CARE OF BELTS, PULLEYS AND GEAR WHEELS.

No mill foreman would willingly take a good, new rubber belt and rig up a scraper thereupon in such a manner as to wear the belt out as soon as possible. Still that very same foreman will pass through the mill day after day where this wearing out process *is being* done all the time on a number of belts, and he never opens his mouth to protest or to order the scrapers taken off the belts. Not long ago, being near a mill, a very strong smell of burning rubber was noticed. The smell seemed to be continuous, and was noticeable at all hours of the day and night. Day after day it was the same, the odor being driven in one direction or another according to the direction of the wind at any given time, but by going all round the mill the burnt rubber smell was to be found at any time on one side of the premises. The cause was found to be the old story of *shafting out* of line and a piece of plank nailed up to keep the belt from running off its pulleys. There can be only one result of a contrivance of this kind, viz., to wear out the belt as quickly as possible. As destructive and mechanical a device as this is I will wager that out of ten mills take them as they are listed, there will be nine that maintain one or more belt destroying appliances of this kind.

When a belt will not run well, instead of putting up a bit of board or plank, put up the millwright to align the shafting or to move the machine around so that the belt will run square. Failing this, *and in some mills* it is almost impossible to get such a thing done, put up a roll to bear against the belt, and let it run on bearings of its own (the roll), even in bits of pine wood, if there is nothing better to be had. Ten to one there is a *bit of shafting* in the storeroom, with a couple of boxes or hangers and a pulley to fit, that can be set up to guide that belt on to the pulley. Then the millwright may be laughed at when he says he has not got time to line up the shafting, *and he may* be told that it is a fact that millwrights work so awfully hard (?) that a drop of sweat from one of them will kill a toad!

Just one thing more in relation to the belt business. This thing is one not to do by all means. In the case where it happened there was a friction clutch driving a centrifugal pump by means of a belt. *By some means* the clutch was so adjusted that it would drive the belt and pump, slowly, it is true, even after the lever had been thrown to strike the clutch out of gear. In this case, instead of having the clutch properly overhauled, the very simple and belt destroying expedient of thrusting a wedge into the space between the lower side of the pulley and the pump frame was adopted. This caused the belt to stop with a bang on the instant, and to stay stopped dead until the wedge was knocked out with a hammer or some other mass of metal.

Among the things to do is that of bushing loose pulleys, of 2 or more feet in diameter, with roller bearings. The pulley is simply bored large enough to admit a cage of rolls around the shaft, the rolls in their cage are slipped in, and a thin collar or flange plate is screwed on to prevent the rolls from coming out. Then the pulley is ready for use, and I have seen pulleys arranged thus run continuously for several years without being oiled or being repaired. The roller bearing is also a mighty good thing for shafting especially line shafting, where the rolls have a fair chance to show what they are worth. As to the roller bearing for heating engine bearings, they are *undoubtedly "things to do"* when they are properly made and adjusted to the bearings. I have seen engines fitted with roller bearings run for years with less power than they consumed before the roller bearing was applied. And these bearings received *absolutely no* attention except to be kept well oiled. In fact, they were deluged with oil or grease, and literally were submerged beneath the surface of a body of oil all the time. The addition of roller bearings in this mill to ten beaters permitted the driving of another beater with the same power as formerly consumed by the ten originally in use.

Every machine manufacturer in the trade and every mill owner or purchasing agent should insist upon the use of the diametrical pitch in all gear wheels for the transmission of power. The age is too far advanced for either maker or purchaser to monkey with "three inch pitch," "one half inch pitch," or any of the sizes between them. Instead of all this nonsense use the terms of the diameter and the number of teeth. Thus, "One pitch, sixth pitch, &c. In this way of stating the diameter of a gear it is understood that there is a stated number of teeth to each inch in diameter of the gear. Thus, a gear of thirty-six teeth, No. 6 pitch, is be exactly 6 inches in diameter of the pitch line. If there be thirty-eight teeth, the gear will be 6 1-3 inches in diameter. The gear of No. 1 pitch will have a tooth for every inch in diameter, and will always measure even inches across the pitch or circle. This method is very convenient for the calculation of gearing, also for the duplication of any gear that may be broken or worn out. For instance, supposing that there is a space of 10 inches between the centres of two shafts and it is desired to connect them by gears of No 6 pitch. This gear is pretty nearly one-half inch pitch by the old method, as the space per tooth would be on a gear 1 inch in diameter, divided by 6 equals .524 inch pretty nearly one-half. Once satisfied that a gear of this size of tooth will stand the work—and that part of engineering we will not go into in this story—it only remains to find how many teeth there must be on both gears to reach between the two shafts. As the distance is 10 inches, it is evident that two gears, each 10 inches in diameter, will just connect the two shafts. With a gear No. 6 pitch, 10 inches in diameter, there must be sixty teeth. Therefore, there must be 120 teeth used to connect the two shafts. Instead of dividing this evenly between two gears of equal size, it may be apportioned out in any manner desired, so that one of the shafts will run at a different speed from the other. Thus, it is only necessary to divide the total number of gear teeth by the number which represents the difference in speed of the two shafts. Thus, if the shafts are to run at equal speed, divide the 120 teeth by 2, and the answer, 60, will be the number of teeth required for each of the gears which will be equal in size. If one shaft is to run twice as fast as the other, then the gears must be in the ratio of four to one, and the total number of teeth will represent five parts, four of which are the number of teeth on the large gear, the one part being the number of teeth on the small gear. Thus: one hundred and twenty divided by five equals twenty-four. Four multiplied by twenty-four equals ninty-six, the number of teeth in each gear, so that the shafts may run four to one, and be exactly 10 inches apart. This method of gear calculation is far ahead of the old chord or circumferential pitch business, and once the paper mill man becomes accustomed to its use, he will have nothing to do with the manufacturer who clings to the old method of gear teeth calculation.

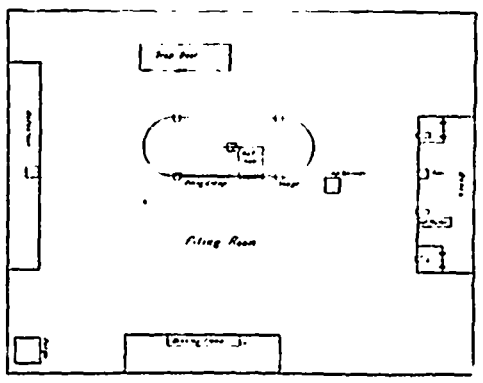
One more thing to do, and that should be done mighty quick. I refer to the high pressure simple engine which is puffing clouds of steam into the atmosphere just for the sake of helping to make rain for the world. At best only 10 per cent. of the heat contained in the coal can be transformed into work even by the best of steam engines, and where the exhaust steam is allowed to escape direct from the engine only about 6 or 7 per cent. of the heat value is made use of. There are many forms of jet condensers in the market which will enable the paper mill man to pull off one or two of the possible points between 6 and the 10 mentioned above. The exhaust jet condenser is little used in this country. It is a German institution, but can be had here. This appliance is only occasionally found in paper mills, but it is capable of adding 20 horse power to an engine of 150 horse power, with no expense whatever, provided there is a supply of water which can be drawn upon by the condenser. This appliance is really a sort of exhaust steam injector, which draws up the water with which the steam is to be condensed. It is different from the siphon condenser, for the reason that the water in that appliance is drawn up by the weight of a descending column of equal weight, while in the injector condenser the column of water is drawn up and supported by the injector action of the exhaust steam in the instrument. The condensation of a portion of the steam creates a vacuum which draws up water by removing the pressure of the atmosphere upon the top of the column, and the condensation of the same steam also draws along another portion of exhaust steam to be likewise condensed and robbed of its working power.

And now, just one more thing; this time both to do and not to do. That thing is the use of steam in the heating coils and circulations. When it is cold there is a very great temptation to put on more steam, even to let it blow through the pipes in order to get as much heat as possible. But that is the thing not to do. There is no heat to be gotten out of steam while it is passing through pipes in that matter. A pound of water in the form of steam contains about 1,000 or 1,100 heat units. If at a temperature of 330 degrees, 1-6 of the thermal units may be drawn out while the steam is blowing through the pipes, but there is carried off with it the 976 units of latent heat of vaporization which will become of use when the steam is condensed in the radiators or circulating pipes.—J. F. H., in Paper Trade Journal.

THE FILING ROOM.

In their little booklet entitled "Instructions on the Erection and Care of Band Saw Mills, Band Saws, Etc.," Messrs. J. A. Fay & Egan Company say regarding the filing room:

Locate the filing room, if possible, directly above the mill. The blade may then be conveniently and quickly lifted from the mill through a trap door into the filing



ARRANGEMENT OF A FILING ROOM.

room, and the blade to replace it can be easily lowered upon the wheels.

The filing room should be well lighted and free from vibration.

The sketch accompanying shows a nicely arranged filing room, 36x28 feet.

The tools deemed almost indispensable for a first-class filing room are shown in the outline in correct position, and are as follows: Saw anvil, cross face hammer, round face hammer, nine inch straight edge, six foot straight edge, tension guage, brazing frame and pads, filing clamp, automatic saw sharpener, automatic swage, small portable forge.

In addition to the above, the following can be used to excellent advantage: Automatic side shaper, automatic saw stretcher, re-toother.

—The Rat Portage Lumber Company have just supplied the sash and doors for a new Baptist college at Brandon, Man. The order was secured in competition with the factories of Minneapolis and Winnipeg.