Dec. 1, 1970 G. P. WRIGHT 3,543,453

SANITARY SEWER MANHOLES

Filed April 4. 1969 3 Sheets-Sheet 1

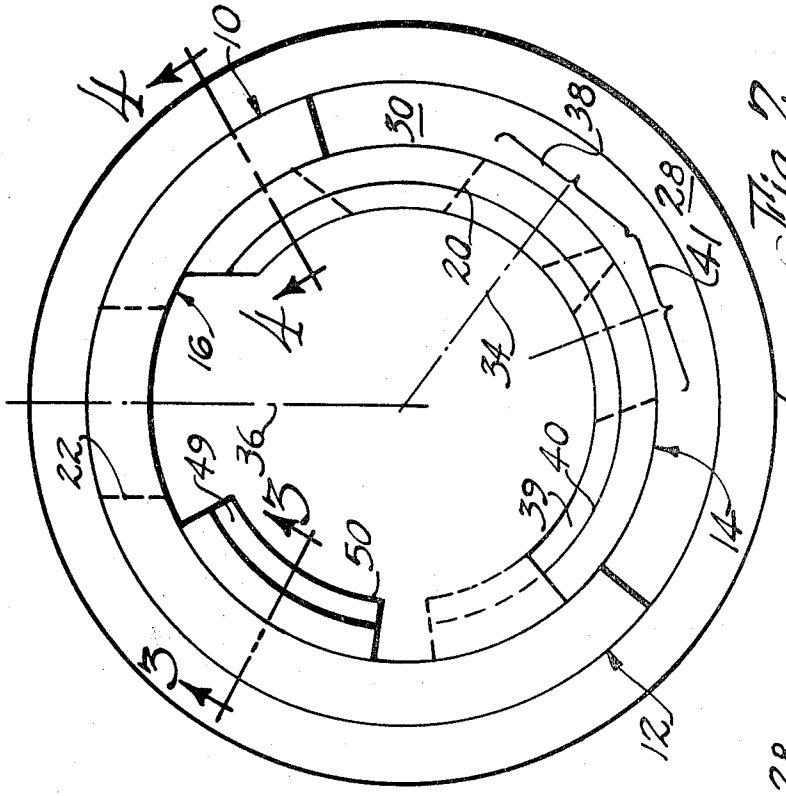


Fig. 2

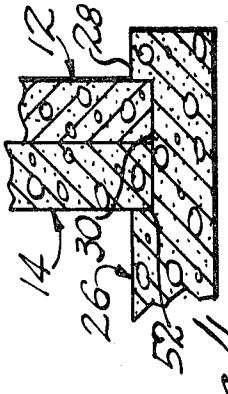


Fig. 4

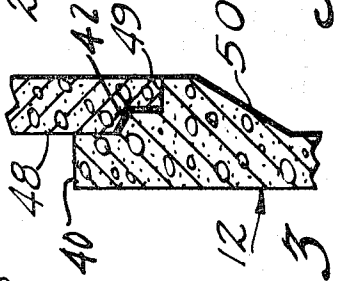


Fig. 3

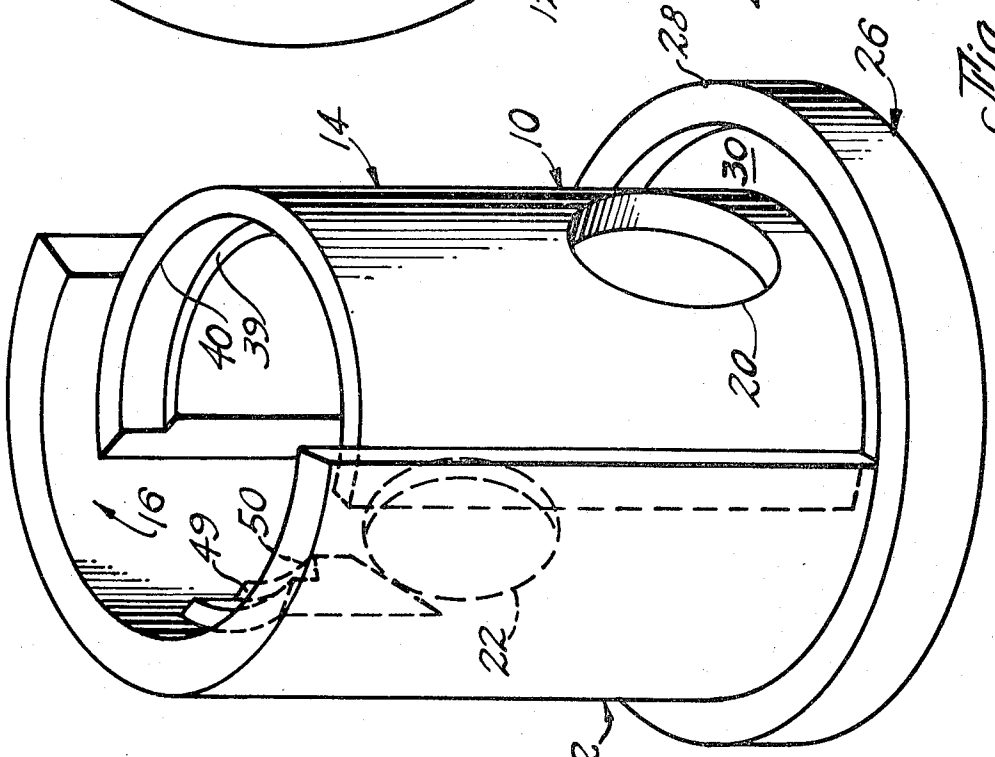


Fig. 1

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SANITARY SEWER MANHOLES

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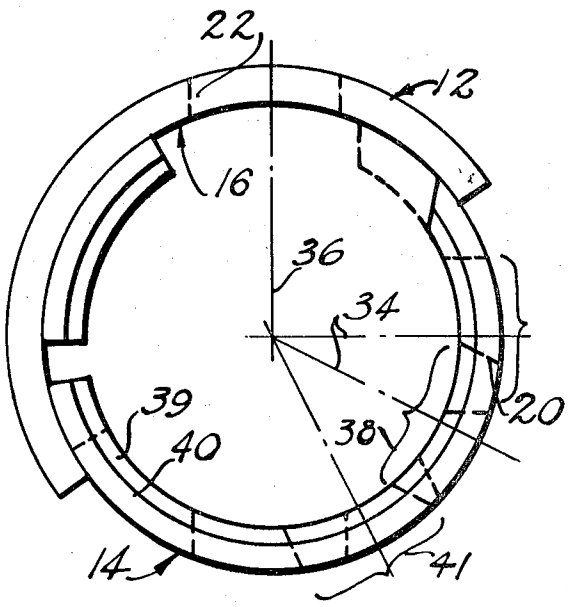


Fig. 5

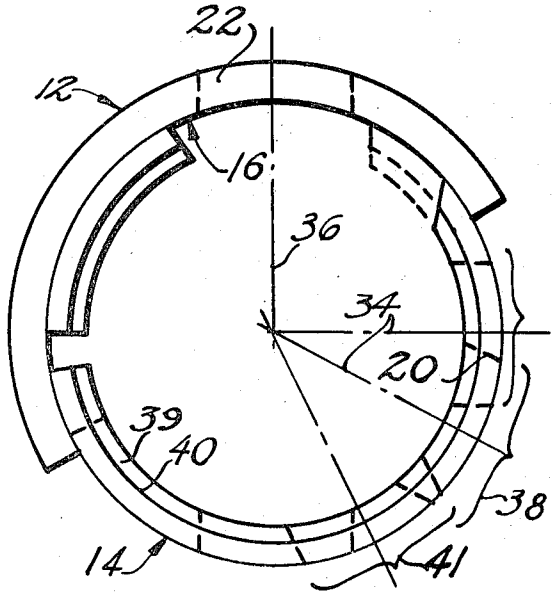


Fig. 6

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SANITARY SEWER MANHOLES

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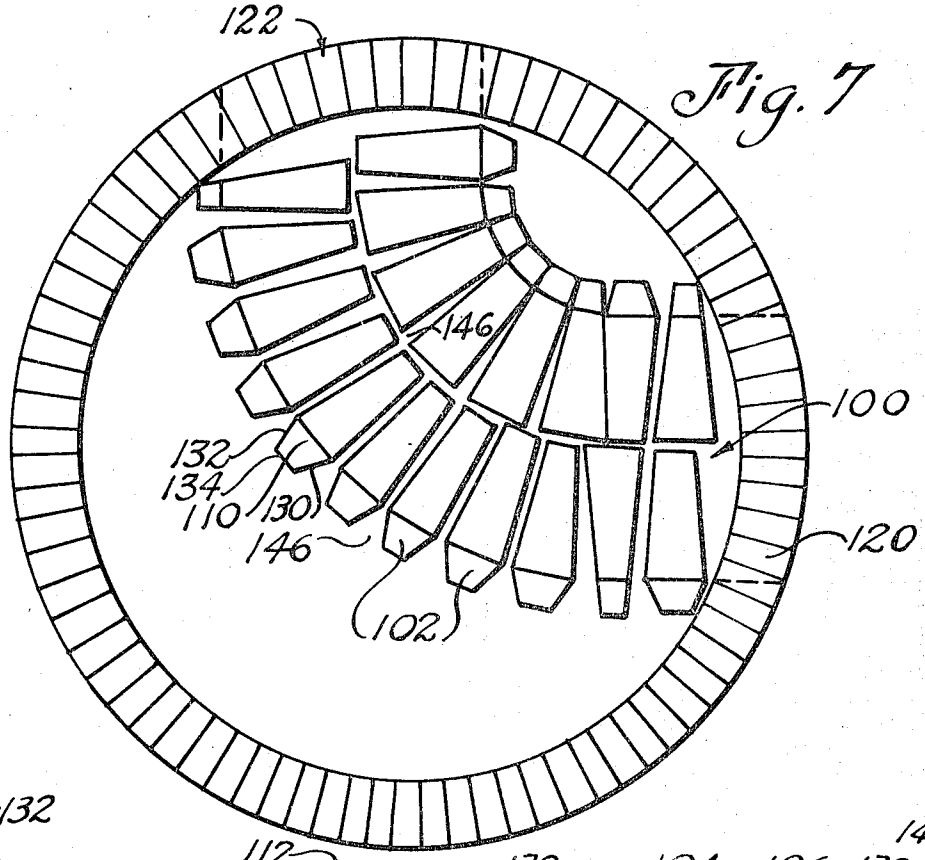


Fig. 7

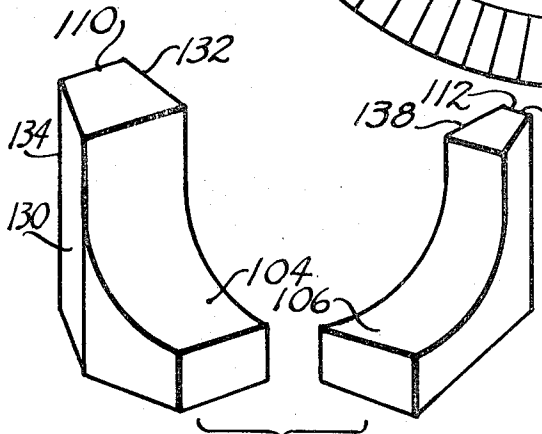


Fig. 10

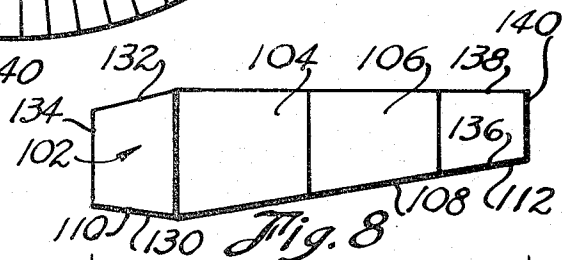


Fig. 8

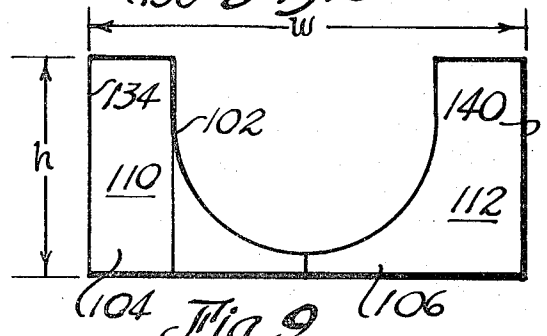


Fig. 9

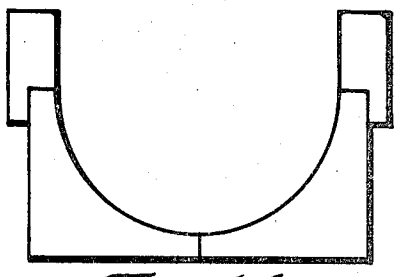


Fig. 11

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United States Patent Office

3,543,453

Patented Dec. 1, 1970

3,543,453

SANITARY SEWER MANHOLES

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Filed Apr. 4, 1969, Ser. No. 813,551

Int. Cl. E02d 29/12

U.S. Cl. 52—20 8 Claims

ABSTRACT OF THE DISCLOSURE

An improved method of construction of sanitary sewer manholes to eliminate brick construction and to substitute pre-cast pieces which are basic in form and may be fitted and adjusted to several different situations. One wall piece is a pre-cast concrete wall section which is arcuate in formation and a second smaller, wall piece to be fitted therein is also a pre-cast concrete wall section of arcuate construction but small enough in size so that at least part of the smaller wall fits into the larger wall for adjustment. Each wall section has a hole therein, one of which is for the input and the other for the output into which the input pipe and the output pipe of the sewer invert are to be located by means of which the sewage passes through the manhole. Thus, the angle of bend may be varied by adjusting one section with respect to the other as opposed to complete constructions from brick or block of the entire walls of the manhole.

Special shaped blocks may be fitted together to make the bend in the sanitary sewer manhole invert, comprising open individual tapered blocks having a concave interior and varying in angularity whereby the entire invert may be constructed by fitting said blocks together to avoid the usual concrete or brick and mortar construction. The blocks are tapered at each edge and are wedge-shaped.

BACKGROUND OF THE INVENTION

Field of the invention

Manhole and sewer construction: Also, sewer construction. Pre-cast concrete pipe construction should also be considered.

Description of the prior art

The prior art method of sanitary sewer construction is based upon some rather stringent requirements derived from engineering standards most of which have been adopted into various municipal and county codes. These have to do with the size and shape and relative arrangement of the manhole walls and also the manhole invert which is common terminology for the portion of the manhole which directs the sewage from the influent input pipe through the manhole to the effluent output pipe. Mainly by custom, such construction is normally done from concrete or bricks and mortar and requires a specialized mason or bricklayer who is specially familiar with manhole construction and invert construction. It is becoming increasingly more difficult to have a sufficient labor supply of such specialized craftsmen, and there is a demand for a better way of installing acceptable sanitary sewer manholes and inverts which can be done with less skilled labor but in such a manner as to assure technical acceptance. The present manhole is not built from brick or blocks but is made from two pre-cast sections fitted together to construct the walls of the manhole. These pre-cast sections are relatively movable to provide the proper angle prior to final mortaring.

SUMMARY OF THE INVENTION

In a sanitary sewer manhole which may be constructed from pre-cast concrete sections that are put together on the job and adjusted for the proper angular relationship between the influent pipe: a first pre-cast, concave, open manhole wall member adapted to be placed approximately vertical and having a first opening for the input or influent pipe therein, a second pre-cast, concave, solid wall member of a size small enough to fit into the concave portion of the first pre-cast member and to adjust therein and having a second effluent or outlet opening therein, and said second precast member being adjustable with respect to said first member whereby the angular relationship between the continuance of the influent pipe and the effluent pipe may be varied, and a bottom pre-cast solid member on which said first and second pre-cast members are positioned to provide a closed bottom, all of which is cemented in place after proper location.

A manhole invert which in vertical cross-section appears as a U-shape and constructed from a plurality of individual invert blocks each having a concave upper portion and being tapered from one thicker end to the other thinner end to provide wedged-shaped blocks which may be fitted together to form an invert curve from the influent pipe to the effluent pipe having a total depth to meet whatever requirements are set in the particular specification. Any voids between the invert block and the manhole wall are filled with a masonry of concrete forming the sloping lines at the top of the block to the manhole wall. The one block may be divided in the middle into two blocks if preferred.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the manhole constructed from pre-cast sections in accordance with the present invention.

FIG. 2 is a top plan view of the manhole construction shown in FIG. 1, with dotted lines to illustrate the adjustment.

FIG. 3 is a cross-sectional view taken substantially along line 3—3 in FIG. 2.

FIG. 4 is a cross-sectional view taken substantially along lines 4—4 in FIG. 2.

FIG. 5 is a top plan, diagrammatic view of the manhole construction.

FIG. 6 is a top plan, diagrammatic view of the manhole construction.

FIG. 7 is a top plan view of a manhole invert constructed from block in accordance with the present invention.

FIG. 8 is a plan view of one individual invert block.

FIG. 9 is a front elevation view of the block shown in FIG. 8.

FIG. 10 is a perspective view of a divided block like that shown in FIG. 7.

FIG. 11 is an elevation view of the FIG. 8 block with a cap added thereto.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Manhole construction

Sanitary sewer manholes are normally constructed with the shape of the lower half of the influent pipe projected to meet the shape of the lower half of the effluent pipe. In most instances specifications require that the shape, usually referred to as "manhole invert," have a total depth of .70 to .80 of the nominal diameter of the pipe, which is accomplished by continuing the maximum width of the

invert (equal to the nominal diameter of the pipe) vertically until the total required depth is reached. The vertical cross-section of the invert appears as a U-shape of the specified height. Normally the U-shape is finished by a mortar joint on a line from the top of the U on either side running to the manhole wall and this line will slope upwards to the top of the U at a rate that may vary with different engineers. A typical rate could average one to six.

The conventional materials of an invert are usually concrete or brick mortar. Some specifications require that the bare brick be in the shape of a U and other specifications allow the bricks to be plastered with motar.

The walls of the sanitary sewer manhole are usually made from courses of brick adhering to a surface shape by specification.

One form of the manhole designated generally by reference numeral **10** in FIG. 1 comprises continuous manhole wall construction created by means of a pair of inter-related pre-cast concave, concrete wall sections, one of which, for convenience, is designated generally by reference numeral **12** and identified as outer section and the other pre-cast wall section which is designated by reference numeral **14**, also referred to as the inside section. The outer section is the first section **12**, which receives the inner section **14**. Section **12** is pre-cast from concrete in a mold and may be part of a pipe having a concave interior **16** which receives therein a portion of the second member **14** that also may be a section of a pipe of smaller diameter than section **12** whereby part of the walls of **14** extend into and generally follow a contour of a concave interior **16** of section **12**.

Section **14** has an opening **20** therein which may be either an influent or effluent opening and section **12** has an opening **22** therein which may be the other of the influent or effluent opening. The bottom of the sections **12, 14** is closed by means of a bottom pre-cast slab **26** which may have an upstanding rim **28** thereon and a flat interior **30** on which the sections **12, 14** rest. Mortar may be placed in the joints between the sections **12, 14** and the bottom **30** so as to make a rigid unit in a tight seal.

As is readily apparent in FIG. 2, the opening **20** in section **14** may be adjusted with respect to what would be a center line of the manhole invert presented by reference numeral **34** to intersect the center line of the other portions of the manhole invert represented by reference **36** through the opening **22**. Brackets **38, 41** illustrate the adjustment of the position of opening **20** to demonstrate the versitility of the present arrangement whereby only two pre-cast sections **12, 14** may be used to obtain a number of different angles between the influent pipe and the effluent pipe. This results in considerable saving as compared with building each manhole from courses of brick so as to have the manhole invert properly located therein.

Section **14** has an inner rim **39** with an upper edge **40**.

FIG. 3 illustrates edge **40** of the section **12** and shows that there is an interior ledge **42** on edge **40** with intermediate angular portion **44** leading to an inner ledge **46** to receive a manhole cover **48**. Section **12** has the inner ledge **46** formed on a pre-cast protrusion **50**.

FIG. 4 illustrates that the bottom **30** of the pre-cast slab **26** may be provided with a channel **52** in which the bottom edges of sections **12, 14** may be seated and mortared in place.

A manhole invert, that is, the conduit for the sewage which goes from an input or influent line to the output or effluent line of the manhole, is designated generally in FIG. 7 by reference numeral **100** and in accordance with the present invention may be created from a plurality of individual blocks **102** so constructed to be put together to create a trough of a different height and curvature depending upon the specifications of any job. As seen in FIG. 8 a typical block may be divided for convenience into sections **104, 106** to provide a U-shaped concave interior in cross-section **108**. Block **102** tapers from its maximum width on end **110** to its minimum width **112** and the taper may be of any angularity and may be on both sides or may be only on one side, whereby different blocks **102** of varying sizes and dimensions may be placed together in the manner shown in FIG. 7 to create the required manhole invert. The height of the block shown as *h* in FIG. 9 may be varied as desired in the pre-cast construction of the blocks so as to provide the amount of depth which may be required by specification. The width of the block represented by *w* in FIG. 9 may also vary as required by specifications to give the amount of interior dimension.

Any manhole wall construction may be used with the blocks **102** and vice versa, including the one of the preceding embodiments as well as the customary brick or concrete block manhole walls. As seen in FIG. 7, blocks **102** are positioned from the influent line opening **120** to the effluent outlet opening **122** to create the proper bend and curvature required by the specifications to properly direct the sewage. The ends **110** of blocks **102** are tapered at sides **130, 132** to the end surface **134**. Likewise blocks **106** are tapered along sides **136, 138** to the end wall **140**. Mortar may be dumped into the gaps **146** between blocks, in the middle and up the sides to create a closed trough from the input **120** to the output **122**.

What is claimed:

1. In a sanitary sewer manhole constructed from pre-cast concrete sections put together on the job and adjusted for the proper angular relationship between influent pipe and effluent pipe: said manhole comprising a first unitary, concave open manhole wall member placed approximately vertically and forming a significant portion of the manhole and having a first opening for the input or influent pipe therein, a second concave, solid wall member of a size small enough for at least part of it to fit into the concave portion of the first member and having a second effluent or outlet opening therein, said second pre-cast member also forming a significant part of the manhole, said second member being angularly adjusted relative to said first member whereby said openings will register with the influent and effluent pipes, and a closed bottom, said first and second members and said closed bottom being cemented together in assembled and adjusted relationship.

2. The device in claim **1**, including:

a manhole invert which in vertical cross-section appears as a U-shape and constructed from a plurality of individual invert blocks each having a concave upper portion and being tapered from one thicker end to the other thinner end to provide wedge-shaped blocks which may be fitted together to form an invert curve from the influent pipe to the effluent pipe having a total depth to meet whatever requirements are set in the particular specification, with voids between the invert blocks and the manhole wall filled with a masonry or concrete forming sloping lines from the top of the blocks to the manhole wall.

3. The device in claim **2**, wherein: the said invert blocks are divided in the middle into two sections.

4. The device claimed in claim **1**, wherein: there is more than one input opening whereby said sections may be positioned with respect to the input and output pipes so as to select one of several possible angles between the input and output pipes.

5. The device claimed in claim **1**, wherein: there is a ledge formed on the concave side near the top of both of said sections.

6. The device in claim **1**, wherein: said bottom has a recess therein in which the lower portion of said sections fits.

7. The device in claim **5**, wherein: said ledge lies below the top of each respective section on which said ledge is located.

8. The device in claim 5, wherein: each of said sections is a portion of a cylinder and both sections are formed of pre-cast concrete.

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U.S. Cl. X.R.

137—363