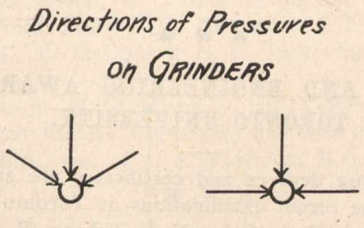
R.P.M. with a pressure of 60 to 75 lbs. per square inch in the cylinder, corresponding to a pressure of 15 to 18 lbs. per square inch on the grinding surface, will require 300 to 350-h.p. to produce five tons of air dry pulp per 24 hours. With 500-h.p., a pressure of 100 to 125 lbs. per square inch and 200 R.P.M., it will produce 7 to 8 tons in the same period. The side plates of the pockets should be set down as close to the stone as possible to prevent chips and splinters from passing through unground. The supply of water required to keep the



Approximate direction of pressure in the Port Henry type. Same in the Carrier, Laine & Co., type.

stone at the proper temperature and to wash down the pulp is usually introduced from a spray at the top and must be carefully attended to. When the lower part of the stone runs into a vat partially full of pulp and water, the spray must be just enough to wash the pulp down. This water should be so regulated that the stone is kept at a rather high temperature (about 100 degrees Fah.), which causes the grinding to be more easily accomplished, hence the output to be increased. In cases where the mill is stopped for repairs or for Sunday, care should be taken that the stone is allowed to cool slowly, and, if the lower part runs in water that the water is drained off so that the stone may cool evenly. The reason why stones crack and fly off when running, is resumed and may sometimes be looked for in the neglect of such details. Sometimes the wood jams in the pockets, thus relieving the pressure on the stone which then ceases grinding the wood in that pocket; in that case it is only necessary to remove the pressure and loosen the wood by means of a short bar. The undersides of the followers should have strips cast on them so as to prevent wood from rolling in the pockets, as seen in the case of the Port Henry grinder. An ordinary good English stone properly handled and operated lasts about a year and wears down in ordinary grinders from 54 to 40 inches. If several stones are coupled directly on the turbine shaft, as in case of Fig. 10, each one has its shaft length, which shafts are all equal and held together by ordinary couplings. All mills should be provided with extra shaft lengths and at least one ready mounted stone; thus, when a stone anywhere on the shaft has to be changed or replaced, the turbines are stopped only the time necessary to uncouple the old stone and replace it with the ready mounted one, which requires but a short time. All grinders used in Canada are of the horizontal running type, as described. In some other countries, however, vertical types are used and the grinding is done cold. Other types have also been invented but so far as the writer knows none has yet proved to be more economical and practical than the present one.

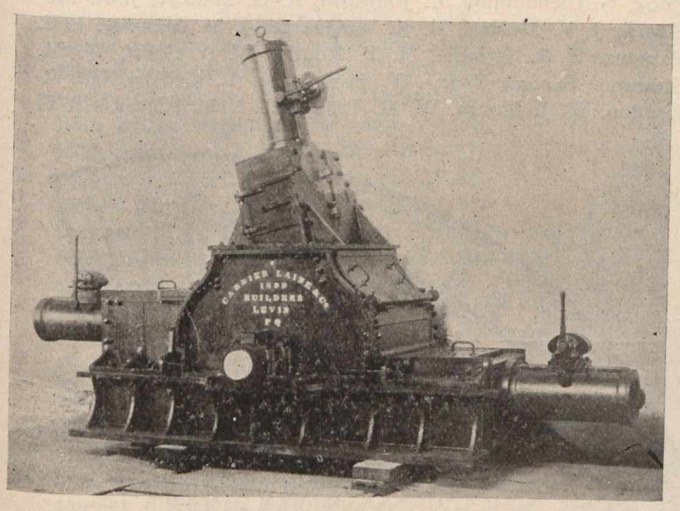


Fig. 20—Pulp grinder, manufactured by Carrier, Laine & Co.

PUMPS.—At least four sets of pumps are necessary for an ordinary exporting pulp mill: 1st. High pressure pumps for the cylinders of the grinders. 2nd. Low pressure pumps for backing cylinder pistons for sprays on the stones and in screens and wet machines and various other uses. 3rd. Stuff pumps to convey the ground pulp from the tanks under the grinders to the screens, and 4th. High pressure pumps for the presses. In case of a mill deriving its power from a high head, the number of pumps may be reduced to the last two, pressure direct from the flume or water pipe being used instead of the first two.

1st. Pump for Cylinders of Grinders.—Ordinary triplex power pumps are used, the sizes varying with the work to be done. At least two are employed and are so arranged that

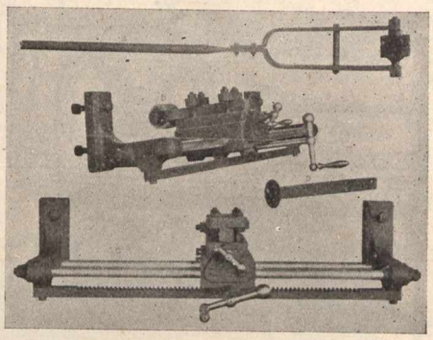


Fig. 21—Stone-turning device for "Success" Pulp Grinder.

if one fails, the other will do the work without any of the grinders being stopped. They are usually driven by means of a belt from the turbine shaft, and thus, the pressure varying with the speed, they will act somewhat as a governor if desired. If a constant pressure is wanted an accumulator is used to regulate it.

2nd. Low Pressure Pumps.—The same type as the one above mentioned, but built lighter will answer the purpose.

3rd. Stuff Pumps.—As the turbines must be set as near the tail race as possible (in most cases not higher than about 15 ft.), the ground pulp must be pumped up to the screen above the wet machines. This wet pulp falls from the grinders into tanks or troughs running along and under the grinders, and is conveyed by gravity to one or several reservoirs from which the stuff pumps take it. On account of the usually low head to be overcome and of their simplicity and freedom from valves, centrifugal pumps are the best adapted for this purpose. Ordinary stuff pumps are sometimes used.

4th. High Pressure Pumps for Presses.—These will be considered later.

(To be continued.)

SMOKE HOOD AND EXHAUST SYSTEM FOR LOCOMOTIVE HOUSES.

Alfred J. Stevens, C.E., and M.E., Toronto, has invented a new method of removing smoke from locomotive houses, which will appeal both to railway managers and municipalities.

This system is designed to replace the Wigwam Jack, now in common use, and to fulfil other ends. It consists essentially of a horizontal main smoke pipe, suspended to the roof and reaching over all the stalls in the house to be served, and provided with swinging, adjustable hoods which fit closely to the stacks of the locomotives. The main pipe is connected to an exhaust fan or chimney, and the smoke is delivered through a single stack at any desired elevation above the engine house or surrounding property.

The application to an engine house of eighteen stalls is shown by Fig. 3. The house is divided into three sections, and the main pipe is reduced in size in each section. The