

### Design and Cleaning of Sewer Catch Basins

By George A. Carpenter, City Engineer, Providence, R. I.

Different cities have adopted different forms of catch-basins and inlets and some engineers even recommend taking storm-water directly into the sewer without any intervening basin in which street detritus may be collected. These argue that, with sufficient velocity in the sewers to carry such street dirt along, it is easier and cheaper to collect it in a few grit chambers located in the line of the sewer and remove it from there than to collect and remove it from a large number of catch-basins. In this section, however, the general practice is to build catch-basins, and these have been designed upon various plans, said Mr. Carpenter in addressing the Providence Engineering Society.

#### *The Providence Basin*

The city has one of the best types of catch-basin. Starting originally with the circular brick basin covered with a granite gutter stone and a granite head stone forming part of the street curb it later developed the cast-iron D Frame and cover for the same basin, and now uses this form exclusively. Cutting an opening through the granite curbing for an entrance for the storm-water, the walls of the basin are drawn in at the top, and it is then capped with a cast-iron frame and cover. Nothing is visible above the surface of the sidewalk except the cover and no break is made in the street curb, or in the paving of the gutter. This design affords one of the neatest and most effective basins for city streets that the author has seen. Recognizing a good thing when it saw it, the City of Pawtucket has used this type of basin for many years.

#### *Experiments with Basins*

The author has made occasional experiments with basins constructed to meet special conditions and also with basins built to render cleaning less expensive. One of these was the construction of a basin with an interior wall of soft, porous brick and a drainage space between inner and outer wall. This space between the walls was connected by a 4-in. pipe with the main pipe running from the basin to the sewer and was designed to drain the basin and produce dryer material for removal when cleaning.

The basin was trapped by a running S-trap on the main connection, just outside the basin wall, and this was protected from sticks and other obstruction by a cast-iron hood hung on the inside wall of the basin. The S-trap provided a water seal after the water in the basin itself had escaped through the porous wall.

Only a few of these basins were built, as an experiment, for it was anticipated that the porous bricks might stop up in time and cease to operate as designed. The basins continued to work as planned, however, and required no bailing of water in advance of cleaning and the material was easier to excavate. After being in service for a dozen years or more the man who inspects the condition of catch-basins reports that they are

still operating as intended and that the walls of porous bricks have not become clogged.

The following credits may be given to this type of basin: There is no water to be bailed out before cleaning. The material in the basin is in a better condition to handle and cart away by the old hand method of cleaning. The basin is trapped by a small quantity of water and the water-seal is more permanent than with the hood-trap. This basin does not breed mosquitoes. If this basin is neglected and becomes filled with dirt above the hood, there is still an outlet under the hood where the water will drain off and leave the street clear.

#### *Modern Methods of Basin Cleaning*

With the modern methods of cleaning basins, however, the desirability of dry material becomes of less importance.

During the author's experience he has often had visions of reducing the cost of cleaning by the old hand method and has spent hours trying to work out some form of basin construc-



STANDARD MOTOR TRUCK EQUIPPED FOR CLEANING SEWER CATCH BASINS, PAWTUCKET, R. I.

tion which would contribute to this end. His schemes have varied all the way from buckets, or tubs, in the basin, which could be hoisted to the surface when full and dumped directly into a car, to a small ladder dredge working through the cover or through a specially designed opening. All these schemes have ultimately led to the conclusion that any cleaning device, to be practicable, must be adaptable to the present form of basin, as there are too many basins in use to think of general reconstruction.

#### *Pawtucket Cleaning Truck*

The Board of Public Works of Pawtucket has recently produced a type of cleaning truck that accomplished the object sought. In its present state it is the result of practical experience on the job, and considerable improvement has been made over the original design. Starting with a simple, self-dumping auto truck equipped with a power-operated hoist, there have been added a water pump and an orange-peel bucket at first hydraulically controlled but recently equipped with compressed air control so that the city now has a machine for the practical and rapid cleaning of basins at a greatly reduced cost.

The truck here illustrated consists of a Standard chassis with a 32 h. p. engine. On this is mounted a steel body made by the Monahan Vehicle Company of Providence, R. I., which measures about 9 ft. by 4½ ft. by 21/3 ft. high and has a capacity of 3.4 cu. yds. Cover plates 2 ft. wide are placed over each end to prevent the slopping of the load. The average load has measured about 2.6 cu. yds. and weighed about 3.4 tons.

The tailboard is hinged at the top, provided with a rubber gasket, and can be clamped tightly against the body. The

body is provided with a hydraulic lift operated from the transmission system. A pair of 6-in. I-beams are mounted on the chassis back of the driver's seat, and on these I-beams are mounted a 6 h.p. Fairbanks & Morse gasoline engine, a cable-drum and control mechanism and an air compressor. The cable runs to an outrigger which can be swung out over the catch-basin and back over the cart after the bucket is raised and ready to dump.

#### *The Cleaning Bucket*

The first bucket provided for this truck was a plain, cylindrical one 14 ins. in diameter and 17 ins. deep with a capacity of 1½ cu. ft. It was filled by hand by a man in the basin, after the manner of the regular cleaning methods then in use. After operating this equipment from July until November, 1913, an orange-peel bucket controlled and operated by oil under a pressure of about 100 lbs. per square inch was substituted.

Experiments were made later with a bucket operated by compressed air and the improvement in operation was so great that an air compressor has been added to the equipment and the bucket is now operated in that way. These various improvements and attachments have overloaded the truck and it would be advisable to start with a five-ton truck if a new machine were to be built.

When this machine was first put in operation, with a bucket loaded by hand, its average output was 5 loads, or 13 cu. yds., per day of nine hours. With the orange-peel bucket this output was increased to an average of 7 loads, or 18.2 cu. yds., and with the addition of compressed air the average output is about one load per hour, or 23.4 cu. yds. per day.

The length of haul is, of course, a controlling factor in the work of the truck and the condition of the basin is also important. At the present time the truck is cleaning basins which are practically solid full of dry material and on this work it is averaging one load per hour with hauls somewhat in excess of one mile. With basins in an average condition the author believes the daily output can be materially increased. With the bucket averaging three fillings per minute the truck can be filled in about 20 minutes and at 7 miles per hour a trip to a dump one mile away and back can be made in 17 minutes. This should leave ample leeway to make a load, on the average of once in 45 minutes, or 12 loads per day of nine hours.

Hauls to a dump are very likely to become longer and undoubtedly will average considerably more than one mile. With a one mile haul it should be noted that it takes as long to go to the dump and return as it does to fill the truck. This indicates that there may be an opportunity for further economy in having one machine for taking the material from the basin and a separate truck for carting it to the dump.