May 31, 1960 R. R. OAKDEN 2,938,255

CASTING OF REINFORCED CONCRETE BEAMS

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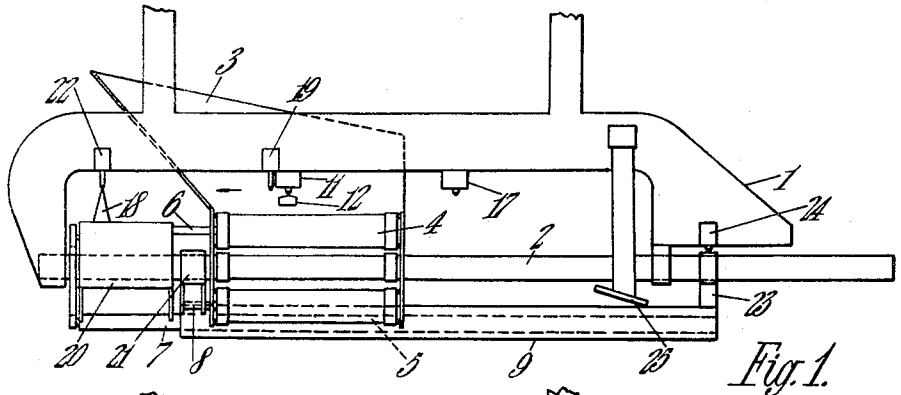

Fig. 1.

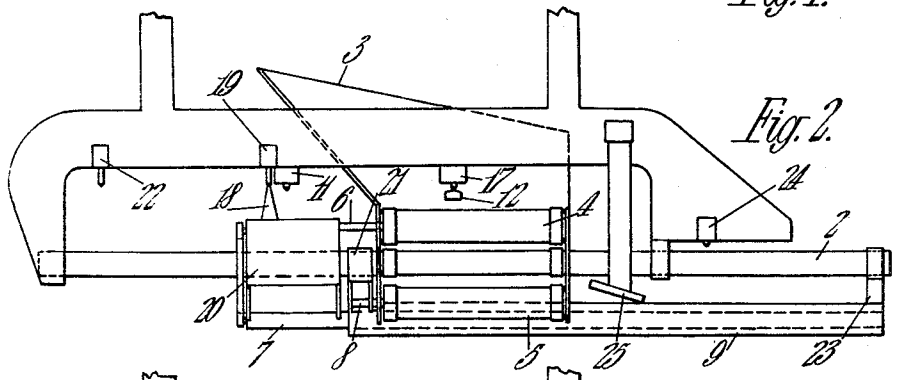

Fig. 2.

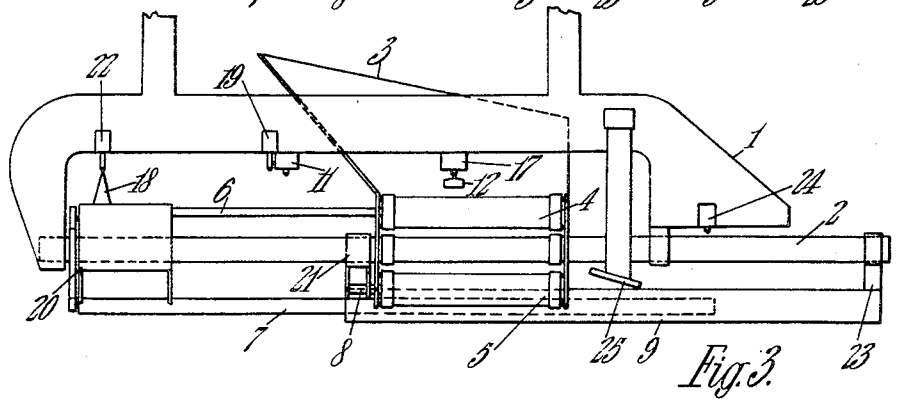

Fig. 3.

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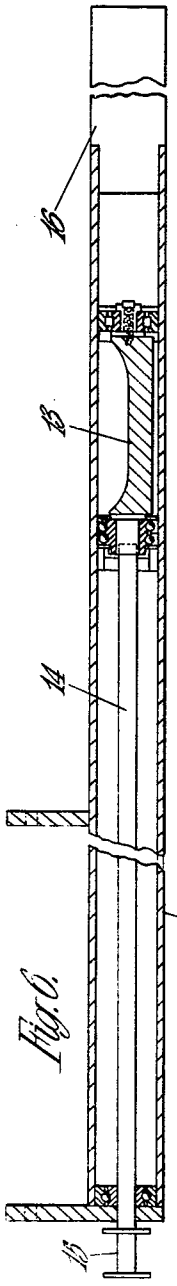

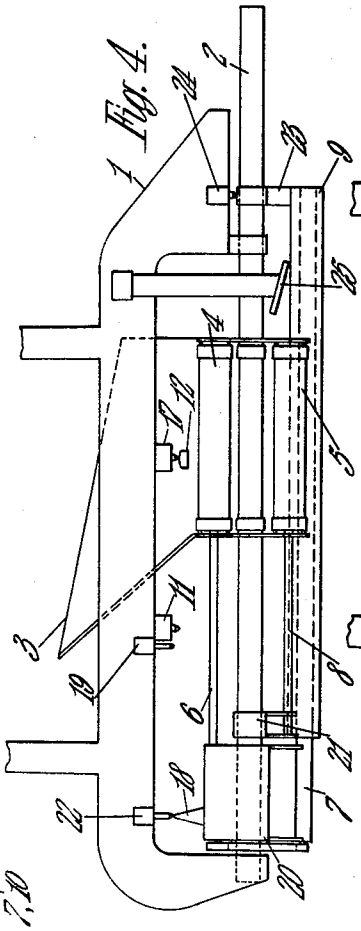

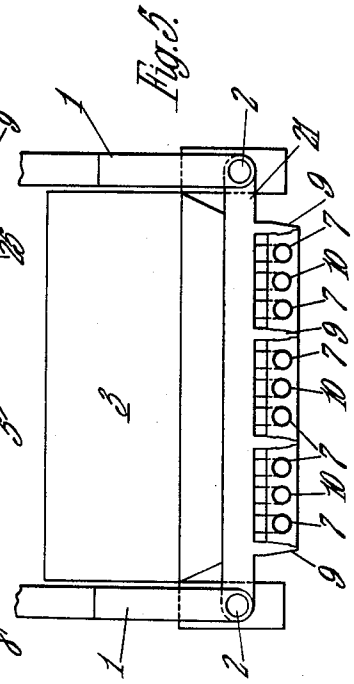

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CASTING OF REINFORCED CONCRETE BEAMS

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2 Claims. (Cl. 25—41)

This invention relates to the production, by a substantially continuous process, of reinforced concrete beams, the object of the invention being to speed up the process.

In accordance with the invention, I provide automatic means for controlling in alternation the operations of feeding and of consolidating the concrete by vibration and the movement of the moulding section.

In one convenient application of the invention the concrete is consolidated by vibration, the concrete being of a no slump or relatively dry type which will stand before the cement sets, due to the low water-cement ratio. Whilst vibration proceeds, the concrete is plastic and the mould in which the beam is cast cannot be moved without dragging the concrete with it. I therefore control the periods of vibration and mould movement so that the mould is stationary during periods of vibration, and vibration is stopped during movement of the mould.

Where a beam has longitudinal passages formed therein to reduce weight, the or some of the cores may be vibrated where they extend into the concrete and there are flexible extensions of the cores, such as inflated rubber tubes, which are attached to the cores to prevent any collapse of the beam immediately behind the cores as they are withdrawn from the beam section which has been cast and vibrated. If desired the side walls of the mould may be vibrated. When the side walls of the mould are vibrated, they are extended with a rubber form to support the concrete beam for a sufficient length to isolate the part already cast from the vibration.

By controlling and alternating the periods of vibration and mould advance, we are enabled to speed up production. The controls may be electrical and regulate motors operating the vibrator and the mould movements.

Referring to the accompanying drawings:

Figures 1 to 4 are side views of a machine for casting three beams at once in accordance with the invention, the various carriages being shown in a sequence of positions.

Figure 5 is a cross-sectional view and

Figure 6 shows the means of operation of the vibrators.

The machine shown comprises a frame **1** carried on a gantry (not shown) which runs on rails arranged either side of the beams to be cast. Carried on the frame are two horizontal rods **2** from which are slidably supported three carriages. One of the carriages comprises a hopper **3** having an upper pneumatic cylinder **4** and lower pneumatic cylinder **5** on either side. The pistons of the cylinders **4** are connected via rods **6** to a carriage **20** which supports two tubes **7** (see Figure 5) out of three which provide passages in each beam to reduce the weight, and are vibrated by out of balance weights.

The pistons in the lower cylinders **5** are connected via rods **8** to a carriage **21** which supports the sides **9** of the moulds and the tubes **10** for the central weight-reducing passage.

In the casting of pre-stressed concrete beams a plurality of wires are stretched to the desired tension along

the run of the beams and the gantry is positioned at one end, the various carriages being arranged as shown in Figure 1. A large hopper (not shown) carried above frame **1** is filled with no-slump or relatively dry concrete which will stand up before the cement sets due to the low water-cement ratio. By means of a paddle wheel to the large hopper a predetermined quantity of concrete is discharged into hopper **3** for each quarter turn of the paddle the operation of which is initialled by a switch **11** mounted on frame **1** and actuated by a projection **12** on hopper **3**. The paddle automatically stops after each quarter turn. Hopper **3** guides the concrete so that it covers the immediate area to be cast.

Switch **11** also initiates two other operations, namely (I) the movement (to the left in the drawings) of the gantry and frame **1** leaving the various carriages behind and (II) the vibrating action which is produced by rotation of an eccentric weight **13** (see Figure 6) in each of the tubes **7** and **10**. The weight **13** is carried at the end of a journalled shaft **14** having a pulley **15** which is belt driven. To prevent collapse of the passage when the tubes are withdrawn they are each provided with a flexible extension **16**. Thus vibration of the concrete takes place whilst the mould and tubes are stationary but the frame **1** is moving forward, the vibration and the frame movement being stopped when a stop switch **17** carried by frame **1** contacts projection **12**. This position is shown in Figure 2.

At the same time as stop switch **17** is operated, a projection **18** on the carriage **20** operates a pneumatic switch **19** which causes compressed air to be admitted to the two upper cylinders **4** so that carriage **20** moves forward on slide rods **2** taking tubes **7** with it. At the end of the stroke, as shown in Figure 3, projection **18** contacts another pneumatic switch **22** which causes compressed air to be admitted to the two lower cylinders **5** so that carriage **20** moves forward on slide rods **2** taking tubes **10** and the mould sides **9** with it. At the end of the stroke, as shown in Figure 4, a member **23** of carriage **21** contacts a pneumatic switch **24** which causes compressed air to be admitted to the other sides of the pistons in both the cylinders **4** and the cylinders **5** so that the carriage comprising the hopper **3** and the cylinders is drawn forward ready to receive a further charge of concrete. This sequence of movements of the frame and various carriages continues until the desired length of the three side-by-side beams is cast.

It is to be noted that the vibration is applied only when the carriages carrying the mould sides and the tubes are stationary, i.e. when frame **1** is moving forward. A transversely operating screeding board **25** is carried on frame **1** and operates as the frame is moving.

After the beams have set sufficiently to handle they are cut into shorter lengths using a diamond abrasive cutting wheel.

What I claim is:

1. In a machine for producing concrete beams having weight reducing passages therein, a frame adapted to be carried by a gantry over a desired run of the beams, a first carriage means supported by said frame for movement relative to the frame, a mold carried by said first carriage means, a first set of passage-forming tubes attached to said first carriage means located within said mold, a second carriage means supported by said frame on one side of said first carriage means for movement relative to said frame and first carriage means, a second set of passage-forming tubes secured to said second carriage means extending into said mold, a third carriage means supported by said frame on the opposite side of said first carriage means for movement relative to the frame and said first and second carriage means, hopper means carried by said third carriage means for supplying

concrete to said mold, upper and lower sets of fluid pressure operated cylinder and piston assemblies carried by said third carriage means, the pistons of one of said sets being operably connected to said first carriage means and operative to move said first carriage means relative to the frame for advancing the mold and first set of passage-forming tubes along the desired run, the pistons of the other of said sets of cylinder and piston assemblies being operably connnected to said second carriage means for moving said second carriage means relative to the frame for advancing the second set of passage-forming tubes along the desired run, both of said sets of cylinder and piston assemblies cooperating to move said third carriage means relative to said frame for advancing the hopper along the desired run, vibratory means mounted in at least one of said sets of passage-forming tubes operative upon vibration to consolidate the concrete in the mold, and switch means operably associated with each of said carriage means and operable according to the positions of said carriage means relative to said frame for controlling said vibratory means and the supply of fluid pressure to said cylinder and piston assemblies for sequentially advancing the carriage means and rendering operative the vibratory means so that no vibration is applied to the concrete in the mold when any of the carriage means is moved relative to the frame.

2. In a machine for producing concrete beams having weight reducing passages therein, a frame adapted to be carried by a gantry over a desired run of the beams, a first carriage means supported by said frame for movement relative to the frame, a mold carried by said first carriage means, a first set of passage-forming tubes attached to said first carriage means located within said mold, a second carriage means supported by said frame on one side of said first carriage means for movement relative to said frame and first carriage means, a second set of passage-forming tubes secured to said second carriage means extending into said mold, a third carriage means supported by said frame on the opposite side of said first carriage means for movement relative to the frame and said first and second carriage means, hopper means carried by said third carriage means for supplying concrete to said mold, upper and lower sets of pneumatic

cylinder and piston assemblies carried by said third carriage means, the pistons of one of said sets being operably connected to said first carriage means and operative to move said first carriage means relative to the frame for advancing the mold and first set of passage-forming tubes along the desired run, the pistons of the other of said sets of cylinder and piston assemblies being operably connected to said second carriage means for moving said second carriage means relative to the frame for advancing the second set of passage-forming tubes along the desired run, both of said sets of cylinder and piston assemblies cooperating to move said third carriage means relative to said frame for advancing the hopper along the desired run, vibratory means mounted in at least one of said sets of passage-forming tubes operative upon vibration to consolidate the concrete in the mold, and switch means operably associated with each of said carriage means and operable according to the positions of said carriage means relative to said frame for controlling said vibratory means and the supply of air pressure to said cylinder and piston assemblies for sequentially advancing the carriage means and rendering operative the vibratory means so that no vibration is applied to the concrete in the mold when any of the carriage means is moved relative to the frame.

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