In the interests of the crusher itself, special attention should be given to lubrication. The conditions under which such a machine works are severe enough without its having to suffer from lack of oil. Owing to the dust, automatic oiling devices have not in general been found reliable, and good lubrication is better assured by the frequent application of small quantities from an ordinary oil can. The oil should be chosen with due regard to the weather. On hot days a heavier grade should be used than when the temperature is low. In cold weather a grade should be selected which retains its fluidity.

Even with the best of care, the wear on crusher bearings is very rapid. In the selection of an outfit a point worth considering is the ease with which bearings and other wearing parts may be replaced. Certain makes of crushers are now supplied with replaceable babbit bearings fitting into machined seats, and the work of renewal is accomplished in a few minutes.

Almost equal to intelligent operation and feeding as a factor governing crusher output is the condition of the jaws. As usually supplied, the jaw plates or dies are of chilled cast iron and wear is rapid. In spite of a much higher cost, jaws of manganese steel are cheaper in the end, and by reason of the much slower wear, give a more uniform product.

The selection of screens for separating the various sizes of crushed stone is important. For road work, two screens, furnishing three sizes are advisable, the sizes of the perforations depending on the character of the stone. When limestone is being crushed the perforations giving best results are 3-inch and 1¼-inch or 1½-inch. For use with granite or trap rock, the perforations should be rather smaller, 2½-inch and 1-inch holes having been found most satisfactory. An excess of dust may be removed by means of a dust jacket placed around the fine screen. A bad practice occasionally observed is that of using three screens having approximately 3-inch, 1½-inch and ¾-inch perforations. This arrangement gives four sizes of stone, including a size ¾-inch to 1½-inch, which when used by itself is more detrimental than useful.

The stone having been placed on the road, the next, and in many respects the most important operation, is that of rolling. The intelligent selection of a roller requires the careful consideration of a number of points. First, the weight must be decided on, and will be governed principally by the subgrade on which it is going to work. On old gravel or stone roads, which furnish a firm foundation, a 12-ton roller may be used to advantage. This size should, however, never be exceeded on country roads. Where the roads have not been previously metalled or where the subgrade is not firm, better results will be obtained with a 10-ton roller, which does not tend to disturb the subgrade to the same extent as the heavier machine.

Motor-driven rollers having in recent years come into prominence, the choice between steam and gasoline or kerosene may well be considered. Owing to its longer and wider use, steam is more generally understood, and it has heretofore been easier to find operators who understand steam engines than those conversant with gasoline motors. This condition is rapidly changing, and with the greater simplicity and increasing reliability of gasoline engines, together with the greater number of men who really understand them, the motor roller is rapidly gaining in favor. It has a number of advantages over the steam roller. No time is required for raising steam, and no delays are incurred through the necessity of firing and taking on water. The time saved by reason of these advantages is estimated at from one and one-half to two hours per day. Smoke and soot are eliminated, making it preferable for work on urban streets. Provided with a competent operator, the motor roller can undoubtedly perform more work in a given time than its steam-driven competitor.

If a steam roller is selected, it should be one with a double-cylinder engine. The twin or compound engine has so many points of superiority over the single cylinder that the slight extra cost is fully justified. Combined with smoother running, it has the advantage of being able to start from any position. This latter advantage is most marked when the roller has dropped into a hole or has slid into a ditch. With a single cylinder engine it is frequently necessary to reverse in order to get a start, and this has usually the effect of putting the machine further into difficulty. Cross-compound engines are now found on numerous rollers, which possess, in addition to the foregoing, the advantage that live steam may be turned into the low-pressure cylinder to provide extra power when required.

The greatest wear on a roller is seen on the rear rolls, which soon become rounded. When this occurs consolidation is slower and not so well done. With rear wheels having detachable rims, such as are supplied on certain rollers, the cost of renewing the rims is much smaller than where the entire wheel must be purchased.

The roller is, or should be, the limiting factor of the organization, and as it is the most expensive part of the outfit, it should be worked to capacity. It is a comparatively easy matter to suit the other operations,—quarrying, crushing, hauling, grading, etc., to the capacity of the roller. For this reason it will pay to secure the most capable operator obtainable. His duties are twofold,—to obtain the greatest amount of effective work from the roller, and to keep it in a condition of maximum efficiency. Having secured such a man, it is advisable to hold him at almost any cost, for the savings he can effect will amount to many times his wages.

The principle on which all rolling should be done is that of securing the utmost consolidation with the least work. It must be so performed that each passage of the roller accomplishes something in the final consolidation of the stone. With careless or inefficient handling the roller may on one passage partly undo the work of the former trip, and not only will the work required for final consolidation be increased, but the result will be less satisfactory. Excessive rolling wears the sharp edges off the individual stones, thereby destroying an important factor in the prevention of internal movement.

To prevent this waste it is necessary that the road be kept finished right up to the wagons delivering the stone. This is especially true where a temporary road is not available and traffic is forced onto the partly consolidated metal.

Satisfactory consolidation can be secured only when the stone is confined at the sides. Unless a shoulder of some kind is furnished to keep the stone within the required width the weight of the roller on top will cause it to spread and form a thin edge which is easily broken off, at the same time destroying the crown of the finished road. A shoulder permits an appreciable depth of metal on the outer edge, the stone is consolidated with the width originally intended, and the time of rolling is considerably shortened. This shoulder may be formed with the grader, or if the subgrade is very hard, or consists of old metal which it is desired to leave undisturbed, a small trench may be picked at the outer edge of the width desired, which will effectually hold the metal within that width.