may be brought down between the rails, removing the snow to a depth of two or three inches. The nose is ordinarily operated by means of either hand levers or by compressed air cylinders controlled from the cupola of the plough. Fig. 8 shows some various types of push and wing ploughs.

Russell Plough.—One well known push plough is the Russell design. This plough, figs. 9 and 10, is of the square nosed type and is generally built of strong timbers reinforced with structural steel. The framing on which the mold boards are laid has as its main feature a heavy timber called the "back bone." Power is applied directly to the front of the plough through a steel reinforced timber bar, hinged or pivoted to the "back bone." This bar extends between the two center sills the entire length of the car frame. At its rear end the coupler is attached. A 4 in. clearance on each side of the bar permits sufficient lateral movement for adjustment on curves. This method of transmitting power directly to the front of the plough is said to be responsible for the claim that Russell ploughs are seldom derailed. On account of the heavy pressure on the front of the square nosed plough, the Russell design is fitted with a front truck which has journal bearings on each side of each wheel. Each axle, therefore, has four journals. The surfaces of the plough which come in contact with the snow have been developed to minimize resistance. The back end of the car is several inches narrower than the front, in order to relieve the car of snow friction against its sides. The top of the plough is fitted with a cupola or lookout from which its operation is controlled. These ploughs are made in several sizes for both single and double track operation and are often equipped with elevator wings and flangers. The wings of the Russell plough are of the elevator type. The face of each wing is formed into two concave chutes called elevators. These chutes slope upward at an angle of approximately 30 deg. This type of wing first loosens the snow at the side of the cut and then carries it up and out. The distance the snow is thrown depends upon the speed at which the plough is travelling. These wings are forced out into position by means of gearing operated within the car. When not in use these wings fit into recesses in the side of the car.

Fuller Plough.—Another style of push plough is that designed by the Union Pacific Rd. and known locally as the Fuller plough, see fig. 11. The framing is 30½ ft. over end sills, and is composed principally of wood. The side sills are 12 in. by 13 in. members. The center sill is 12 x 12 in., and the two intermediate sills are each 6 x 8 in. The end sills are 12 x 16 in., and the entire frame, in addition to being mortised and tenoned, is braced by brackets and held together by ¾ in. bolts. In addition, the coupler castings at each end are connected by two 1½ in. diameter rods, extending the entire length of the frame and passing through the 12 x 24 in. body bolsters. At the front end of the frame is a system of bracing that supports the steel plough. The steel mold plate, 11 ft. wide, is of the square nosed type, the vertical wedge and the horizontal wedge being constructed of continuous 3/16 in. plate, in order to eliminate angles, joints and riveting at the junction of the two wedges. At the nose the mold plate is radiused downward. For 3 ft. back of the lower cutting edge, the framing under the nose is filled solid with wood, se-

Fig. 2. An early form of locomotive pilot snow plough.

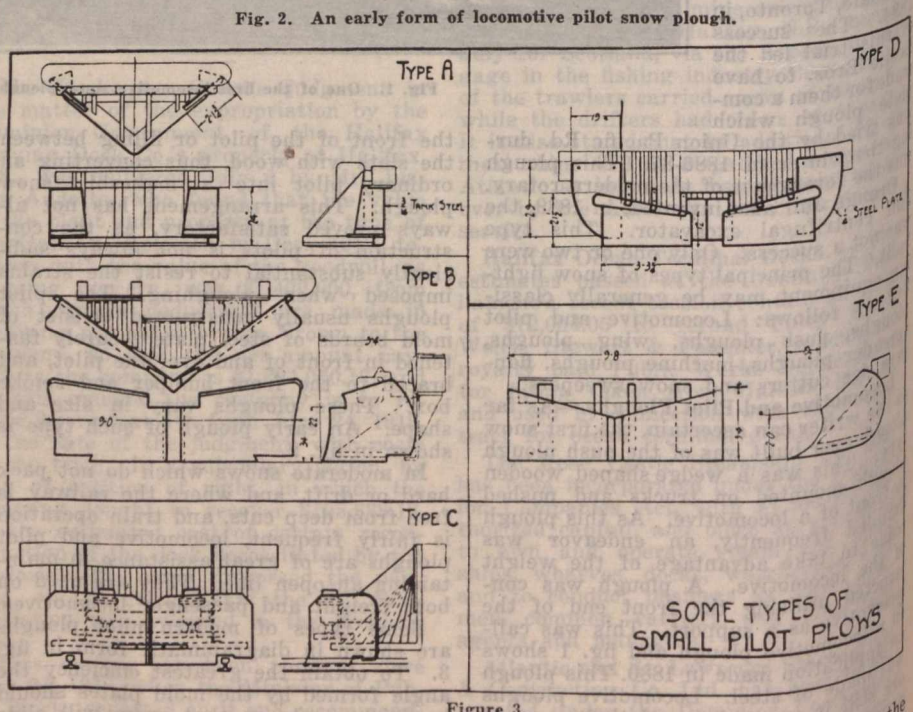

Figure 3.

curely bolted. The nose piece is a triangular steel bar over which the cutting plate is placed. The front end of the plough, when depressed, is carried on cast iron shoes. These slide along the rail and are arranged so they can be readily replaced in case of breakage. The sides below the mold plates are carried