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A Double-Triangular Type Frame and Cover for Carriageway Jointing Chambers

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A variety of designs of frames and covers has been used to provide access to carriageway jointing chambers. A new design of cover has now been developed in an effort to eliminate the disadvantages of earlier designs.

INTRODUCTION

Throughout the history of underground construction in the Post Office, the need to provide access to jointing chambers for the purposes of maintenance and alterations of the cable networks has been met by a variety of designs of frames and covers. Each type of frame and cover employed has, however, been found to have its own disadvantages. The specially-designed Frame and Cover, Unit Type,[1] for example, which is the current standard, suffers from rocking and from frame failure at the joints, unless particular care is taken during installation. Search for an improved frame and cover included trials of a double-triangular type of American origin, which gave encouraging results. This led to a new design of cover[2] which has now been introduced as an alternative to the unit-type frame and cover, and it seems likely that it will eventually become the British Post Office standard.

DESIGN CONSIDERATIONS

An ideal frame and cover should satisfy the following requirements.

(*i*) It must withstand the highest loads to which it is likely to be subjected.

(*ii*) The cover must not be free to move relative to the frame, as rapid wear of the rubbing surfaces can result. This movement usually takes the form of the cover rocking, sliding or bouncing when a vehicle passes over it.

(*iii*) The frame should be made in one piece. Experience has shown that many failures in the current Post Office type can be attributed to a sectionalized frame.

(*iv*) The design should avoid lengthy machining operations that make the item costly to manufacture.

(*v*) The weight of the cover should be kept to a minimum to simplify lifting.

(*vi*) It should not be possible for the cover to fall through the frame opening into the jointing chamber.

(*vii*) It should be possible to install the frame with the covers removed.

SINGLE-UNIT DOUBLE-TRIANGULAR MANHOLE COVER

Trials of the original American design of frame and cover, supplied by manufacturers in this country, indicated that this type of cover fulfilled most of the above requirements, but a small percentage of the covers fractured in service. This weakness was overcome by modifying the web structure of the cover so that its strength was substantially increased with a negligible increase in weight.

FIG. 1—Frame and triangular half-covers

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The double-triangular frame and cover comprises a one-piece cast-iron frame into which are fitted two triangular half-covers, also of cast-iron, and a removable mild-steel safety grid (Fig. 1). Each half-cover is supported in the frame by three lugs, and is thus stabilized and non-rocking. Each supporting lug projects beyond its respective corner of the triangle, and any tipping action from traffic loading applied to the extreme edges of the cover is thus eliminated. The lugs are wedge-shaped, and a mating taper in the frame creates a gripping action sufficient to resist bounce of the cover, but the cover can be readily freed for lifting by striking the lugs with a piece of timber.

The frame chosen for Post Office use is 6 in. deep, and has a 2 ft square clear opening. It weighs 196 lb, and, to facilitate handling with lifting equipment, four lifting holes are provided in the frame webs. Each half-cover weighs 140 lb and can be lifted by means of a single key-hole sited above the centre of gravity. The removable safety-grid is provided to safeguard cables, etc., in the event of a cover being accidentally dropped into the opening. The upper surface of the cover is treated with a non-skid coating of epoxy resin and calcined-bauxite chippings.

RESULTS OF TRIALS

Trials of new covers of the improved design were carried out and, to date, none of these has failed. The load test specified in BS 497[3] for Grade A covers calls for the application of a 35-ton load via a 12 in. diameter disk at the centre of the cover for a period of 30 seconds without fracture. The modified design adequately meets this specification when the test load is placed on the centre of each half cover, and tests on six half-covers produced an average result of 43 tons.

INSTALLATION

Installation is extremely simple. The covers are taken out of the frame, and the frame is then set on to a bed of cement mortar and gently tapped down until the top edge is level with the road surface. When road closure overnight is undesirable, resin mortar may be used in lieu of cement mortar so that the installation may be re-opened to traffic the same day.

MULTIPLE-UNITS FOR CARRIAGE-WAY JOINT BOXES

Two-cover and three-cover units using the same basic principles as the single-cover unit are being developed for use on joint boxes; Fig. 2 illustrates the two-cover unit. With these, however, there are a number of additional difficulties to be overcome, and a small quantity is currently undergoing a field trial to provide further information.

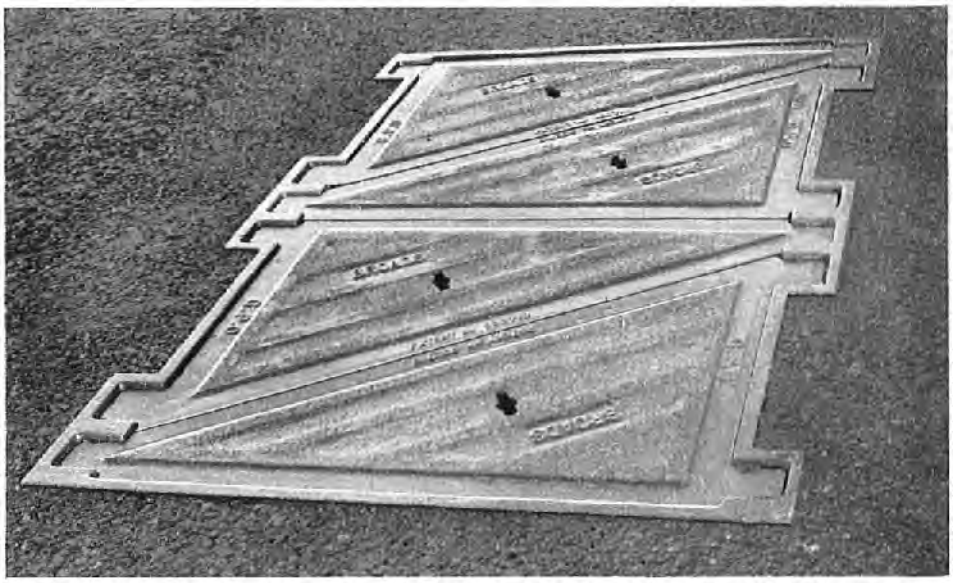

FIG. 2—Two-cover unit

CONCLUSIONS

The double-triangular type of frame and cover theoretically satisfies most of the ideal requirements, and the reaction of users has been favourable. If it proves to be as successful in a multiple form, as indications show the single unit to be, considerable savings should be possible due to the lower initial outlay and installation costs, and also the longer life that can be expected.

ACKNOWLEDGMENT

Acknowledgment is made to the Telecommunications Region and Area staffs who assisted in arranging the trial installations, and also to Broads Manufacturing Company, Ltd., for their co-operation with the experimental modifications.

References

[1] JENNINGS, S. W., and HEARN, A. F. L. A New Frame and Cover for Carriageway Manholes and Joint Boxes. *P.O.E.E.J.*, Vol. 54, p. 164, Oct. 1961.

[2] The design is the subject of Patent No. 932719.

[3] B.S. 497:1967. Specification for Cast Manhole Covers, Road Gulley Gratings and Frames for Drainage Purposes.