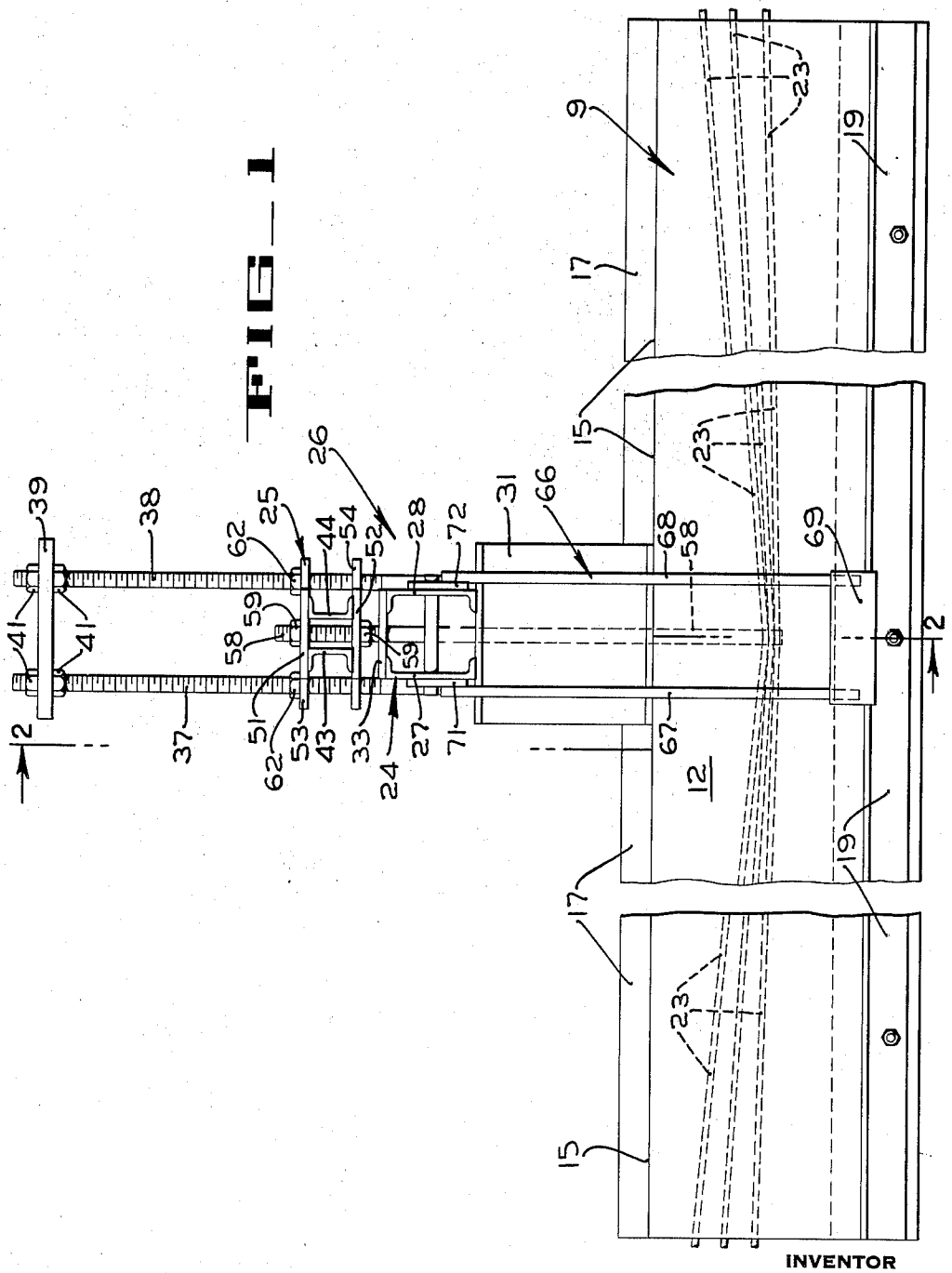
Nov. 1, 1960 R. R. HARTUP 2,958,507

CABLE HOLD DOWN DEVICE FOR PRESTRESSED CONCRETE CASTING BEDS

Filed Nov. 15, 1956

2 Sheets-Sheet 1

FIG. 1



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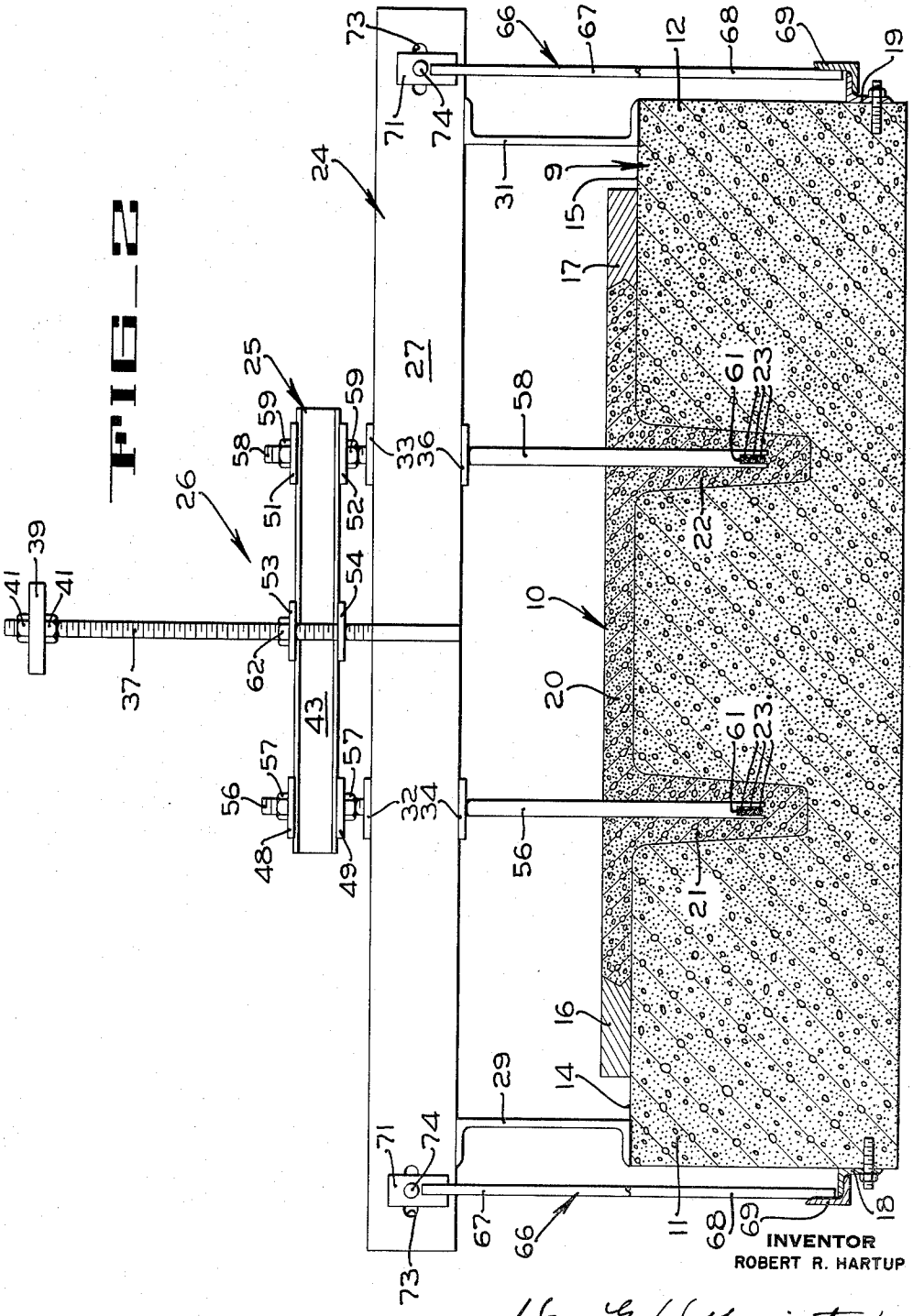
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FIG. 2



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CABLE HOLD DOWN DEVICE FOR PRESTRESSED CONCRETE CASTING BEDS

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This invention pertains to the art of casting concrete and more particularly relates to an improved cable hold down device for use in producing prestressed concrete beams.

It is well known that concrete is strong in compression but very weak in tension, therefore, such items as concrete roof beams which are subjected to tension in their lower portions must be reinforced with steel cables, or the like, to prevent breakage. It has been found that by tensioning the steel cables placed in the lower portion of the beam prior to the pouring of the concrete, and by maintaining these cables in a tensioned state until the concrete is set, the concrete becomes precompressed after the outside tensioning force has been removed from the reinforcing cables. The concrete may be precompressed in this manner so that the amount of precompression is exactly equal to the anticipated tension load to be applied to the beam. Thus, substantially all the tension forces may be eliminated within the design limits of the beam so that only compressive forces are acting on the concrete.

Since the prestressing cables must be located in the lower portion of the beam, the beam tends to buckle slightly when the external prestressing forces are released from the cables. This buckling or "camber" causes the beam to arch upwardly, creating a construction problem so that, in some cases, it is highly desirable to produce low camber beams.

It has been found that by locating the prestressing cables at a relatively high location in the beam and then forcing the center of the cables down at midpoint of the beam, the camber of the beam is greatly reduced while at the same time the advantages of prestressing are maintained.

It is, therefore, one object of this invention to provide a cable hold down device for use in the production of low camber prestressed concrete beams.

Another object is to provide an improved device for deflecting the prestressing cables during the molding of a concrete beam.

Another object is to provide a stable and easily adjustable cable hold down device.

These and other objects and advantages of the present invention will be apparent from the following description taken in connection with the following drawing, in which:

Fig. 1 is a side elevation of the hold down device shown in an operative position associated with a casting bed and a concrete beam being formed therein.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

The casting bed 9 (Fig. 1), within which concrete beams 10 are formed, is provided with vertical side walls 11 and 12 having horizontal upper surfaces 14 and 15. A pair of longitudinally extending members 16 and 17 are adapted to be clamped in place in any suitable manner on the surfaces 14 and 15, respectively, to provide relatively shallow, removable side walls at the top of the casting bed. Hold down rails 18 and 19 are secured to the side surfaces of the walls 11 and 12 respectively, and project outwardly therefrom. The transverse cross section of the concrete beam 10 is also shown in Fig. 2 and comprises an upper horizontal member 20 and a pair of spaced downwardly extending legs 21 and 22 within which several longitudinally extending prestressing cables 23 are positioned.

The cable hold down device 26 of this invention comprises a frame structure 24 detachably mounted in stationary position above the bed 9, and a beam assembly 25 movable up and down on the frame to engage and deflect downwardly the prestressing cables 23 before the concrete is poured into the bed. The frame portion 24 of the device 26 comprises a pair of spaced, parallel channel members 27 and 28 (Fig. 1) secured as by welding to support pedestals 29 and 31, which are positioned under opposite ends of the channel members. The pedestals 29 and 31 are arranged to be placed on the surfaces 14 and 15, respectively, of the casting bed 9 during the casting operation. However, the entire device 26 may be removed from the casting bed 9 to allow the finished concrete beam to be removed from the casting bed. The channel members 27 and 28 are also secured together by a pair of centrally apertured, spaced guide plates 32 and 33 which are secured across the upper surfaces of both channel members 27 and 28, and by a similar pair of apertured lower guide plates 34 and 36 which are secured across the lower surfaces of the members 27 and 28 and are disposed directly below the guide plates 32 and 33. A pair of non-rotating threaded rods 37 and 38 are secured, as by welding, to the central portion of the side surfaces of the members 27 and 28, respectively, to project upwardly therefrom. A suitably apertured spacer plate 39 is received on the upper ends of the rods 37 and 38 and is held in position by nuts 41 which are threadedly received on the rods 37 and 38.

The hold down beam 25 comprises a pair of spaced channel members 43 and 44 that are positioned above and parallel to the channel members 27 and 28. The channel members 43 and 44 are secured in parallel relationship by mounting brackets 48, 49, 51 and 52, and upper and lower beam guide plates 53 and 54 all of which are welded to the channel members 43 and 44. The guide plates 53 and 54 are apertured to permit the non-rotating rods 37 and 38 to extend therethrough. The mounting brackets 48 and 49 (Fig. 2) are apertured to receive the upper threaded end of a cable hold down rod 56 which is secured thereto by nuts 57. The rod 56 projects vertically downwardly in guided relation through the apertured guide plates 32 and 34. Similarly, the mounting brackets 51 and 52 (Fig. 2) are apertured to receive a cable hold down rod 58 which is secured thereto by nuts 59. The rod 58 projects vertically downwardly through the apertured guide plates 33 and 36. The lower ends of the hold down rods 56 and 58 are provided with slots 61 within which the cables 23 are

positioned while being forced down. The hold down beam **25** and the attached hold down rods **56** and **58** are forced downwardly by two nuts **62** (Fig. 1), one of which is threaded on each of the non-rotatable rods **37** and **38** above the guide plate **53**.

In order to prevent the raising of the entire cable hold down device **26** when the nuts **62** are screwed downwardly, a clamping mechanism **66** is provided at each end of the device **26**. The two clamping mechanisms **66** are identical, therefore the explanation of one will suffice for both. Each clamping mechanism **66** comprises a pair of parallel spaced rods **67** and **68** (Fig. 1) which are secured at their lower ends to an angle member **69**. Suitably apertured plates **71** and **72** are secured to the upper ends of the rods **67** and **68**, respectively. The aforementioned channel members **27** and **28** are each provided with horizontal slots **73** (Fig. 2) which are positioned adjacent the outer ends thereof. A pin **74** is inserted through each pair of end slots **73** and also through the apertures provided in the plates **71** and **72** in order to pivotally mount each clamping mechanism **66** to the hold down device **26**. As clearly shown in Fig. 2, the angle member **69** of each of the clamping members **66** is positioned in locking engagement under one of the hold down rails **18** or **19**, thus preventing upward movement of the device **26**.

The operation of the hold down device **26** in producing a low camber prestressed concrete beam will be described in connection with other procedures used in the forming of a beam. With the casting bed **9** empty, and its interior surfaces oiled or otherwise prepared to permit withdrawal of the finished beam therefrom, the cables **23** are properly positioned in the bed and are then tensioned by any suitable tensioning device such as power driven winches (not shown). The hold down device **26** is placed on the casting bed **9** as shown in Fig. 2, at the longitudinal midpoint thereof, and the rods **56** and **58** are oiled. The angle member **69** of one of the clamping mechanisms **66** is placed under the rail **18** while the other angle member **69** is placed under the rail **19**, thus locking the hold down device **26** to the casting bed **9**. The hold down beam **25** is then lowered so that the cables **23** will be positioned in the slots **61** of the cable hold down rods **56** and **58**. The clamping nuts **62** are then screwed downwardly on the rods **37** and **38** until the cables **23** are deflected the desired amount. The concrete is then poured into the casting bed **11** and allowed to set.

After the concrete has firmly set, the clamping nuts **62** are loosened and the cable hold down rods **56** and **58** are withdrawn from the concrete. The angle members **69** of the clamping mechanisms **66** are then released from their locking position under the rails **18** and **19** and the entire hold down device **26** is removed from its normal position on the casting bed **9**. A suitable hoist may then be used to remove the finished concrete beam **10** from the bed **9**, thus completing the operation of producing a low camber prestressed concrete beam.

While I have shown and described a preferred embodiment of the present invention, it should be noted that various changes may be made therein without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. In a device of the character described, a frame, means for detachably clamping said frame to a casting bed so that said frame is secured against upward movement, a pair of threaded members fixed to said frame and extending upwardly therefrom, a movable beam extending transversely above said casting bed and above said frame, a guide plate fixed to said beam, said guide plate having apertures through which said threaded members extend, cable engaging means fixed to and extending downwardly from said movable beam, and nuts threaded on said threaded members above said guide plate and rotatable thereon to force said movable beam downwardly to deflect the cables engaged by said cable engaging means

2. In a device of the character described, a frame, means for detachably clamping said frame to a casting bed so that the frame is fixed against movement away from the bed, a movable beam assembly extending transversely above said casting bed and mounted for vertical movement relative to said frame, a cable engaging rod fixed at its upper end to said movable beam assembly, means defining a slot in the lower end of said rod for embracing a cable, and means mounted on said frame for forcing said movable beam assembly downwardly to deflect said cable.

3. In a device of the character described, a frame, means for detachably clamping said frame to a casting bed and thereby securing said frame against upward movement, a movable beam extending transversely above said casting bed and mounted for vertical movement relative to said frame, a cable engaging rod fixed at its upper end to said movable beam assembly, means defining a vertical slot in the lower end of said rod for embracing cables, said slot being of sufficient depth to accommodate several cables in the same vertical plane, and means carried by said frame for forcing said movable beam assembly downwardly to deflect said cables.

4. In a device of the character described, a frame, means for detachably clamping said frame to a casting bed and thereby securing said frame against upward movement, a threaded member fixed to said frame and extending upwardly therefrom, a movable beam assembly extending transversely above said casting bed and above said frame and through which said threaded member extends, a cable engaging rod fixed at its upper end to said movable beam assembly, a slot in the lower end of said rod for embracing a cable, and a nut threaded on said threaded member to force said movable beam assembly downwardly to deflect said cable.

5. In a device of the character described, a frame, means for detachably clamping said frame to a casting bed and thereby securing said frame against upward movement, a pair of threaded members fixed to said frame and extending upwardly therefrom, a movable beam extending transversely above said casting bed and above said frame, a guide plate fixed to said beam, said guide plate having apertures through which said threaded members extend, a cable engaging rod fixed at its upper end to said movable beam, a slot in the lower end of said rod for embracing a cable, said slot being of sufficient depth to accommodate several cables in the same vertical plane, and nuts threaded on said threaded members above said guide plate and rotatable to force said movable beam downwardly to deflect said cables.

6. In a device of the character described, a frame adapted to straddle a casting bed adjacent the mid-portion thereof, a pair of clamping members, one of said clamping members being pivotally connected to each end of said frame, the lower ends of said clamping members being adapted to engage beneath lateral projections on the opposite sides of said casting bed, a pair of threaded members fixed to said frame and extending upwardly therefrom, a movable beam extending transversely above said casting bed and above said frame, a guide plate fixed to said beam, said guide plate having apertures through which said threaded members extend, a pair of cable engaging rods adjustably fixed adjacent their upper ends to said movable beam, a slot in the lower end of each of said rods for embracing the cables, each of said slots being of sufficient depth to accommodate several cables in the same vertical plane, and nuts threaded on said threaded members above said guide plate for forcing said movable beam downwardly to deflect the cables.

7. In a device of the character described, a frame, means for detachably clamping said frame to a casting

bed to secure the frame against upward movement, a threaded member secured to said frame and extending upwardly therefrom, a movable force applying member disposed above said frame, cable engaging means fixed to and extending downwardly from said movable force applying member, and a threaded means screwed on said threaded member and rotatable to engage said force applying member to force the force applying member downwardly to deflect the cables engaged by said cable engaging means.

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