United States Patent [19]

Sontag

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[45] **Sept. 24, 1974**

[54] **DEVICE FOR STRIPPING FORMS FROM CAST CONCRETE STRUCTURES**

[76] Inventor: **John Sontag,** 7438 18th Ave., Burnaby, B. C., Canada

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[21] Appl. No.: **342,791**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 204,654, Jan. 31, 1972, abandoned.

[52] **U.S. Cl.** **249/66,** 249/205

[51] **Int. Cl.** **B28b 7/10**

[58] **Field of Search** ..... 249/66, 66 C, 205, 217

[56] **References Cited**

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Primary Examiner—Robert D. Baldwin

Attorney, Agent, or Firm—Fetherstonhaugh & Co.

[57] **ABSTRACT**

A device having an apertured reaction plate for engagement against the concrete forming face of a concrete form, and a hollow bushing extending coaxially from the reaction plate for engagement through a hole in the form. A plug is provided for the aperture to prevent ingress of concrete and means such as a bolt or a hydraulic or pneumatic ram are provided for exerting a force through the hollow bushing and plug against the concrete to effect separation of the form from the concrete.

10 Claims, 10 Drawing Figures

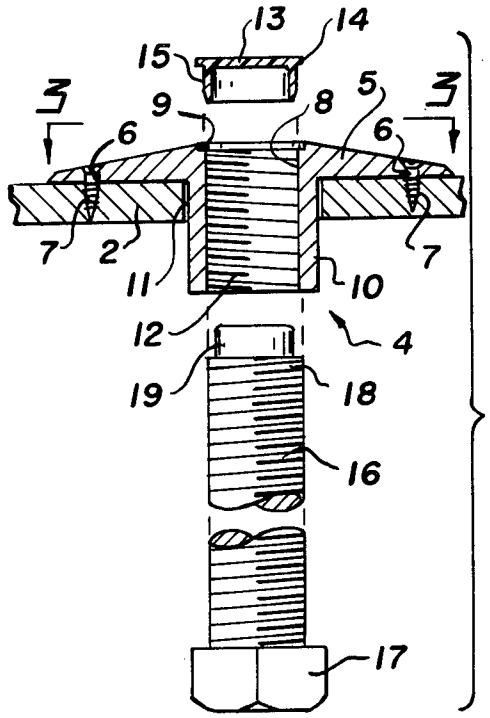


Fig. 1.

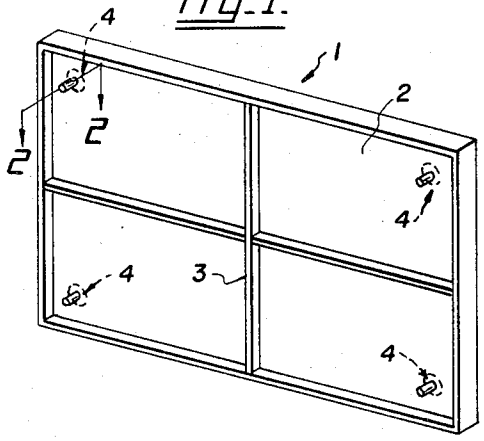
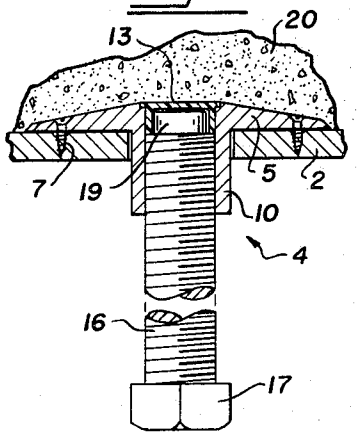


Fig. 4.



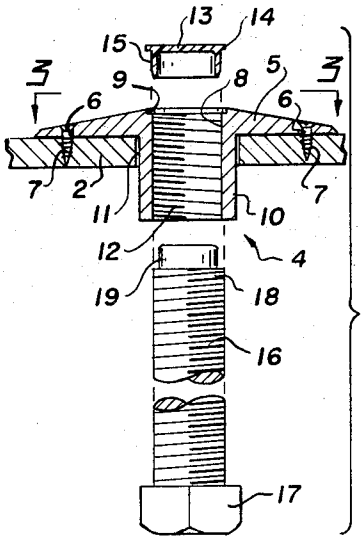


Fig. 2.

Fig. 5.

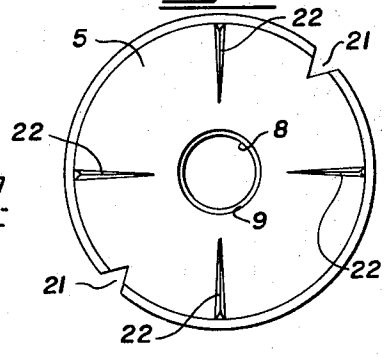
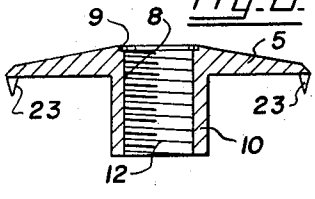


Fig. 6.



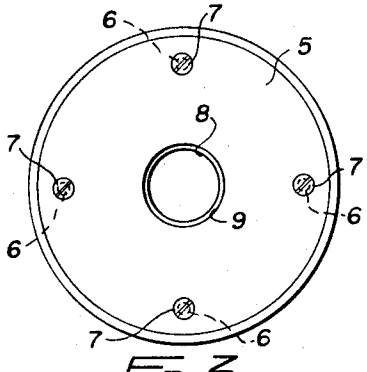


Fig. 3.

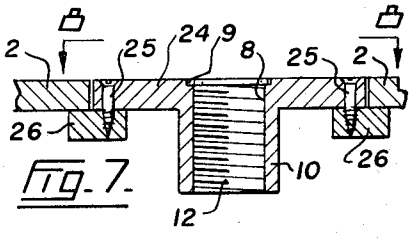


Fig. 7.

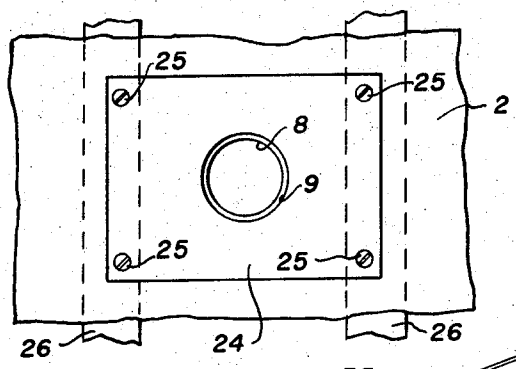


Fig. 8.

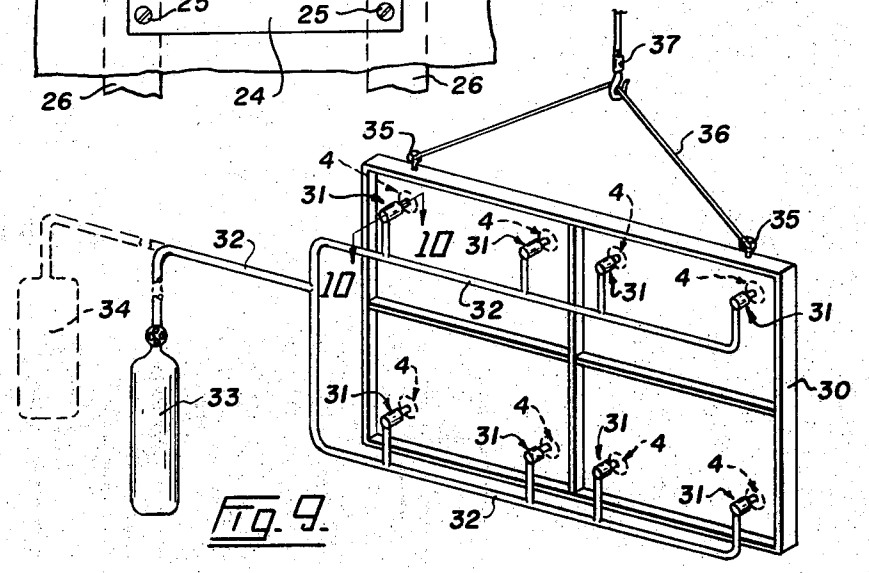


Fig. 9.

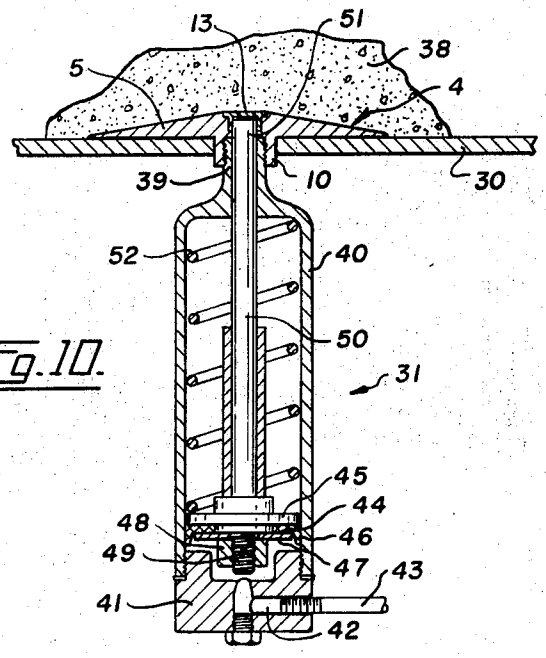


Fig. 10.

DEVICE FOR STRIPPING FORMS FROM CAST CONCRETE STRUCTURES

This application is a continuation-in-part of application Ser. No. 204,654 filed Jan. 31, 1972, now abandoned.

The invention relates to devices for use with concrete forms in stripping the forms from cast and set concrete structures.

Concrete forms are generally constructed from heavy gauge plywood sheets secured to a frame for bracing purposes. After concrete has been poured into the mould assembled from such forms and the concrete has set into a structure, it is sometimes very difficult to break the adhesion between the form and the set concrete surface. It is frequently necessary to resort to the use of levers or cold chisels at the edge of the form and this causes considerable damage both to the form and to the cast concrete. In addition, and particularly where a high building is concerned, it is frequently necessary for the constructors to work in exposed and precarious positions in order to obtain the necessary access to the form.

It is among the objects of the present invention to provide a device for incorporation in a form, whereby the form may be released from a concrete structure cast against it without difficulty or danger.

The invention therefore provides a device for use with a concrete form in stripping the form from a cast and set concrete structure, said device comprising an apertured reaction plate for engagement against the concrete forming face of the form, and a hollow bushing extending coaxially from the aperture in the reaction plate for engagement through a cooperatively formed hole in the form, said hollow bushing including means for engagement with an actuating unit having a ram head drivable through said bushing, whereby a form incorporating said device can be separated from a concrete structure cast thereagainst by engaging an actuating unit with said hollow bushing and driving the ram head thereof through the bushing to exert pressure on the concrete structure.

The invention will now be further described with reference to the accompanying drawings in which

FIG. 1 is a perspective view of a form incorporating devices according to the invention,

FIG. 2 is a sectional exploded view on the line 2—2 of FIG. 1 showing a device according to the invention,

FIG. 3 is an elevation on the line 3—3 of FIG. 2,

FIG. 4 is a view similar to FIG. 2 with the components in an assembled condition and showing the form engaged against a concrete structure,

FIG. 5 is a view similar to FIG. 3 but showing the configuration of a second embodiment,

FIG. 6 is a sectional elevation showing a third embodiment,

FIG. 7 is a sectional elevation showing a fourth embodiment,

FIG. 8 is a view on the line 8-8 of FIG. 7,

FIG. 9 is a perspective view showing a form incorporating a number of devices according to the invention connected up for simultaneous operation, and

FIG. 10 is a sectional elevation on the line 10—10 of FIG. 9.

Referring first to FIG. 1 of the drawings, this shows a form 1 including a main panel 2, the non-visible face

of which constitutes the concrete forming face. The rear of the panel 2 is braced by a frame 3. Four devices 4 are provided in the panel 1 as shown for facilitating removal of the form 1 from a concrete structure cast thereagainst.

Turning now to FIGS. 2, 3 and 4, each device 4 comprises a reaction plate 5 in the form of a flange having four holes 6 therein for the passage of screws 7. The plate 5 is centrally apertured at 8 and formed with a peripheral recess 9 surrounding the aperture. A hollow bushing 10 extends rearwardly from the aperture 8 through a hole 11 formed in the panel 2 and is internally threaded as shown at 12.

A plug 13 of plastics material having a flange 14 is engageable in the recess 8 by means of a smooth hollow cylindrical portion 15. When so engaged, the flange 14 seats in the recess 9 so that the upper surface of the plug 13 is substantially flush with the upper surface of the plate 5.

A bolt 16 having a head 17 is engageable in the bushing 10. The leading end 18 of the bolt 16 is formed with a ram head 19 which is dimensioned for engagement within the cylindrical portion 15 of the plug 13.

FIG. 4 shows the components of FIGS. 2 and 3 in the assembled condition with a concrete structure 20 cast against the panel 2 and plate 5. It will be appreciated that rotation of the bolt 16 in the bushing 10 will cause the ram head 19 to drive the plug 13 against the concrete, thus effecting separation of the device 4 and the panel 2 from the concrete structure 20. The screws 7 prevent rotation of the plate 5 during the rotation of the bolt 16 so as to ensure that relative axial movement can be effected.

FIG. 5 shows an embodiment in which V notches 21 are provided in the periphery of the plate 5 instead of the holes 6. Nails or screws are engaged through the notches 21 with the panel 2 so as to prevent rotation of the plate 5. Also, as shown in FIG. 5, ribs 22 may be cast into the upper surface of the plate 5 so that they bed into the concrete as it sets. The ribs 22 will then serve to prevent rotation of the plate 5 until separation from the concrete has been effected by the movement of the bolt 16.

FIG. 6 shows a third embodiment in which pins 23 are cast into the underside of the plate 5 so that they bed into the panel 2 to prevent rotation of the plate.

FIG. 7 and 8 show an embodiment in which a rectangular reaction plate 24 is recessed into the panel 2 so that the upper surfaces of the plate 24 and the panel are flush. Due to the non-circular configuration of the plate 24, rotation of the plate is prevented. The plate is secured to the panel by means of screws 25, which extend into bracing elements 26 extending across and secured to the rear of the panel 2.

FIGS. 9 and 10 show a system whereby a form may be relased from cast concrete by the simultaneous use of a number of devices 4 mounted in the form. The system shown lends itself to remote operation so that constructors are not required to work in precarious positions as was previously necessary.

The arrangement shown in FIG. 9 comprises a form 30 having a number of devices 4 mounted therein, each device 4 having an air cylinder unit 31 engaged therewith. All of the air cylinder units 31 are identical and one is described below with reference to FIG. 1. The air cylinder units 31 are connected to a common air line 32 which is in turn connected to a source of com-

pressed air **33** such as a compressed air bottle. It will be appreciated that the air cylinder units **31** may equally be operated as hydraulic cylinders to which hydraulic fluid could be fed from a pump **34** as shown in broken lines. The form **30** is provided with eye bolts **35** so that it may be supported by a sling **36** from a crane hook **37** when being released from the concrete.

FIG. **10** is a cross-section through one of the air cylinder units **31** when in engagement with a device **4.** The device **4** is shown with its reaction plate **5** trapped between the form **30** and the cast concrete mass **38.** The hollow bushing **10** has a threaded open-ended neck **39** of a cylinder **40** engaged therewith. The other end of the cylinder has a screw-threaded plug **41** engaged therein, the plug **41** defining an air passage **42** from an air inlet **43.**

Within the air cylinder **40,** a piston **44** is movable. The piston **44** comprises a flange **45** against the underside of which a neoprene gasket **46** is trapped by a washer **47.** The washer **47** is held in place by a nut **48** engaging on a stud **49** extending form the flange **45.** A rigid piston rod **50** extends from the other side of the flange **45** and through the neck **39** into engagement with the plug **13** of plastics material forming part of the device **4.** The end **51** of the piston rod **50** serves as a ram head. A coil spring **52** is located within the cylinder **40** between the flange **45** and the end of the cylinder for retracting the piston and piston rod when air pressure is released through the inlet **43.**

When it is desired to release a form **30** from a cast concrete structure, the form is first supported from a crane hook **37** by means of a sling **36** and eye bolts **35.** With the air cylinder units connected up as shown in FIG. **9,** they are then pressurized to drive the piston rods **50** through the hollow bushings **10** and simultaneously exert pressure on the concrete **38.** As soon as release has been effected, the form can be quickly removed by the crane.

I claim:

1. A device for use with a concrete form in stripping the form from a cast and set concrete structure, said device comprising

an apertured reaction plate for engagement against the concrete forming face of the form, said plate having a large under surface to bear against a large area of said form face and a large outer surface to bear against the concrete,

a hollow bushing extending coaxially from the aperture in the reaction plate to extend through a cooperatively formed hole in the form,

an actuating unit engageable with the hollow bushing and having a ram head drivable through said bushing,

a plug removably fitting in the plate aperture at the outer surface of the plate and completely closing the aperture, said plug having a hollow cylindrical portion extending into the bushing away from the outer surface of the plate and into which said actuating unit movably fits, and

engagement means within the bushing for connecting the actuating means to the bushing,

whereby a form incorporating said device can be separated from a concrete structure cast thereagainst by engaging an actuating unit with said hollow bushing and driving the ram head thereof through the bushing to exert pressure on the concrete structure.

2. A device as claimed in claim **1,** wherein said reaction plate is formed with holes for the passage of fastening means into the form, whereby rotation of the device relative to the form can be prevented.

3. A device as claimed in claim **1,** wherein said reaction plate is formed with peripheral notches for the passage of fastening means into the form, whereby rotation of the device relative to the form can be prevented.

4. A device as claimed in claim **1,** wherein the outer surface of the reaction plate is dome-shaped and said reaction plate is formed with projections on said outer surface for contact with the concrete during casting whereby rotation of the plate is prevented.

5. A device as claimed in claim **1,** wherein the reaction plate includes retainer pins on the surface for engagement with the form, whereby said pins can be driven into the form to prevent rotation of the plate.

6. A device as claimed in claim **1,** wherein the reaction plate is of non circular configuration for recessing into flush relation with the concrete forming surface of the form to prevent rotation of the device.

7. A device as claimed in claim **1,** and further comprising a flange on said plug for engagement in the aperture in said reaction plate to prevent the ingress of concrete into said hollow bushing during pouring.

8. A device as claimed in claim **7,** wherein said reaction plate is formed with a peripheral recess around said aperture for cooperating engagement with the flange of the plug, whereby the surface of a plug engaged in the aperture is substantially flush with the surface of the plate.

9. A device as claimed in claim **1,** wherein said engagement means comprises an internal thread formed in said bushing, and wherein said actuating unit comprises a threaded bolt engageable in said hollow bushing with the leading end of the bolt constituting said ram head.

10. A device as claimed in claim **1,** wherein said engagement means comprises an internal thread formed in said bushing, said actuating unit comprises a cylinder having an externally screw threaded and open ended neck at one end for screwed engagement with the hollow bushing and an inlet for a pressure fluid at the other end, a piston movable within the cylinder, and a piston rod extending from said cylinder and through said neck, the end of the piston rod constituting said ram head.

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