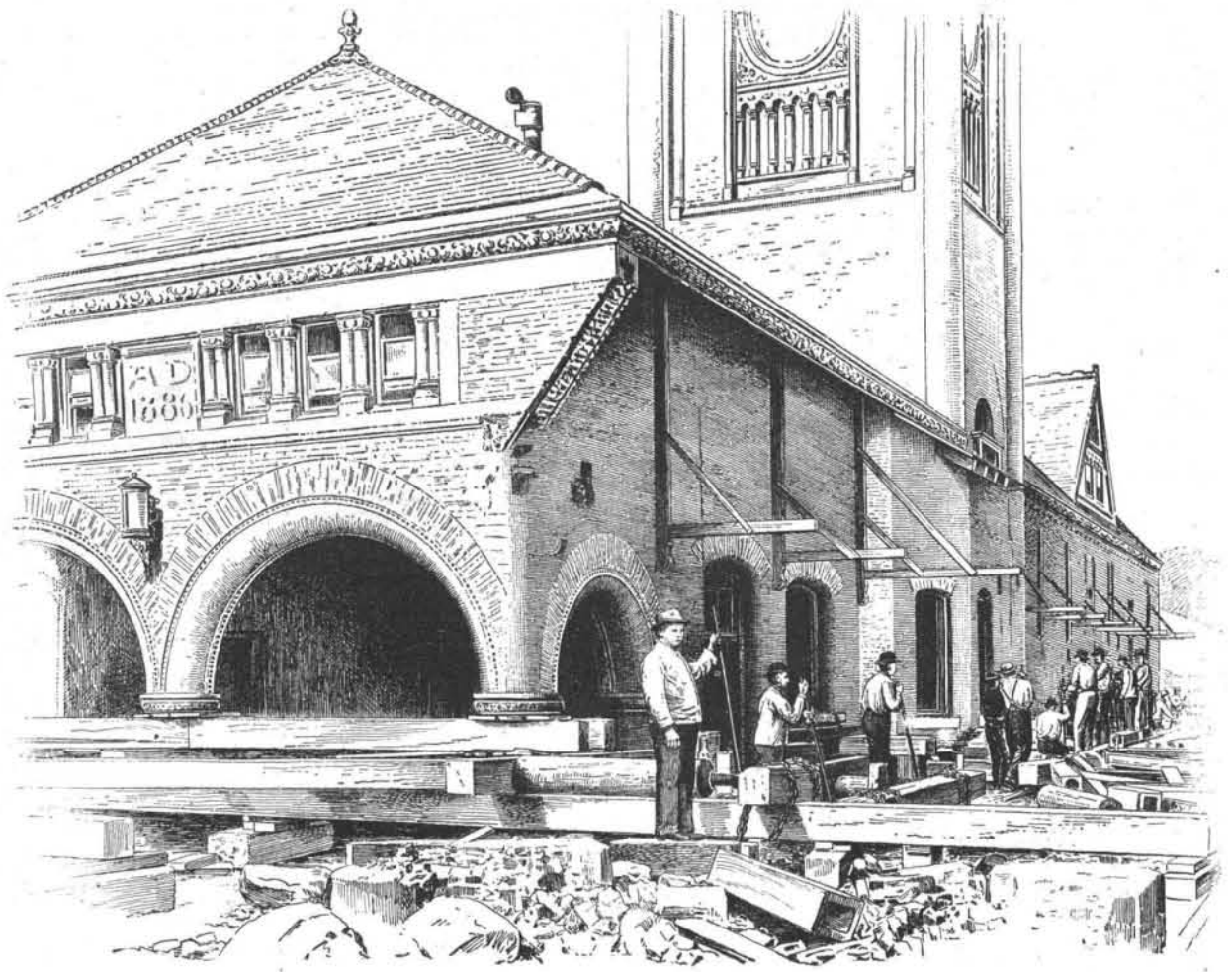
A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

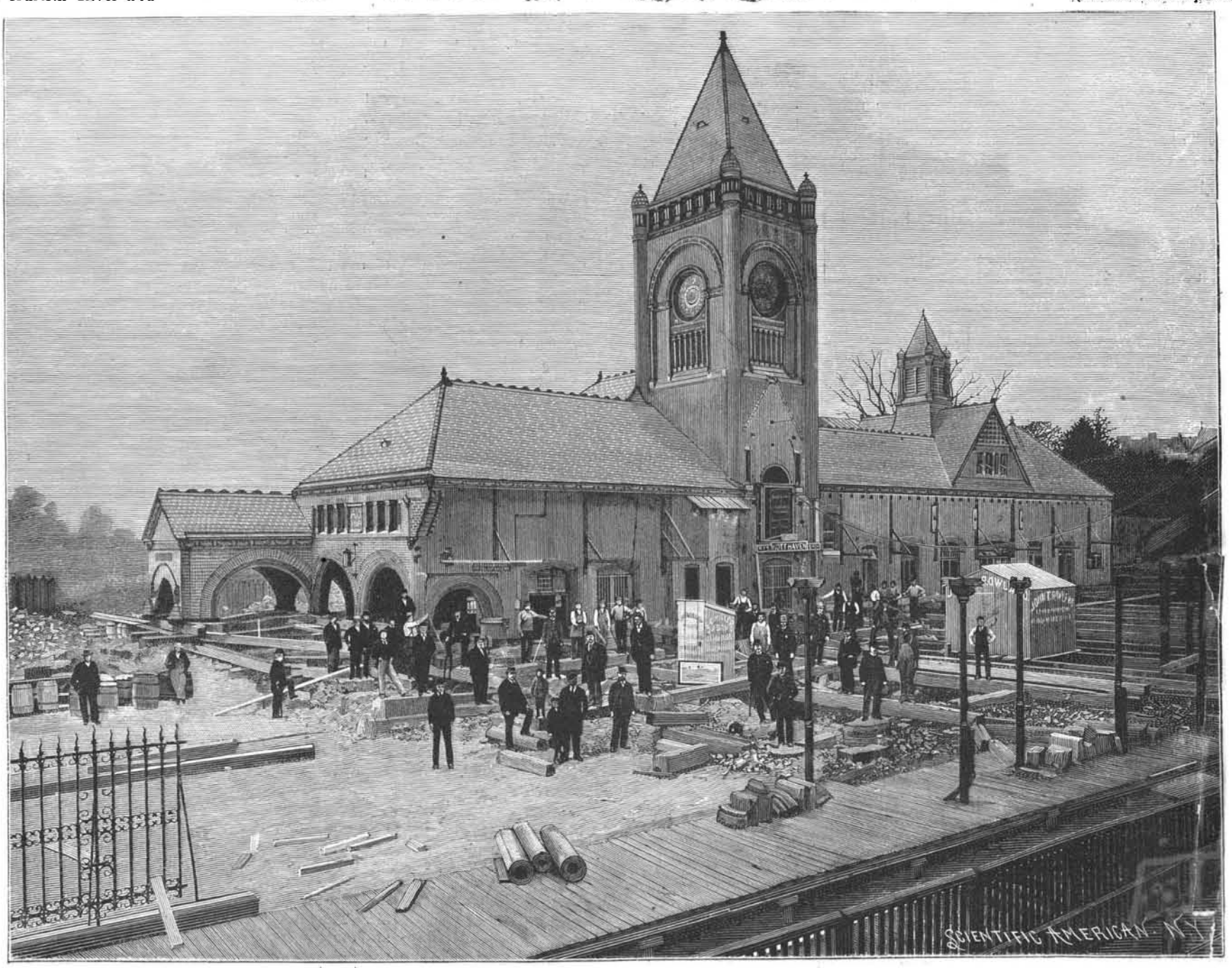
Vol. LXX.—No. 19. ESTABLISHED 1845. | NEW YORK, MAY 12, 1894. | $3.00 A YEAR. WEEKLY.


## THE PARK AVENUE IMPROVEMENT IN NEW YORK CITY—THE TEMPORARY HARLEM RIVER BRIDGE AND THE MOVING OF THE MOTT HAVEN STATION.

We have recently illustrated some of the operations which are now in course of execution for the Park Avenue improvement in New York City. As we stated in the article referred to, which appeared in our issue of April 28, there is included in these changes the erection of a new bridge over the Harlem River, to replace the present one. In order to give the railroad transit across the river while the new bridge is in course of erection, a temporary drawbridge and viaduct has been built, crossing the river to the west and north of the old one. The temporary tracks diverge from the present line some distance south of the Harlem River and return again to the existing line north of the river in Mott Haven. Some years ago, when the necessity for an auxiliary draw bridge in the then existing bridge over the Harlem became apparent, which necessity was brought about by the liability to injury of the rotary draw in regular use, a tower lift drawbridge was added purely as an auxiliary. This gave an opening of 50 feet span, available in emergencies, and consequently was but little used. Eighteen months ago, after the present improvements had been arranged, it was decided to utilize the tower of this draw for the temporary bridge, moving it to the new line and adding thereto a new lift span, so as to supply a drawbridge in connection with the viaduct. The operation of moving the tower was described in our issue of December 31,

(Continued on p. 296.)




THE PARK AVENUE IMPROVEMENT IN NEW YORK CITY—MOVING THE MOTT HAVEN STATION.

## THE PARK AVENUE IMPROVEMENT IN NEW YORK CITY—THE TEMPORARY HARLEM RIVER BRIDGE AND THE MOVING OF THE MOTT HAVEN STATION.

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1892, which moving was quite a remarkable engineering achievement. The tower alone was transferred, the old lift span being left to form a part of the permanent way.

Now the tower stands in line on the new bridge, a lattice truss draw span has been supplied, and at midnight on Sunday, May 6, the operation of turning the rails and making connections for the temporary bridge began. The newspaper train leaving the Grand Central Depot at 4:40 A. M. was the first train to pass over the line. Our illustration shows the bridge with the draw span hoisted.

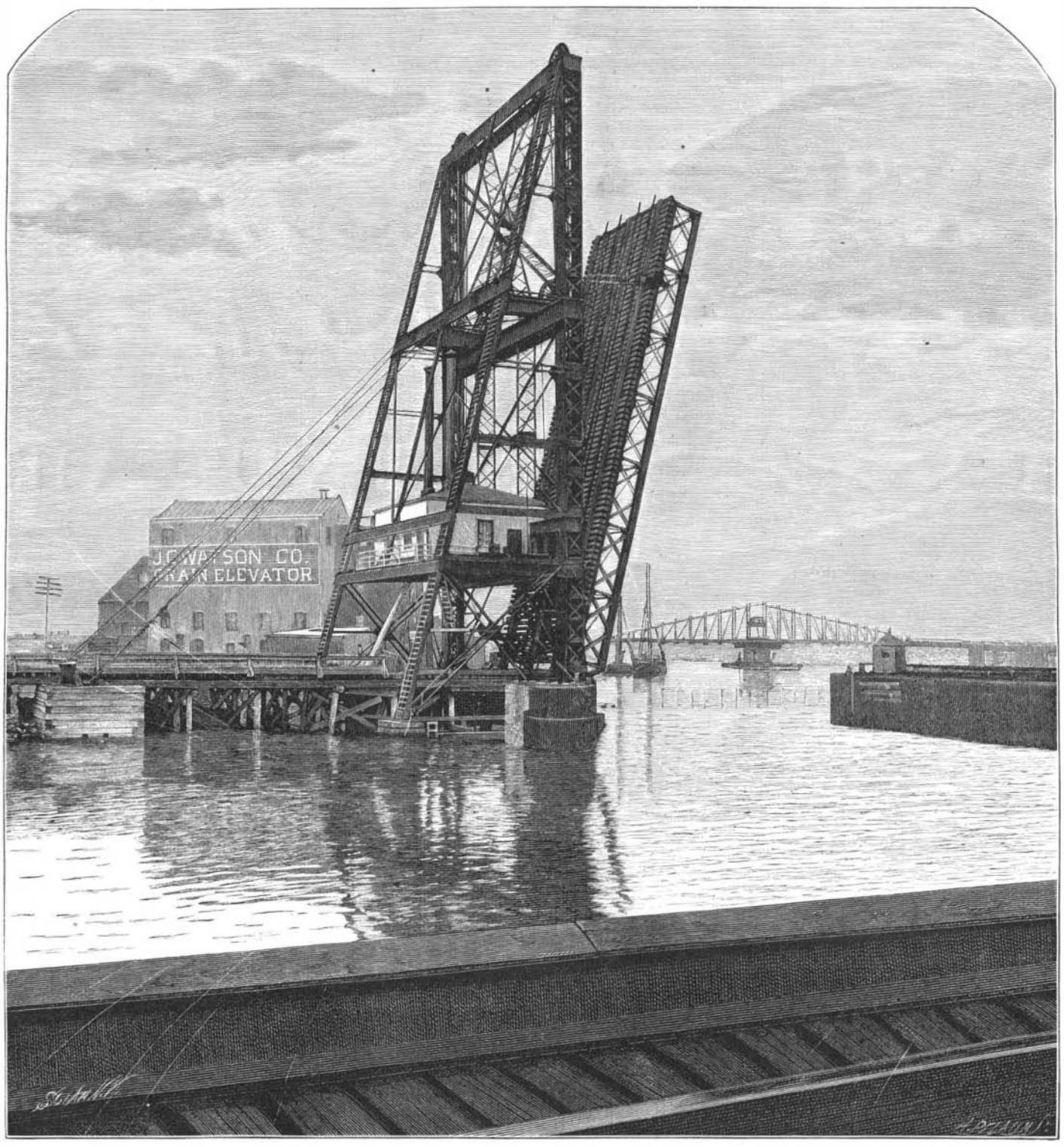
The length of the draw span is 103 feet, its width is 19½ feet, it is carried by 7½ foot deck trusses, and its weight is 127·7 tons. It is hoisted by a cable hoist, and counter-weights are employed to facilitate the raising. It will be seen that owing to the moment of the structure varying, the counter-weights should also vary. They are accordingly distributed in 22 sections, the uppermost weighing 3,600 pounds, the lowest 4,900 pounds, while the intermediate ones vary proportionately. As the span rises it deposits the weights one by one, and as it descends picks them up again in the reverse order. Two double cylinder Crook hoisting engines are used to raise it, the steam for which is supplied by two boilers. Spiral springs are introduced between the counter-weights in order to prevent shock or jar. Two minutes' time is occupied in hoisting. The relation of the old and new temporary tracks, where the bridge now stands, is shown very well in the cut in our issue of December 31, 1892.

The Mott Haven station was situated on the west of and close to the tracks used by three railroads, the New York Central, New York and New Haven and the New York and Harlem Railroads, immediately north of the bridge. Two tracks occupied the roadbed. The place was reached by a curve. Two operations were contemplated by the engineers for this place—the road is to be changed to a four-track way and the curve is to be made an easier one. It therefore became necessary to move the station fifty feet to the west to give room for the four tracks on the newly determined curve. The station is a brick building 185 feet long and averaging 35 feet in depth. The tower, which is seen in the cuts rising to one side of the center of the front, is 19 feet square and 80 feet high. The weight of the tower alone is estimated at 500 tons, the rest of the building weighing 1,200 tons. Messrs. B. C. Miller & Son, of Brooklyn, N. Y., the firm that moved the Brighton Beach Hotel in 1888, were in charge of the moving, which was recently executed with great success. The problem was a very difficult one, as the least inequality in support or in moving strain would have cracked the brickwork.

The building was first placed upon Georgia pine blocking, generally of 14 × 14 inches cross section, the distribution of the underpinning and ways being shown in the cuts. The weight to be moved was so great and the building so liable to damage that the ordinary system of blocks and falls and windlasses was discarded in favor of jack screws. Fourteen jack screws, each of ¾ inch pitch, 3½ inches diameter and 12 inches long, were distributed along the front of the building. Each screw had as abutment for its outer end or head heavy timbers secured to the ground ways by chains. The other or threaded end of the screw entered a hollow beam, such as used by builders, and the end of this beam bore against the transverse sliding ways.

Soap was first applied to the ways by rubbing on the exposed surfaces, while between sliding and ground ways, where one crossed the other, thin slices of soap were introduced. The surfaces were then further lubricated with tallow, and all was ready for the start. The screws were turned until all felt the strain. There were four screws along the tower point. These were gradually turned until the tower moved a perceptible amount—perhaps a sixteenth of an inch. Then the whole series of fourteen screws were turned in unison by stroke of bell. At each stroke one-quarter of a turn was given to each, and the screws being of ¾ inch pitch, this advanced the building three-sixteenths inch for each bell stroke. As the screws had a working length of 12 inches, some fifty readjustments were required for the distance. A week of work was required. Two men were assigned for each tower screw, which had to give an average thrust of 15 tons each, and one man worked each of the other ten screws, and one foreman directed the turning. Thus nineteen men only were directly concerned in the moving.

Even the brick entrance porch was moved with the rest, although it had originally been decided to tear it down and rebuild it. The main body of the building varied from 29 to 50 feet deep. Taking this feature and the porch into consideration, it will be seen how very irregular the structure was in plan; yet, after the transfer, hardly a perceptible crack could be found in brickwork or interior finish.




THE PARK AVENUE IMPROVEMENT IN NEW YORK CITY—THE TEMPORARY DRAWBRIDGE ON THE HARLEM RIVER.

### Lubrication.

In a paper on lubrication, read before the Birmingham Association of Engineers, Mr. Railings the author mentioned the following as the requirements of a good lubricant: (*a*) It should be thick enough to keep a constant film between the two surfaces to which it acts as a separator; (*b*) it should be as thin as possible consistent with the first requirements; (*c*) it should be a good conductor of heat; (*d*) it should contain nothing that will act chemically upon the bearing it lubricates; (*e*) it should be difficult of evaporation and decomposition. Sperm oil, when it is sperm oil, is one of the best lubricants, but it is dear. For surface working at low speeds and heavy pressure, graphite, soapstone, tallow, and grease are recommended. For high speed and heavy pressures, sperm, castor, and heavy mineral oils are suitable. For light pressures and high speeds, sperm, petroleum, olive, rape, and cotton oils may be used with advantage, and for steam cylinders heavy mineral oils will be advisable.

ITALY has 4,800,000 lemon trees, which produce about 1,260,000,000 lemons annually.