ports the inner forms and places them in their new positions. Projecting from the end face of the section shown in Fig. 1 may be noted half a 6-inch strip of No. 20 gauge copper water-stop. This strip extends the full length of the joint. The important purpose which it serves in case of contraction in the concrete, and the



Fig. 4.—Gasoline-operated Walking Dredge Engaged in Trench Excavation.

unique details of its form and adjustment are described in The Canadian Engineer for June 10th, 1915.

In Fig. 3 the process is shown of pouring concrete into a closure arch through wooden chutes from the steel dump-cars operated upon a dinky track built upon the spoil bank alongside the trench. This method of distributing and pouring concrete is in use upon contracts Nos. 32, 33 and 34, which are being executed jointly by the Northern Construction Company and the Carter-Halls-Aldinger Company. The character of the country and the condition of the trench is typical of all work upon this construction east of the Brokenhead River, Mile 40.

Besides the Red River crossing (to be accomplished by rock tunnel), there are the Falcon, Birch, Whitemouth and Brokenhead Rivers, under each of which the aqueduct is depressed, converted to circular section and reinforced with steel. At these points it is provided, also, with blow-offs and waste weirs. Fig. 2 is a view of the west end of the reinforced section passing under the Brokenhead River and across a 3-mile depression adjacent thereto. Concrete at that point in the line is ¹ foot thick and reinforced. The pipe is 7 ft. 6 in. in diameter.



Fig. 5.—Thew Shovel Excavating in Heavy Soil.

Figs. 4, 5 and 6 show the three types of plant applied to the opening of the aqueduct trench. Fig. 4 is a walking dredge, operated by gasoline power, excavating in the trench in the prairie at Mile 24. This is on Contract 30, Camp No. 2, of the work being carried out by the Tremblay McDiarmid Company. Fig. 5 shows a Thew shovel mounted upon a truck excavating in firm soil at Mile 43 on work being carried out by Thos. Kelly & Sons under Contract 31. These contractors have three such shovels at work—two of them

at this point and one at Mile 33. Fig. 6 shows the largest of six Bucyrus drag-line machines operated by the Northern Construction Company and Carter-Halls-Aldinger Company on Contracts 32, 33 and 34. The machine excavating has a two-yard bucket, as it operates in a rather deep cut. The other five machines are equipped with buckets of one yard capacity. All of these machines are working upon swamp-covered soil and operate upon sectional platforms.

According to the report of Mr. W. G. Chace, chief engineer, to whom we are indebted for the accompanying views, approximately 8 miles of the aqueduct had been completed on September 25th. The crossing of the Whitemouth River, which is similar in depressed and reinforced section

to the Brokenhead crossing, was about 90 per cent. completed at that time.

While little concrete work will be done after November 1st, other phases of the work will be vigorously



Fig. 6.—A Bucyrus Drag-line Excavator at Work on a Deep Cut.

proceeded with during the winter, particularly rock work. In addition, a contract has just been let to Henderson & Snider to make test borings where the aqueduct will cross the Red River at Winnipeg. It is expected that this work will occupy three months.

Sanitary engineers are following with great interest the progress of the activated-sludge method of sewage treatment. At Houston, Tex., according to Mr. E. E. Sands, the City Engineer, they have one large activated-sludge tank in operation, and also have a small tank about 12 in. square and 8 ft. deep, with a glass front and a small filtros plate in the bottom of tank. They have been operating the large tank (14,000 gallons) but a few days and have only accumulated 5 per cent. of sludge so far, but find that at a certain time of the day the sewage carries a considerable amount of solid matter, so they are able to build up the sludge quite rapidly, and they expect within the next three or four weeks to have the tank running at a normal condition.