FOREST PRODUCTS LABORATORY † FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE

.4S2222 (Layouts)*

SMALL SAWMILL IMPROVEMENT

PRACTICAL POINTERS TO FIELD AGENCIES

SETTING UP A GROUND MILL

In choosing the mill site the general requirements are:

1. Place the mill so as to minimize logging up hill and to favor hauling out lumber.

2. Have the machinery on relatively level ground combining, if possible, gentle slope at the log deck, sharp downslope to the refuse burner if slabs and edgings are burned, and level or downhill haul to the yard in case lumber is dried at the setup. The drying lumber should not be in a depression where free air movement is blocked. If steam powered a suitable water supply becomes an essential.

The essential requirements in setting up a ground mill are:

1. Mandrel level.

2. Track level at right angles to mandrel and so bedded that carriage headlocks clear the saw by 1/2 to 3/4 inch at a line approximately 1 inch above the saw collar.

3. Track and husk so bedded and bolted as to hold this relationship under the shocks and stresses of sawing.

Place the husk at desired location and lay a sill under each end so as to permit accurately bolting husk to sills, allowing sills to extend parallel from beyond outside track to the pulley end of mandrel. Sills should be at least 10 to 10 inches, well-dried heartwood of durable species. Mills differ as to methods of locking husk to sills. Some use metal plates or angle irons, others bolt the husk directly to the sills. Husk and sills should have no play under the heavy stresses of operation. Mortising plates into sills and dressing the face at contact with husk furthers this in some types.

Mark on the ground the outline of sills and saw pit. Bed sills firmly about half their depth so that the husk is level both ways. Use a level to determine this. See that sills are solidly supported their entire length with ends under outside track, each resting on a post driven solidly into the ground and tamp earth firmly against sides. Dig saw pit ample to provide for type of dust removal and feed works employed.

Bolt husk firmly to sills, place mandrel and feed works.

Portable mills are usually provided with light metal tracks fastened to light stringers and correct tract width is maintained by cross pieces

† Maintained at Madison 5, Wisconsin in cooperation with the University of Wisconsin

between stringers. These stringers rest on ties which in turn rest on sills bedded in the earth. The gap in the sill-tie foundation at the saw pit should be reinforced with 6- by 8-inch cross pieces saddled between the husk sills directly under each track. Good foundations for the track beyond the saw pit are secured by bedding under each rail a 4- by 6-inch sill levelled with the top of the husk sills.

The mill manufacturer patterns the drum shaft and track stringers to insure that the headblocks clear the saw by 1/2 to 3/4 inch at a line about 1 inch above the saw collar. In some mills this 1/2 to 3/4-inch clearance is fixed by metal plates between husk and track. Lacking these fit blocks between the husk and rail stringer, one bolted to each sill. Bolt track stringers tightly to husk sills and ties making sure that track is absolutely right angles to mandrel and level both ways throughout its length. Tie in other track sections maintaining those conditions.

Place carriage on tracks, run it the length of track testing with levels lengthwise and across the headblocks to check accuracy of levelling. If inaccuracies occur correct by raising or lowering sills under ties. Fasten one end of cable to cable eye on front of carriage, run cable through deck end pulley and back over drum. Usually the first strand is carried over the top of the drum and from 3 to 5 wraps taken on the drum, the cable leaving drum at the top. These wrappings should occupy the middle portion of the drum. Thread cable through other pulley and fasten to eye at rear of carriage. The cable should be tight when fastened.

Mills naturally wear with service and may give a poor performance even when carefully set up. Mandrel bearings, carriage wheels, set works, and headblocks should be checked. The mandrel should run level and without end play, which calls for good bearings. The same is true of carriage wheels. Provision is usually made for taking up play developing in carriage wheels. Keep the wheel adjusted just short of binding or sticking. Worn setworks parts preclude accurate cutting as do worn bolsters on headblocks.

Fasten the guide blocks to husk adjusted so that guide pins touch the saw about 1/4 inch inside the gullet to clear bit holders and 2 inches below level of carriage bolsters on the front or deck edge of saw. The board side pin should be set even with the face of the fixed collar by placing a straight edge across the face of the fixed collar and bringing pin to straight edge, fixing guide block firmly to hold this adjustment. The log side pin is set after putting lead in saw.

The next step is to hang the saw. It must fit the mandred perfectly, not so tight that it must be forced on nor loose enough for perceptible play. Place loose collar and tighten lug pins or screws. Tighten nut hard against collar and check with plumb line to insure that saw is vertical and not dished. Minor dishing can be corrected by inserting paper shims. Cut one paper ring 1/2 inch wide and of the full diameter of the collar. Cut a second ring 1/2 inch wide and of a diameter to fit inside the hole in the first. Oil both paper rings and stick larger on fast collar and smaller on loose collar if dish is away and reverse if dish is toward log. Additional rings may be used if required but guard against reversing dish.

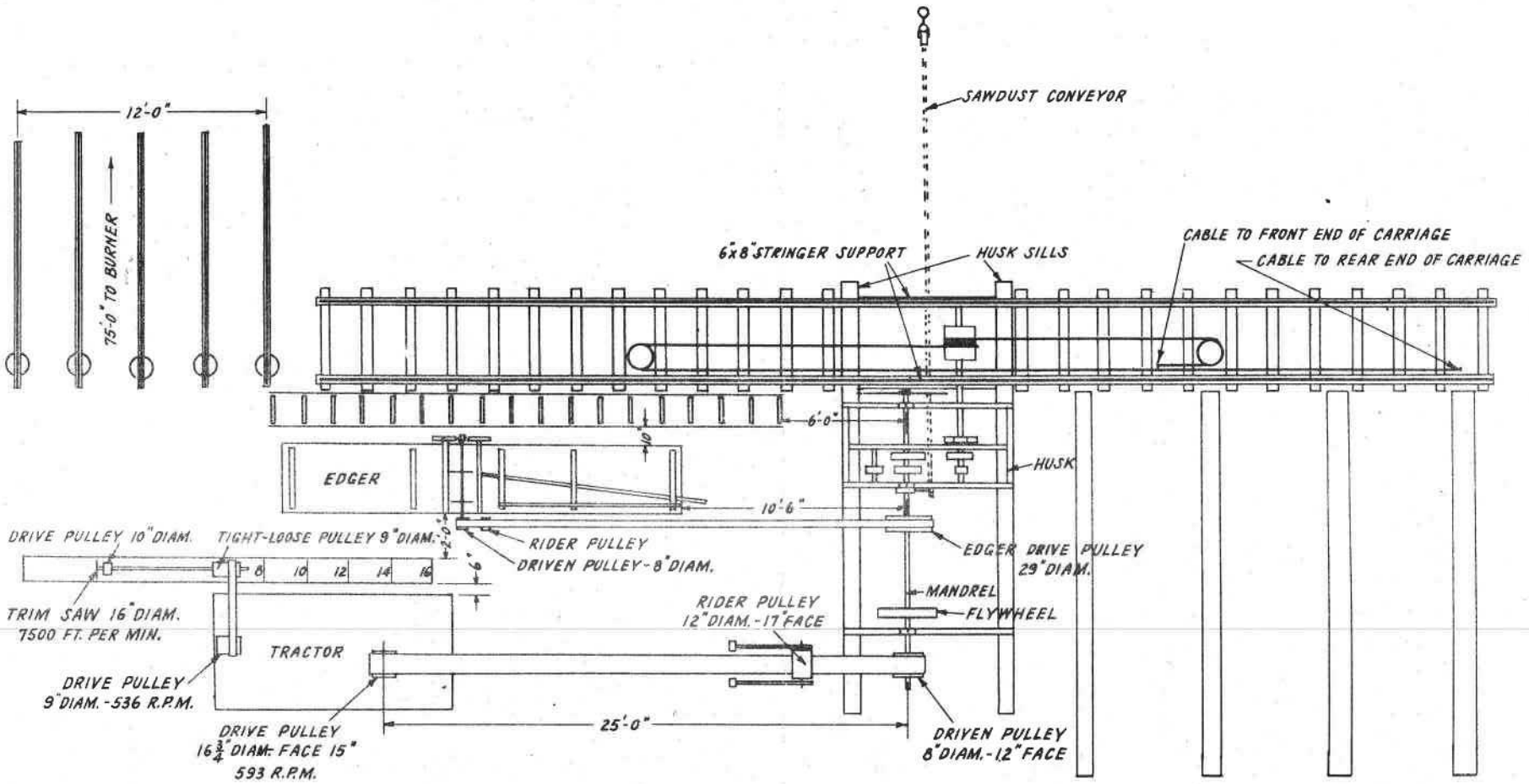
Next, put the lead in the saw. This is done by slewing the mandrel slightly in a horizontal plane by means of set screws controlling this adjustment so as to bring the front edge of saw slightly into log. Be sure mandrel does not bind in bearings after adjustment. Try a lead of 1/8 inch in 20 feet and if saw heats at the rim reduce this, if it heats at center increase it. A simple means of getting 1/8 inch in 20 feet is to bring the carriage so that rear bolster is opposite saw center and fasten a strip along top of bolster to project within 1/8 inch of the saw. Run carriage 20 feet from saw center toward deck and stretch a line from end of strip across face of saw. Adjust mandrel until the string tautened in a straight line touches both edges of saw along log side face. Set board side guide pin to saw in new position and, when saw is running, set log side pin close enough to steady but not bind saw. Attach spreader wheel behind saw to clear the teeth about 1/2 inch and in same plane as saw, but not so that it rubs the log.

There remain the installation of log deck and power unit and possibly of lumber rolls, edger, cut-off saw, dust conveyor, dip tanks, shelter, and yards. A simple log deck can consist of skids to facilitate easy appraach of log to carriage. A gentle down slope to the carriage is helpful though not essential.

The power unit, if hooked up by means of a flat-belt drive, should be so placed that the driver and driven wheels are about 25 feet apart, their mandrels truly parallel and pulleys in line so that the belt centers on the pulleys. Do not use guides to keep belt centered. Space units so that belt has about a 4-inch sag on slack, or top, side. Place belt rider on top of the slack belt. For edger driven from headsaw mandrel (as in figure) the lower belt is slack. Place rider on under side of lower belt and close to small driven pulley on edger.

Portable mills sacrifice power to mobility and cannot maintain high speeds in feed and saw. Tractor-powered mills run idle with a rim speed of saw approximating 7,000 feet per minute, falling quickly as the saw enters the log. On a wide face the saw can be practically stopped. The sawyer attempts to vary the feed in order to maintain this lower speed uniformly under load. To attain good production a mill of this type should, up to a 12-inch width of cut in softwoods, stand a feed which cuts a 16-foot line in as many seconds as the face is wide in inches and hold a rim speed of 5,500 feet per minute.

Contributed by C. J. Telford,
Forest Products Laboratory,
May 31, 1935.


12'-0"
75'-0" TO BURNER
SAWDUST CONVEYOR
6"x8" STRINGER SUPPORT
HUSK SILLS
CABLE TO FRONT END OF CARRIAGE
CABLE TO REAR END OF CARRIAGE
6'-0"
EDGER
HUSK
10'-6"
DRIVE PULLEY 10" DIAM.
TIGHT-LOOSE PULLEY 9" DIAM.
RIDER PULLEY
DRIVEN PULLEY - 8" DIAM.
EDGER DRIVE PULLEY 29" DIAM.
8
10
12
14
16
MANDREL
FLYWHEEL
TRIM SAW 16" DIAM. 7500 FT. PER MIN.
RIDER PULLEY 12" DIAM. - 17" FACE
TRACTOR
DRIVE PULLEY 9" DIAM. - 536 R.P.M.
DRIVE PULLEY 16¾" DIAM. FACE 15" 593 R.P.M.
25'-0"
DRIVEN PULLEY 8" DIAM. - 12" FACE

Z M 26455 F