ABSTRACT: For draining cast concrete a filter gauze is spread over the concrete surface and covered by a mat of flexible rubber or plastics. Draining passages are formed between the gauze and the mat and connected to collecting spaces provided at the outside of the mat. Outlet ports from said collecting spaces cooperate with a nozzle connected to a movable suction conduit and dimensioned to cover all said outlet ports when applied manually in correct position against the exterior of the mat.
DEVICE FOR DRAINING NEWLY CAST CONCRETE BY VACUUM TREATMENT

BACKGROUND OF THE INVENTION

A device for draining and compressing newly cast concrete by vacuum treatment is described in the U.S. Pat. No. 2,046,867. A filter gauze to be spread over the concrete surface is covered by a mat of flexible rubber, and draining passages formed between the gauze and the mat communicate with openings passing through the mat within a narrow bandlike area, said openings being then connected to suction means. Although not mentioned, the mat may of course also be made from flexible plastic material. This device known since more than 30 years probably functions satisfactorily, but nevertheless it has met with little interest, which may be explained by the expensive construction and a most tedious mounting and dismantling.

SUMMARY OF THE INVENTION

The object of the invention is to provide an improved device which eliminates said inconveniences. For that purpose, the openings communicating with the draining passage end in collecting spaces provided at the outside of the mat, and these spaces communicate in turn with outlet ports located within a restricted area of the mat. Further, a central section connected to a movable suction conduit is dimensioned to cover all the outlet ports when applied manually in correct position against the exterior of the mat. Because the mat is thus quite free from attached suction conduits, it can be stored and transported in the form of a roll which may, with a few simple manipulations, be rolled out over the newly cast concrete surface, whereupon the suction nozzle is applied and adheses to the area around the outlet ports. When the desired degree of draining has been reached, the nozzle may be released by closing a valve in the suction conduit, for instance, and the mat may then easily be moved on to another concrete surface cast meanwhile, whereupon the nozzle is again applied. In this way the work may be carried out rationally. The disposal of the collecting spaces above the mat makes it possible to use a cheap, fluted mat of a standard type.

In the known way, the bottom side of the mat may contain the draining passages open towards the filter gauze, but in a preferred embodiment said passages may be formed in a perforated web or sheet placed between the gauze and the mat. Such a sheet may consist of a wide-meshed net of rather coarse threads, preferably of metal or plastics. If a particularly well planed concrete surface is desired, the sheet may consist of a rather rigid and perforated sheet of rubber or plastics fluted on the underside. The sheet can be divided into a plurality of sections which are placed one beside the other so that together they cover the concrete surface to be drained in one operation. Preferably the gauze is attached to the various sections so that it is spread out simultaneously therewith. If wire nets are used, their edge portions may be caused to overlap each other slightly. The cover mat is made of one piece and may to advantage consist of a thin and smooth cloth of rubber or plastics preferably reinforced by fabric. As such a mat may be given a comparatively light weight, it may be dimensioned such that a rather large concrete surface (30-40 sq.m.) may be drained in one operation. The thin plastic cloth may conveniently be rolled up on one or two rods so that even in large dimensions it can be easily handled by two workmen.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in more detail with reference to the accompanying drawings which show three embodiments.

FIG. 1 shows a perspective view of one embodiment;
FIG. 2 is a perspective view of the mat on a larger scale with some parts broken up;
FIG. 3 shows an end view of the suction nozzle;
FIG. 4 shows a perspective view of another embodiment, partly broken up; and
FIG. 5 shows a perspective view of a third embodiment, likewise partly broken up.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

In FIGS. 1 and 2, a rather dense gauze 5 of metal wire or textile material, preferably nylon or a similar synthetic material, is spread over a rectangular concrete surface 6, and the gauze is covered by a rubber mat 7 projecting outside the gauze 5 at all four edges so that it can be sucked into sealing contact with the concrete surface. The mat 7 is provided with longitudinal flutes 8 on the side facing the gauze, and as shown at 9 in FIG. 1, such flutes 8 may be closed at the short sides of the mat, although this is not always necessary. Preferably, the edges of the gauze 5 are in some way releasably secured to the mat 7 so that the mat and the gauze may be applied as a unit.

The flutes 8 communicate with the top side of the mat by holes 10 provided in zigzag along a transverse central section in such a way that the mat is not unduly weakened. The holes are covered by a strip 11 of highly porous material, preferably a wide-meshed net, and this strip is, in turn, covered by a rubber ribbon 12 of greater length and width. The edge portions of said ribbon 12 are cemented to the mat 7 all around. The ribbon 12 in involves a desirable reinforcement of the middle section of the mat weakened by the holes 10. Within a limited central area the ribbon 12 has a number of closely spaced slits 13 which thus communicate with all the flutes 8 at the bottom side of the mat.

To evacuate the flutes 8, a suction nozzle is placed over the area having the slits 13. In FIG. 1, a nozzle 14 is shown in a position above the slits. In the embodiment shown, the nozzle consists of a box secured to and communicating with one end of a rigid handle tube 15 containing a shutoff valve 16. The other end of the tube is connected by a hose, not shown, to a source of vacuum, likewise not shown, preferably over a water collecting tank. The wall of the nozzle box facing away from the tube 15 is provided with a great number of perforations 17 (FIG. 3) and is, moreover, widened to form a flange 18 serving as support for a collarlike cloth 19 of rubber or plastic slipped on and projecting from the flange. When the nozzle 14 is placed over the slits 13, the edge portions of the rubber cloth 19 are sucked onto the underlying ribbon 12 to form a leak-proof coupling.

In the embodiment in FIG. 4, the gauze cloth 5 and the rubber mat 7 are of the same kind as described, but the porous strip 11 and the smooth cover ribbon 12 are replaced by a rubber ribbon 20 cemented to the mat along its edges. The lower side of the ribbon 20 is provided with longitudinal flutes 21 closed at both ends, as shown at 22, and communicating with the holes 10 in the mat 7. A central portion of the ribbon 20 is provided with longitudinal slits 23 adapted to cooperate with the nozzle 14 described.

In the embodiment in FIG. 5, the gauze 5 has its edges secured to one side of a wide-meshed net 24 made of metal or plastics and dimensioned such that passageways of sufficient cross section area are formed between the crossed wires. As an example it may be mentioned that the wire thickness may be about 1 mm., while the size of the mesh may be 2-3 mm. Wire nets of this kind are obtainable commercially in a width of 1.5 m., and in the embodiment shown three wire net sections 24 with attached gauze are laid over the concrete surface 6 in such a way that their longitudinal edges overlap. The wire nets 24 are covered by a smooth cloth 25 of rubber or plastics, preferably reinforce by fabric. The cloth 25 may have a thickness of 0.5-1 mm., and as appears from FIG. 5, it is dimensioned such that its edge portions project slightly outside the wire nets 24.

In the same way as in the embodiments described previously, the cloth 25 is provided with holes 26 within a narrow central section, and said holes are covered by a strip 11 of highly porous material, preferably a wide-meshed net. The
strip 11 is, in turn, covered by the ribbon 12, the edge portions of which are cemented to the cloth 25. Slit-shaped openings 13 in the ribbon 12 communicate with the passages formed by the wire nets 24 between the gauze 5 and the mat 25. The suction nozzle 14 is of the same kind as that described in the previous embodiments.

As indicated above, the device described involves a substantial simplification of the draining operation. In the embodiments in FIGS. 1–4, the mat and the attached gauze may initially be in the form of a roll which need only be rolled out over the concrete surface, whereupon the nozzle connected to the source of vacuum is applied manually. When using the embodiment in FIG. 5, the sheets with attached gauze are laid over the concrete surface, and the thin cloth initially on a roll is rolled out to cover all the sheets, whereupon the nozzle is applied. The device has proved to operate effectively, and at a pressure of about 0.1–0.3 atm., for instance, a draining period of 1 minute per cm. of the thickness of the concrete is generally quite sufficient to make the concrete hard enough to carry a man without any risk of impressions.

I claim:

1. Means for draining newly cast concrete by a vacuum treatment, comprising a filter gauze to be spread over the concrete surface, a mat of flexible material covering said gauze, draining passages between said gauze and said mat, a porous strip located at the outside of said mat having collecting spaces, said mat having openings in a narrow bandlike area connecting said draining passages to said collecting spaces, a cover ribbon covering said porous strip sealed to said mat outside the edges of said strip, said cover ribbon having outlet ports from said collecting spaces located within a restricted area of said cover ribbon, and a nozzle covering said outlet ports connected to a suction conduit.

2. Means as set forth in claim 1 wherein said flexible material is rubber.

3. Means as claimed in claim 1 in which a net is inserted between said filter gauze and said mat.

4. Means as claimed in claim 1, in which said porous strip is a net inserted between said mat and said cover ribbon.

5. Means as claimed in claim 1 in which said draining passages consist of flutes formed in the underside of said mat.

6. Means as claimed in claim 1 in which said nozzle is surrounded by a rubber or plastic collar to be sucked into seating contact with said cover ribbon around said outlet ports.

7. Means as claimed in claim 1 in which said draining passages is formed by a perforated sheet placed between said gauze and said mat.