F. W. SKINNER.

CONCRETE FLOOR.

APPLICATION FILED MAY 25, 1908.

915,801.

Patented Mar. 23, 1909.

4 SHEETS—SHEET 1.

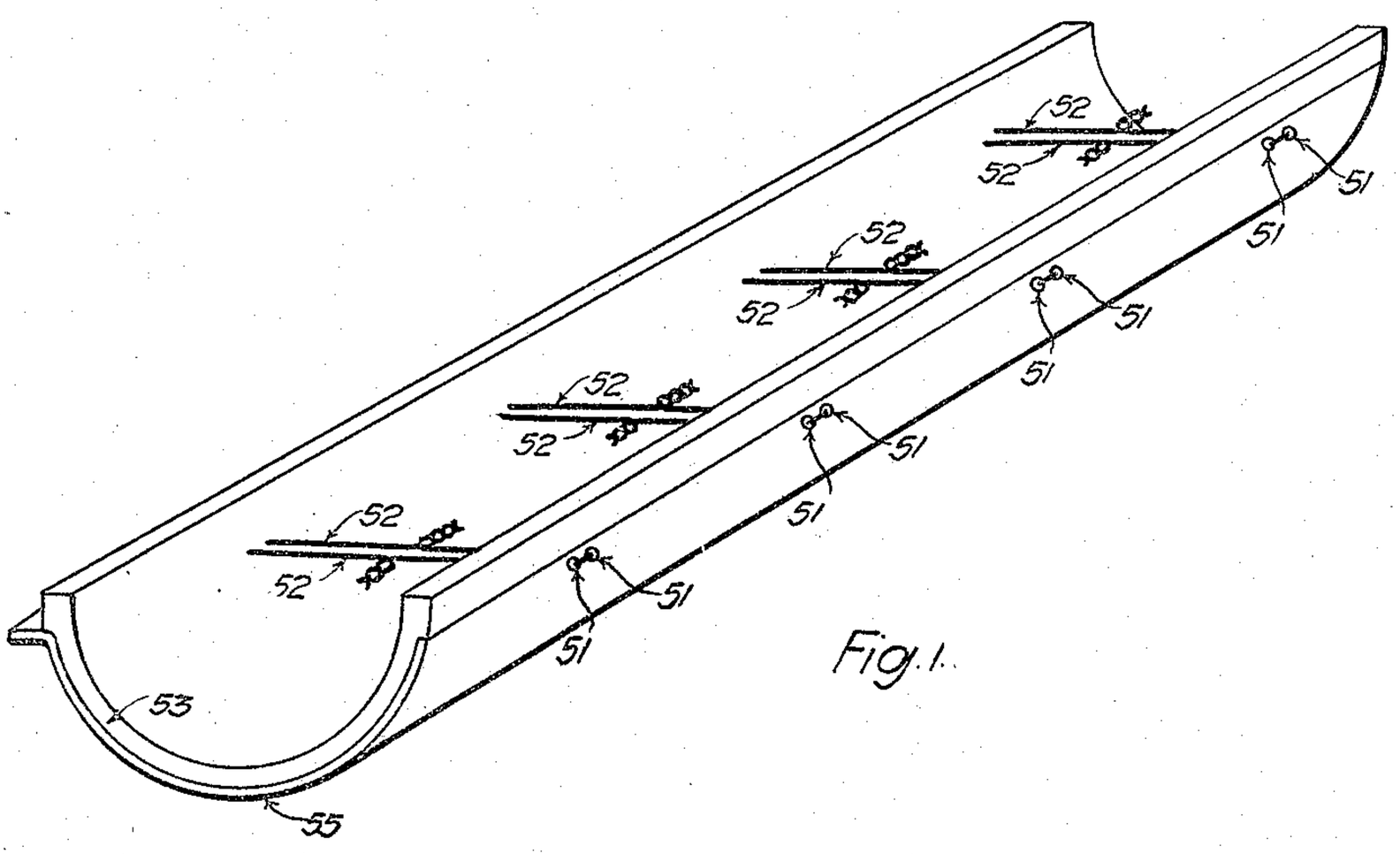

Fig. 1.

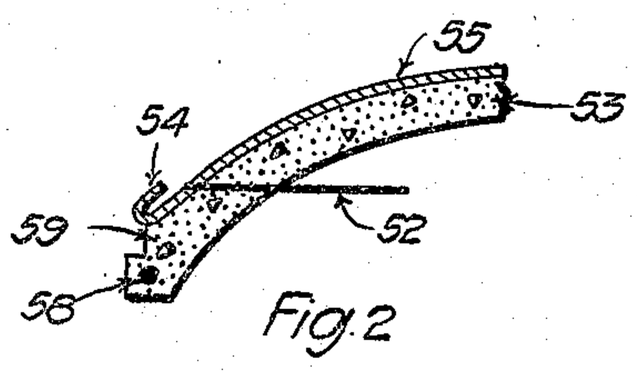

Fig. 2

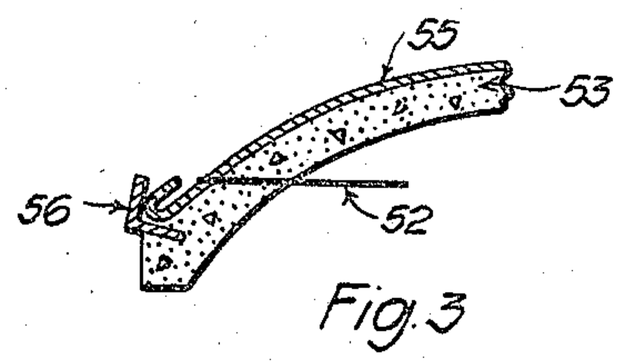

Fig. 3

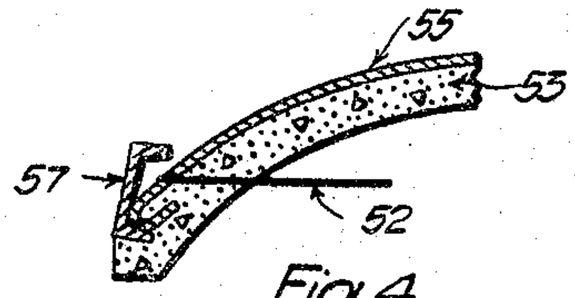

Fig. 4

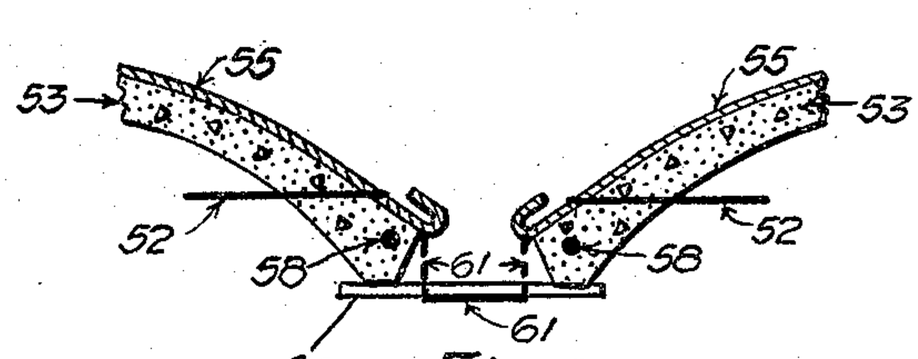

Fig. 5

WITNESSES:

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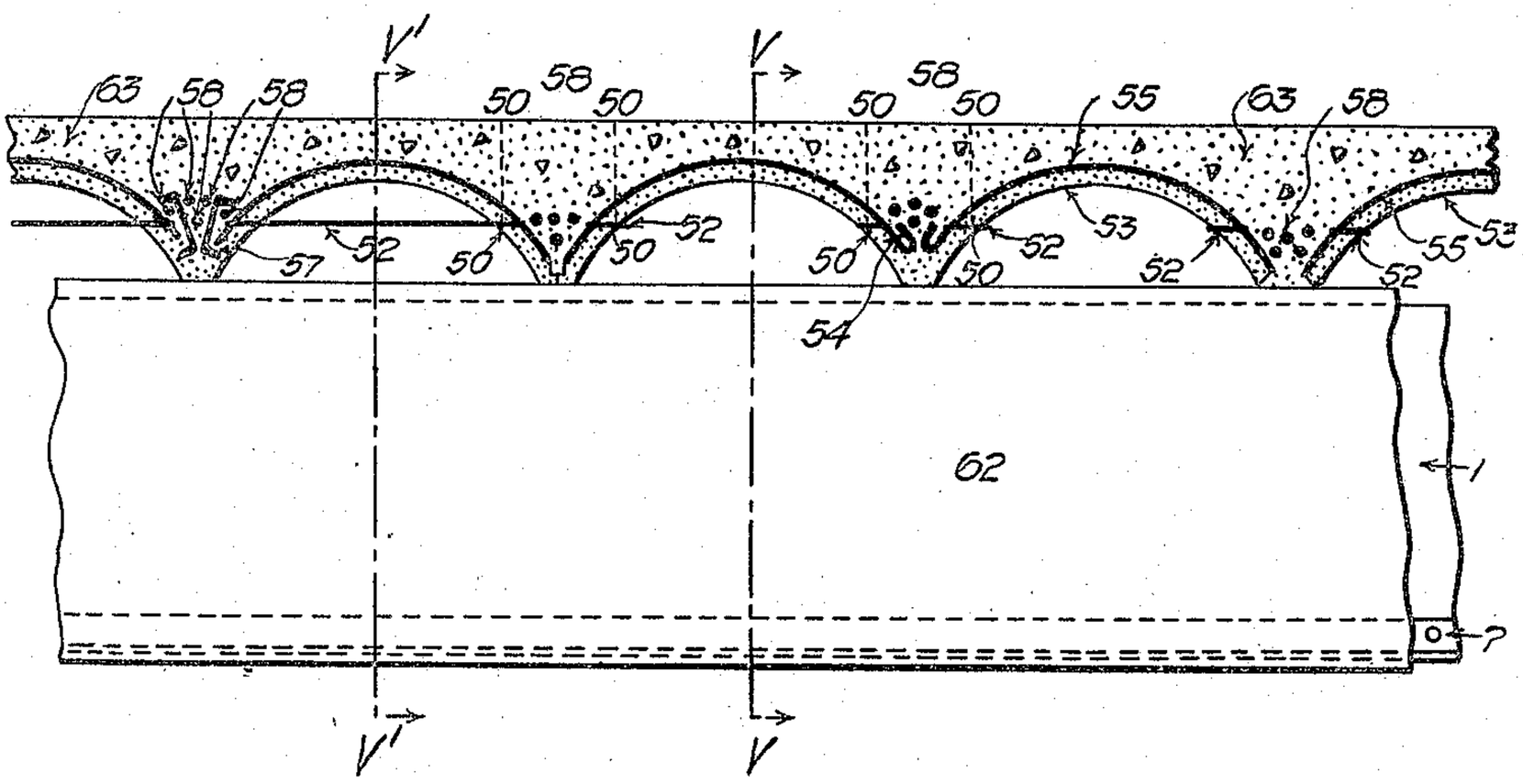

Fig. 6

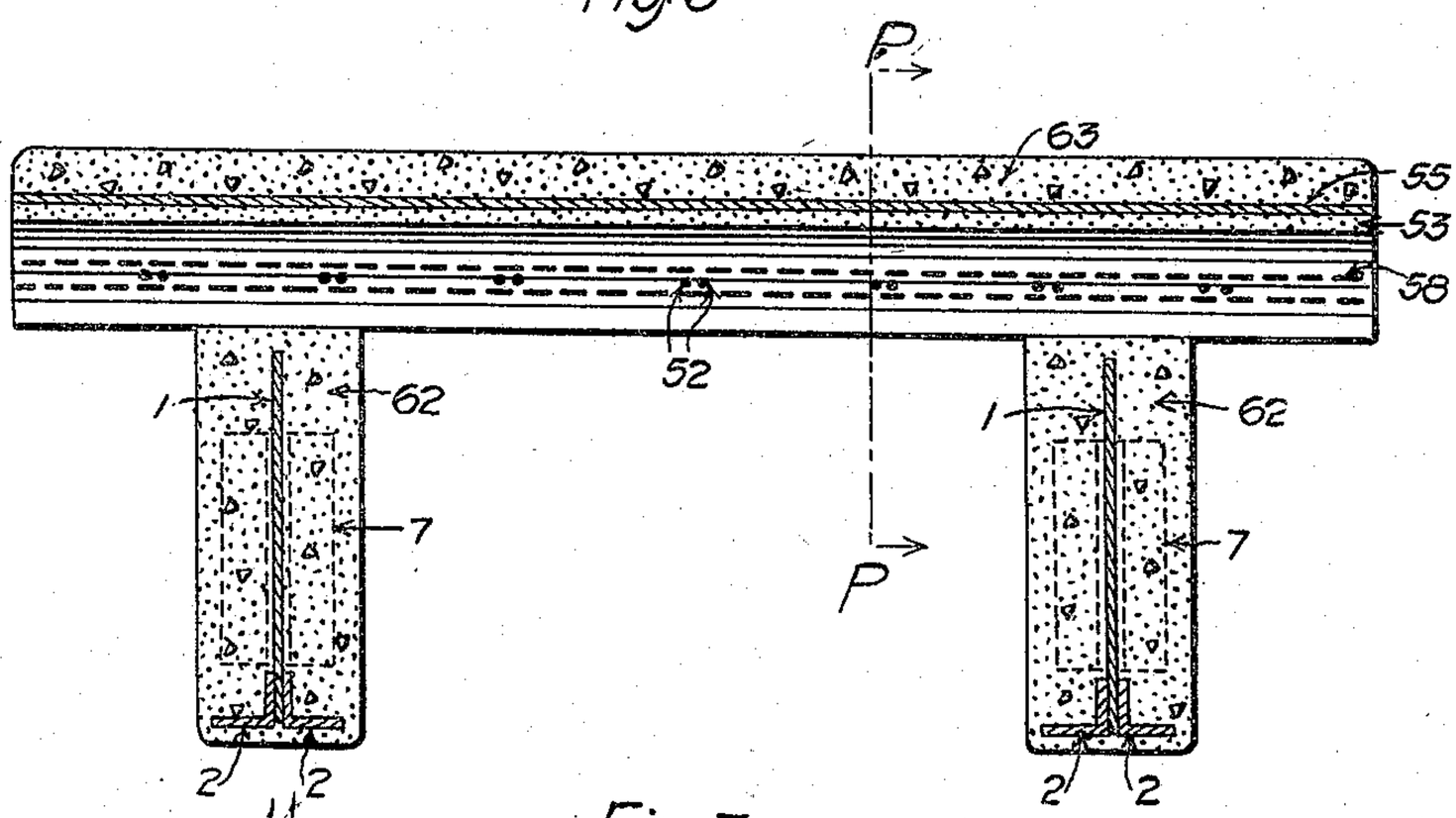

Fig. 7

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4 SHEETS—SHEET 3.

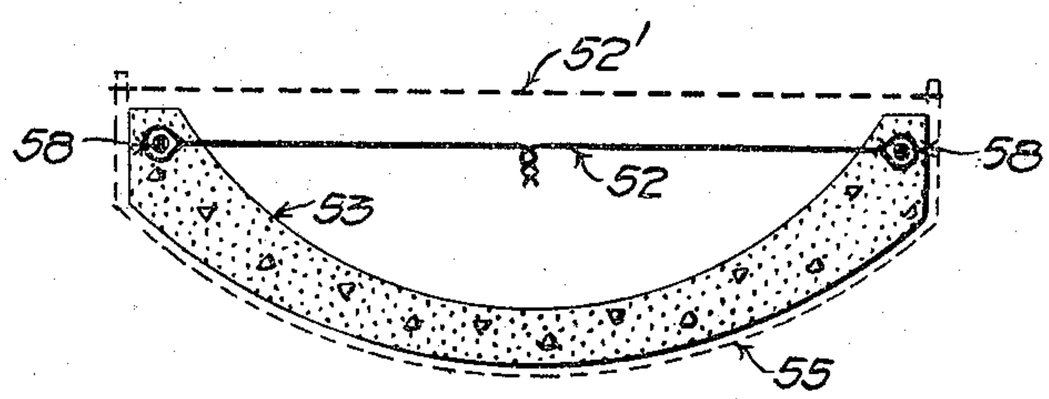

Fig. 8

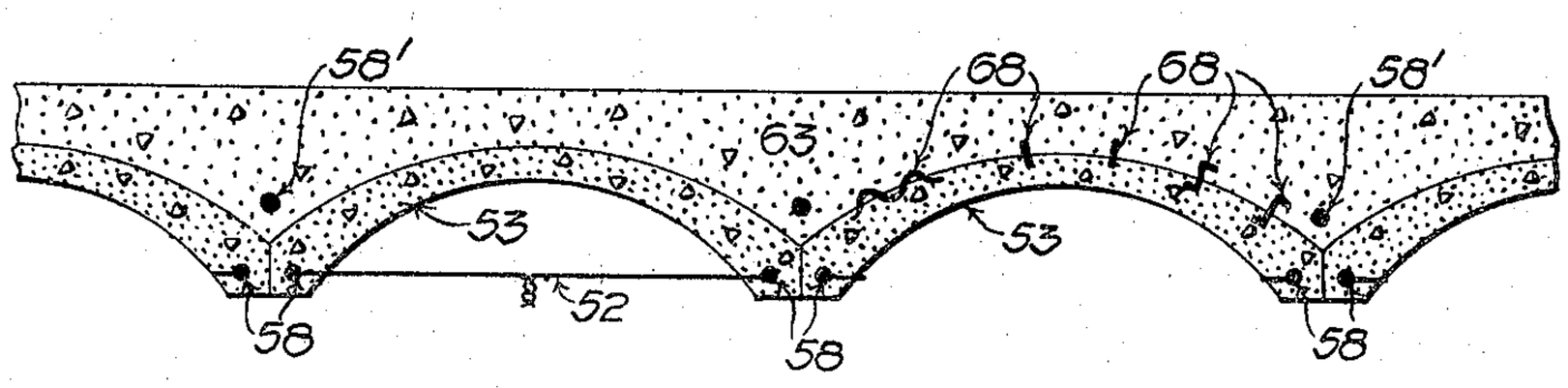

Fig. 9

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CONCRETE FLOOR.

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4 SHEETS—SHEET 4.

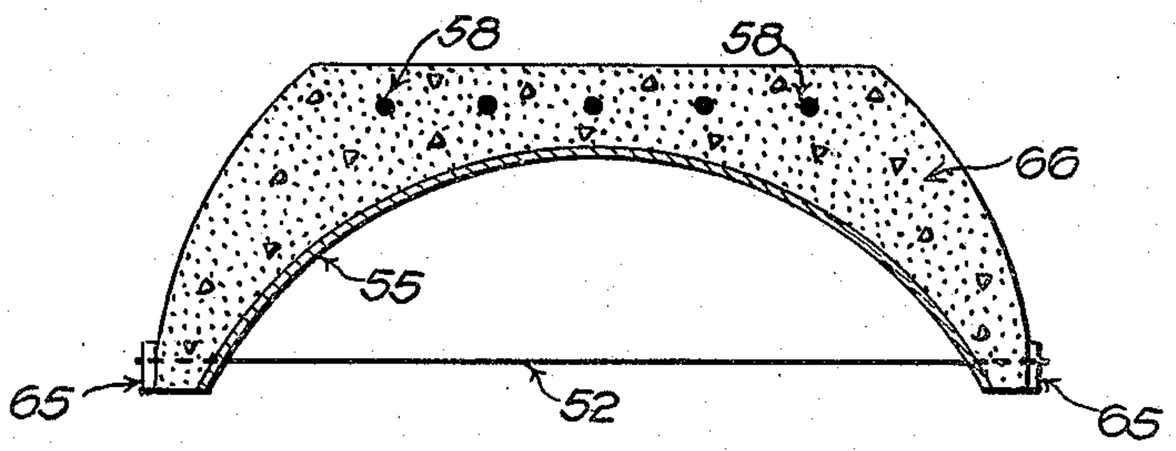

Fig. 10

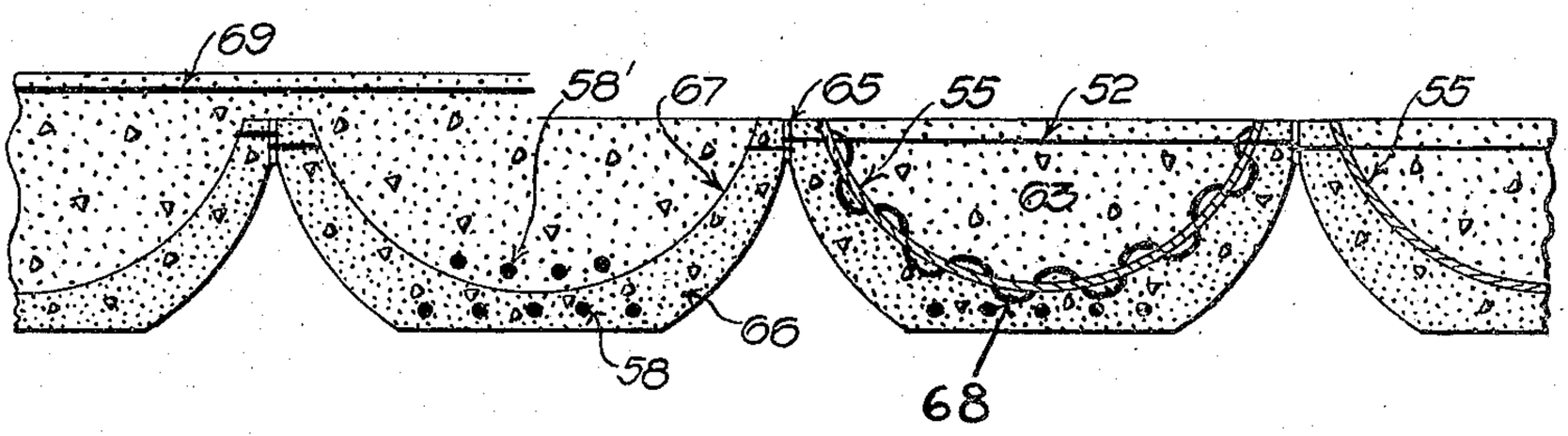

Fig. 11

WITNESSES:

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UNITED STATES PATENT OFFICE.

FRANK W. SKINNER, OF TOMPKINSVILLE, NEW YORK.

CONCRETE FLOOR.

No. 915,801. Specification of Letters Patent. Patented March 23, 1909.

Application filed May 25, 1908. Serial No. 434,973.

To all whom it may concern:

Be it known that I, FRANK W. SKINNER, a citizen of the United States, residing at No. 50 Sherman avenue, Tompkinsville, in the county of Richmond and State of New York, have invented a new and useful Concrete Floor, of which the following is a specification.

Heretofore the labor, cost and time of building concrete floors has been excessive on account of the necessity of providing temporary molds for them and of also providing falsework, centering or other temporary support to carry, during construction and for a short time afterward, a platform designed to eventually have ample strength to support itself and a superimposed load.

In arched floor slabs, previously constructed with continuous reinforcement it has been difficult or impossible to protect the under surface of the reinforcement metal from fire, corrosion, moisture etc. and when a continuous sheet of reinforcement metal is used it is difficult to bond it thoroughly with the concrete.

Concrete beams, girders, and floor slabs have been cast in molds on the ground and after hardening have been assembled in the structure, but this method is objectionable and expensive because it subjects them to severe and unnatural strains, involves the transportation and lifting of heavy members, is likely to injure them and does not provide a continuous, monolithic structure.

In my invention no temporary forms, falsework or centering is required, all reinforcement steel is entirely protected, the main body of concrete is monolithic, and successive bodies of concrete are perfectly bonded together, no heavy members have to be transported, and the floor is self-sustaining during construction.

Broadly, my invention consists of the construction of floor units, which may either form the slabs or the beams or both, with permanent self-supporting molds themselves made with a combination of the reinforcement steel and concrete, arranged to efficiently resist working stresses in the finished structure, to become integral elements of it, and to be self-supporting during construction, thus utilizing the tensile strength of the steel during the construction of the work instead of allowing it to lie dormant until after completion.

In a simple form of my invention, the whole or a part of the reinforcement steel required for the completed floor unit is designed as a thin, full length sheet of rolled steel or steel fabric, bent or curved to a trough shape cross section and covered with concrete on one surface. When the concrete has set it is light and strong and may easily be placed in the required position and receive the additional concrete and reinforcement steel, if any, necessary for the finished structure.

Figure 1 is a perspective view of the steel reinforcement for an arch floor unit with thrust ties, and with concrete protection for the concave surface. Figs. 2, 3, 4, and 5 are sectional details showing various methods of forming the concrete at the edge of the reinforcement plate and of combining concrete and plate with permanent steel bars adapted to strengthen the units during erection and to interlock with concrete afterward placed on the opposite side of the plate. Fig. 6 is a transverse sectional elevation at P P, Fig. 7, of a floor made with units like those of Figs. 1, 2, 3, 4, and 5, supported at intervals on reinforced concrete girders. Fig. 7 is a sectional elevation at V V, Fig. 6. Fig. 8 is a concrete unit detachable from the curved steel plate. Fig. 9 is a transverse section of a floor made with units like the one shown in Fig. 8. Fig. 10 is a cross section of a floor unit intended to be used with the convex side down. Fig. 11 is a transverse section of a floor made with units similar to that shown in Fig. 10.

In all figures the same or similar parts are designated by the same reference characters.

Fig. 1 shows a thin sheet of steel plate, expanded metal or other reinforcing material 55 bent to form a curved cross section and retained in that shape by wire ties 52, 52, which form chords of the arc. The wires pass through holes 51, 51 and are conveniently made and adjusted with two pieces with their ends twisted together as shown. The concave surface of the plate is covered with a thin layer of concrete or mortar 53, and when the latter has hardened the unit has sufficient strength to be safely handled and to support itself and the weight of wet floor concrete above when it is placed, concave side down, on supports at the ends. Obviously the edges of the plate may be made as here shown, or both long edges may be made like either of these, or they may be bent in any

convenient way or may have bolted to them detachable pieces to facilitate molding the concrete 53, in any special form. The ties, 52, 52, serve to resist the thrust and make the unit act independently as an arch, and also serve an important function in locking the concrete 53, to the plate 55.

In Fig. 2, the edge of the plate 55 is hooked at 54 to bond with the concrete to be placed on the convex side of the plate, an additional reinforcement bar 58, is placed in the concrete and a recess 59, is molded in it to receive concrete or grout between adjacent units.

In Fig. 3, an angle 56, is used for reinforcement to take tensile stresses in the finished floor and to bond together the concrete on the concave and convex sides of the curved plate 55. It also acts as a skewback for the arch plate

In Fig. 4 a channel bar 57, is used instead of the angle in Fig. 3, for permanent reinforcement, bearing, and bonding.

Fig. 5 shows adjacent units temporarily connected by a horizontal strip 60, attached to them by suspension wires 61 and forming a support for wet concrete between and above the curved plates 55, 55. The piece 60 is removable by cutting the wires 61, 61.

Figs. 6 and 7 show a complete floor made with units of slightly differing details illustrating the variations already described and supported on girders 62, 62 and covered with a monolithic continuous mass of concrete 63, joining the separate units together and leveling up the spaces above their convex surfaces to a uniform height. The separate units may be constructed at the site or at the contractors' yards and independently assembled in position parallel and adjacent to each other, but not depending in any way on each other for stability or strength, each being individually complete. Together they form a continuous platform on which boards may be laid temporarily for the distribution of wet concrete to form the upper surface of the floor connecting the units together. In calculating the strength and proportioning it, the finished structure may be considered as formed of T-shape beams, each one comprising all that part of the structure included between two longitudinal vertical planes V V, and V' V' through the centers of adjacent units. Additional reinforcement bars can be efficiently located between the units, as shown in Fig. 6 if necessary, and after the concrete 63 has set the ties 52, being no longer necessary may be allowed to remain until corroded, or may be cut out as shown at the right of Fig. 6.

Fig. 8 is a cross section of a portion of a floor unit from which the curved steel plate or fabric 55, indicated by dotted lines, has been removed, leaving the ties 52 and permanent reinforcement bars 58, 58. Temporary ties, 52' are used with the pieces 55 and removed with them. When conditions are such that it is desirable to concentrate all the permanent reinforcement in separate bars 58, 58, and omit the continuous reinforcement 55, the concrete 53 may be proportioned to have sufficient strength to act as a beam independently during construction and still be light and rigid enough to be handled easily and safely and support the weight of the concrete 63 on the upper side before it develops strength to be self sustaining.

Fig. 9 is a cross section through a finished floor made with units like that shown in Fig. 8. Additional reinforcement bars 58' 58', may be placed in the upper concrete 63 and the ties 52 52, may be cut out after the completion of the floor, as shown at the right of the figure, or they may be left in position as shown at the left, thus affording convenient attachment for a suspended ceiling or for other purposes. Steel rods or other bonding pieces of various forms 68 68, may be cast into the concrete 53 to lock it with the concrete 63, or the surface of contact between these different masses of concrete at 67, may receive special treatment, applied to the mass 53 after the removal of 55, Fig. 8, adapted to promote chemical or mechanical bonding between the old and new concrete, as it is well known can be effected by picking, or by the use of a special wash.

Fig. 10 is a transverse section of a floor unit in which the steel reinforcement sheet 55 is on the concave side of the concrete 66. If the unit is constructed with the concave side of the sheet down, as indicated, the concrete can be applied with a trowel without the use of any mold other than is formed by 55, and after the concrete has hardened and developed sufficient strength, the unit can be reversed and placed in the floor, concave side up, making a trough shape element adapted for a very heavy floor slab or for a beam or girder to support a lighter slab. Bearing plates 65 are provided to distribute the pressure of the ties 52, on the surface of the concrete. Obviously the sheets 55 may form either permanent or temporary portions of the finished floor unit, in the latter case the ties 52 may be cut or slots may be formed in the concrete to facilitate their removal without cutting.

Fig. 11 is a cross section of a floor composed of units like that shown in Fig. 10, placed concave side up and filled level with concrete 63. The concrete filling, 63, may be of the same or of a different mixture from that of 66, and it may terminate at the upper edge of 66, or may be made higher, as shown at the left hand of the figure, and be reinforced with bars 69, thus bonding the units together. The curved sheet 55 may be expanded metal, wire netting, or other fabric

adapted to bond with the concrete on both surfaces, or it may be provided with special bonding devices like the sinuous wires 68, engaging the concrete. If it is more advantageous for any given conditions, to have the permanent reinforcement all in the form of separate bars 58, 58′ etc. as at the left side of the figure, the curved sheet 55 may be removed and the concave surface of 66 may receive special chemical or mechanical treatment to improve its bond with the concrete filling 63.

I claim,

1. In a trough shape reinforced concrete floor unit, a long and relatively narrow sheet of metal curved in transverse section and covered, before erection, on one face with plastic material.

2. In a trough shape floor unit, a long and relatively narrow reinforcement sheet of metal curved in transverse section and covered, before erection, with plastic material on the concave face.

3. In a trough shape floor unit, the combination of a long and relatively narrow sheet of metal, curved in transverse section, transverse tie rods, and a layer of plastic material on one face of the curved sheet.

4. In a trough-shape floor unit the combination of a long and relatively narrow sheet of metal, curved in transverse section, a layer of plastic material on one of its faces, transverse tension members connecting the longitudinal edges of the trough, and longitudinal metal bars in the longitudinal edges of the trough.

5. A trough-shape concrete floor unit, cast before erection, reinforcement bars in the longitudinal edges with two flanges, one of which is embedded in the unit, and the other of which projects beyond the surface of the unit and is adapted to engage the concrete subsequently filled in between the units and bond it to the unit.

6. In a trough-shape floor unit the combination of a long and relatively narrow sheet of metal, curved in transverse section, a layer of plastic material on one face of the sheet and a longitudinal reinforcement angle bar in the edge of the unit engaging between its flanges the longitudinal edge of the curved sheet.

7. A trough-shape concrete floor unit, cast before erection, provided with longitudinal reinforcement bars in the longitudinal edges of the unit, and straight transverse tension rods connecting the longitudinal bars and forming chords of the arc of the transverse section of the unit.

8. In a concrete floor, the combination of concrete trough-shaped units cast before erection, with a concrete filling over and between the units, and longitudinal metal reinforcement bars with one flange embedded in the edge of the unit and the other flange embedded in the filling.

9. In a trough shape reinforced concrete floor unit, a long and relatively narrow sheet of metal fabric curved in transverse section, and covered, before erection, on one face with plastic material.

10. In a trough shape reinforced concrete floor unit, a long and relatively narrow sheet of expanded metal curved in transverse section and covered, before erection, on one face with plastic material.

11. In a trough shape reinforced concrete floor unit, the combination of a long and relatively narrow sheet of metal curved in transverse section, a layer of plastic material on one face of the curved sheet, and outwardly projecting flanges on the longitudinal edges of the unit.

May 9, 1908.

FRANK W. SKINNER.

Witnesses:

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HENRY I. COHEN.