FACTS AND FIGURES CONNECTED WITH BELTING.

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FRICTIONAL OFARING

municating motion, which do not appear to up counteracted by any peculiar disadvantages. In large mills where this ; gearing is used to transmit power to drive five or six gangs, one or two large circular saws, a muley, gang edgers, trim-mers, slashers, lath mills, shingle mills and other machinery, where 20,000 feet of boards may be sawn in an hour, the faces of the wheels are made as smooth and traight as possible; one wheel is made of iron and the other of wood or of iron covered with wood. Where it is practicable this gearing is so arranged that the wood drives the iron, to prevent the "slip" at starting from wearing the wood-faced wheel unevenly. Although this tendency is much less than might be supposed, as in most cases the "bull-wheel" used for drawing logs into the mill, is a large wooden wheel driven by a small one of iron, and these wheels started and stopped while the driver is in full motion a hundred times a day, work well and last for several years But for machinery in constant use, the wooden wheel should always drive the iron | In the early use of friction gearing, when it was used only wheel. For driving heavy machinery, the wooden drivers are as backing gear in saw-mills, and for hoisting in grist-mills, put upon the engine shaft, and each machine is driven by a separate counter-shaft. Two or more of these counter-shafts are usually driven by contact with the same wheel, and each is arranged so as to be thrown out from the driver and stop. ped whenever required, and again started at any moment, by a slight movement without interference with other machinery. To drive small machinery these friction drivers are put upon a line shaft so as to drive a small counter-shaft from which the machine is driven by a belt, which may be shifted in the usual way. In many mills from 100 to 300 horse-power are transmitted by this kind of gearing

For driving light machinery, running at high speed, as in sash, door and blind factories, bass-wood, the linden of the Southern and Middle States, has been found to possess good qualities, having considerable durability, and being unsur-passed in the smoothness and softness of its movement.

Cotton-wood has been tried for small machinery, with results somewhat similar to those of bass-wood, but is found to be more affected by atmospheric changes; even white pine makes a driving surface which is, considering the softness of But for the wood, of astonishing efficiency and durability all heavy work, where from 20 to 60 horse-power is transmitted by a single contact, soft maple has, at present no rival. Driving-pulleys of this wood, if correctly proportioned and well built will run for years with no perceptible wear For very small pulleys, leather is an excellent driver and very durable. Recently, paper has been introduced as a driver for small machinery, and has been applied in some situations where the test was most severe ; and the remarkable manner in which it has thus far withstood the severity of these tests, appears to point to it as the most efficient material yet The proportioning of friction pulleys to the work req. . . d. 1 and their substantial and accurate construction, are matters of perhaps more importance than the selection of material. The mechanic who thinks he can put up frictional gearing temporarily and cheaply will make it a failure. Leather belts may be made to submit to all manner of abuse, but it is not A is a double bell crank frame, with arms 2 ft. long. The so with friction pulleys They must be accurately and sub- ends of the upright arms receive the bearings for the iron direction of the circumference. The cants should be closely if tted, and be put together with white-lead or glue, strongly nailed and bolted. The wooden rim thus made up to within about 3 in. of the width required for the finished pulley, is mounted upon one or two heavy iron "spiders" with 6 or 3 radial arms. If the pulley is above 6 ft. in diameter there should be 8 arms, and 2 spiders when the width of the face is more than 18 in.

Upon the ends of the arms are flat " pads," which should be of just sufficient width to extend across the inner face of the wooden rim, as described, that is three inches less than the width of the finished pulley. These pads are gained into Frictional gearing is a term applied by Webster to wheels admit keys under and beside the pads. When the keys are that transmit motion by surface contact without teeth. This well driven strong "lag" screws are put through the ends of style of gearing is much used in the lumbering regions of the the arm into the rim. This done an additional "round" is North-West and is fast galning favour wherever applied. It put upon each side of the rim to cover bolt-heads and to se-has some advantages, not possessed by other modes of com + cure the keys from ever working out. The pulley is now put to its place on the shaft and keyed, the edges trued up, and the face turned off with the utmost exactness.

For small drivers the best construction is to make an iron pulley of about 8 Inches less diameter and 3 inches less face than the pulley required Have 4 lugs about one inch square cast across the face of this pulley Make a wooden rim, 4 inches deep with face equal to that of the iron pulley, and the inside diameter equal to the outer diameter of the iron Drive this rim snugly on over the rim of the iron pulley, having cut gains to receive the lugs, together with a hard wood key beside each. Now add a round of cants upon each side, with their diameter less than the first so as to cover the iron rim If the pulley is designed for heavy work, the wood should be maple, and should be well fastened by lag screws put through the iron rim But for light work it may be of bass wood, or pine and the lag screws omitted. But in all cases the wood should be thoroughly seasoned.

the pulleys were made so as to present the end of the wood to the surface; and we occasionally yet meet with an instance when they are so made. But such pulleys never run so smoothly nor drive so well as those made with the fibre more nearly in line with the work. Besides it is much more difficult to make up a pulley with the grain placed ridially, and to secure it so that the blocks will not split when put to heavy work, than it is to make it up as above described.

As to the width of face required in frictional gearing, when the drivers are of maple, a width of face equal to that required for a good single leather belt to do the same work is sufficient. Or, to speak more definitely, when the travel of the surface is equal to 1,200 ft. per minute, the width of face should be at least 1 in for each horse power to be transmitted, and for drivers of bass-wood or pine, 14 to 2 in. The driven pulleys are wholly of iron, and similar to belt pulleys, but much heavier, having more arms and stronger rim. The arms should be straight rather than curved and there should be two sets of arms when the face of the pulley is above 16 in A very good rule is to make the thickness of the rim 21 per cent, of the diameter of the pulley. To secure perfect accuracy these pulleys must be fitted and turned upon the shait; and when large, the shaft should run in journal boxes, while the face is being turned, after which they should be balanced ; neglect of which has been the means of destroying friction pulleys that were otherwise well made The conditions and results of a few experiments made to test the tractive power of smooth face friction pulleys are here given, these experiments, when made, were not meant for publication or for the benefit of science, but to establish rules for private practice. They should be repeated by others before being taken as conclusive. For the experiments, two pulleys were made in the usual way, one being of wood-soft maple-and the other of 1ron. Both were accurately and smoothly finished. These pulleys were each 17 in. in diameter, and of 6 in. face, and were put up as shown in the diagram (Fig. 1.)

so with friction pulleys They must be accurately and soor the up of the journals of this rulley are 14 in. diameter stantially made and put up and kept in perfect line. All pulley, 1 The journals of this rulley are 14 in. diameter large drivers, say from 4 ft to 10 ft diameter and from 12 in. | and 3 in. long, and run in Babbitt boxes. The 'rame is hung to 30 in. face should have rims of soft maple 6 in or 7 in. deep. upon journals, T, and is balanced by the weight B. The face These should be made up of plank 12 in or 2 in thick, of the pulley I, is extended beyond the six inches to receive cut into "cants" 1-6th, 1-8th or 1-10th of a circle, so as to the cord C, for which purpose a shallow groove is cut in the place the grain of the wood as nearly as practicable in the pulley, so as to bring the centre of the cord to the periphery. The driving pulley V, is put upon a shaft where it may be made to revolve slowly in the direction of the arrow. It will be seen that P, will bring the pulleys together with a pressure just equal to its weight. The wooden pulley being in motion, the pressure, when sufficient, will roll the other pulley and raise the weight W. The manner of experimenting was to put a given weight upon the cord C, and while the driving pulley was moving, to increase the weight P.