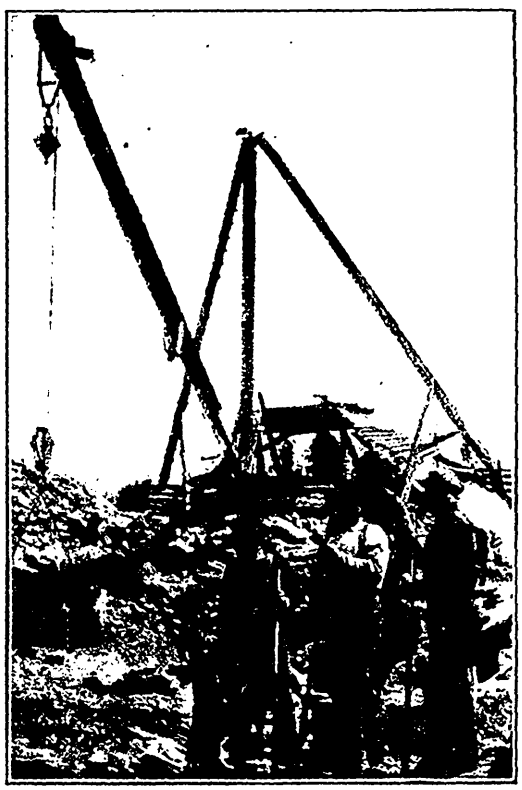
A STEAM SHOVEL.

Whatever character they possess—and they possess much—they derive entirely from their unadorned simplicity, their rugged strength, and the adaptation to the purposes for which they are designed.

For bridges of smaller size the general plan adopted is that shown in the initial cut. The piers and abutments are built as hollow towers, with walls about five feet in thickness, and with circular or rectangular wells within—these wells being sometimes ten feet in diameter. Thus a great saving of material is secured, while a perfectly adequate strength is maintained.

Fig. 1 shows a part of one of these bridges before the laying of the track. The large square abutment to the left is one of these hollow towers. The heavy piers to the right of the cut show the form commonly adopted for resisting the shove of ice in the spring freshets. The sharp wedge-like edge rips up the ice and causes it to part on either side. As the shove, except in tidal rivers, is always down stream, it is on the upper side that this form of structure is chiefly employed.

Among the most difficult constructions on the road are the large bridges near the mouth of tidal rivers. The piers are sunk by means of huge caissons, sixty by thirty feet, formed of hewn timber and water-tight planking. The lower part of the caisson is a chamber designed in the form of an inverted hopper to admit of undermining and dredging operations. The lower edge of the caisson terminates in a cutting edge formed of hardwood timber and boiler plate. Above the working chamber are others which are filled with concrete in order to sink the caissons to the bottom. Through these a vertical shaft or well is left, by means of which the excavated material from the bottom is elevated. These huge frameworks are constructed on land, launched and carefully sunk exactly upon the



A DERRICK AT WORK.