Dec. 4, 1934. A. R. WELCH 1,982,713

DOWELING MACHINE

Filed Feb. 15, 1932 3 Sheets-Sheet 1

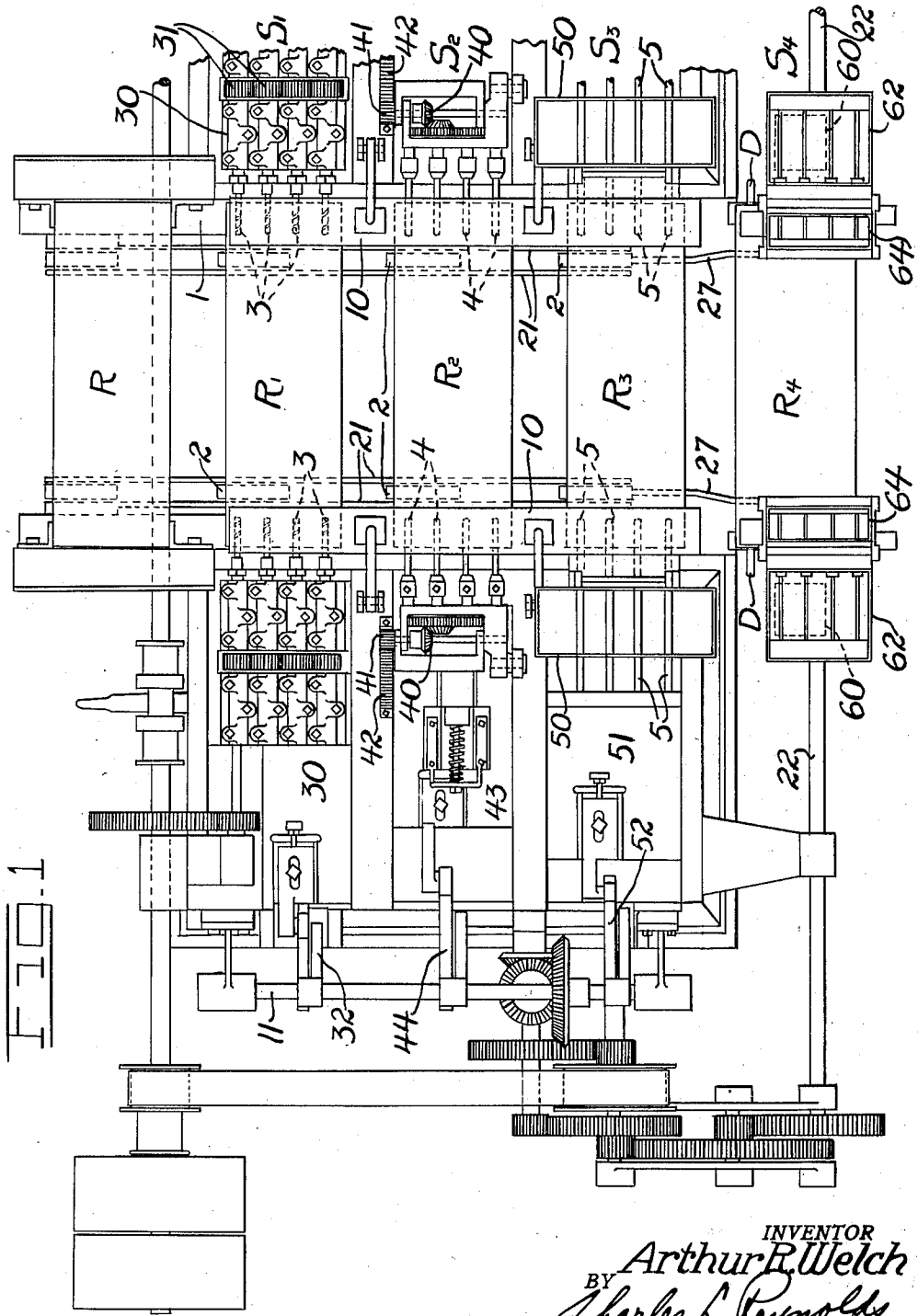


FIG. 1

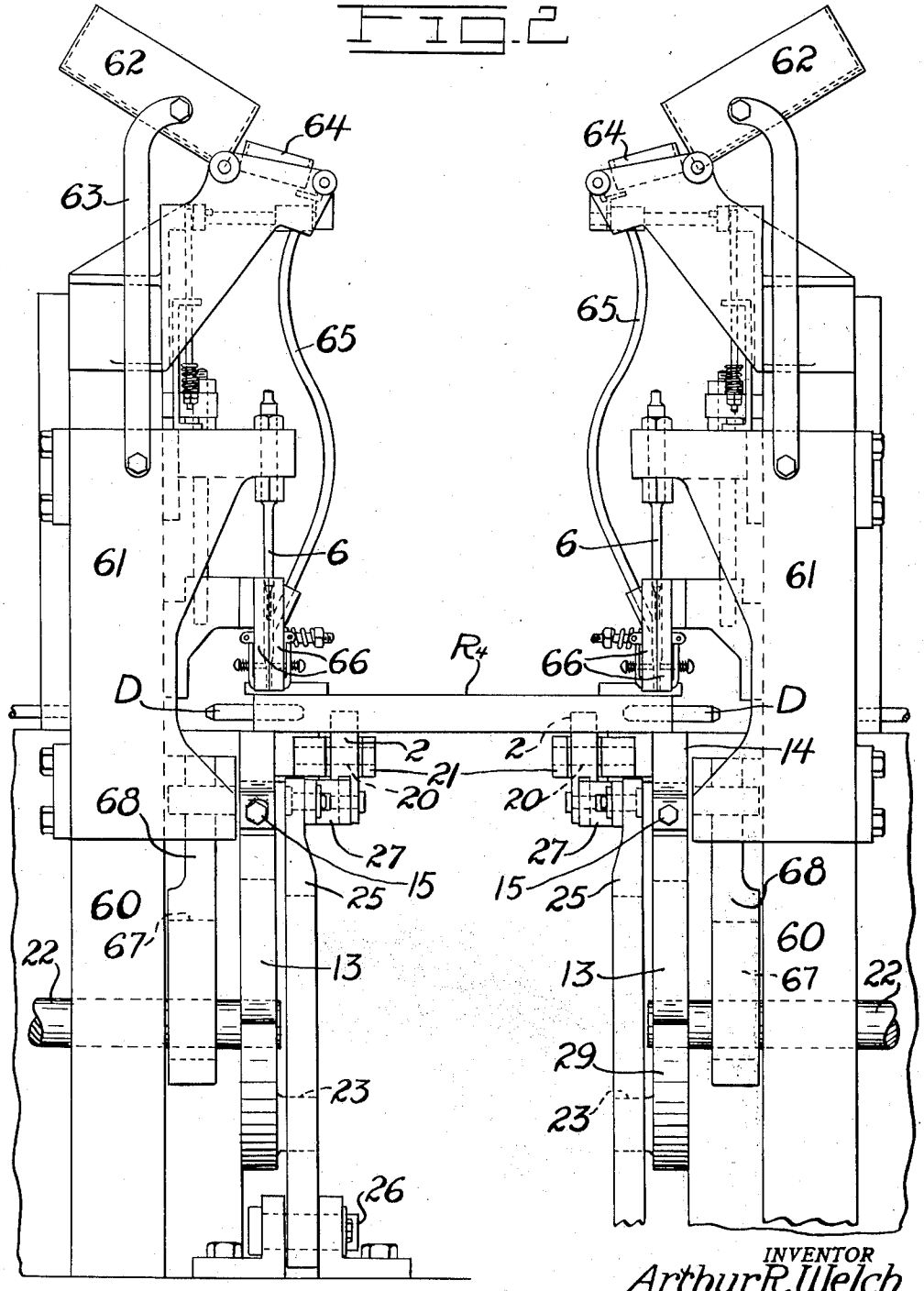
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FIG. 2



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Fig. 4

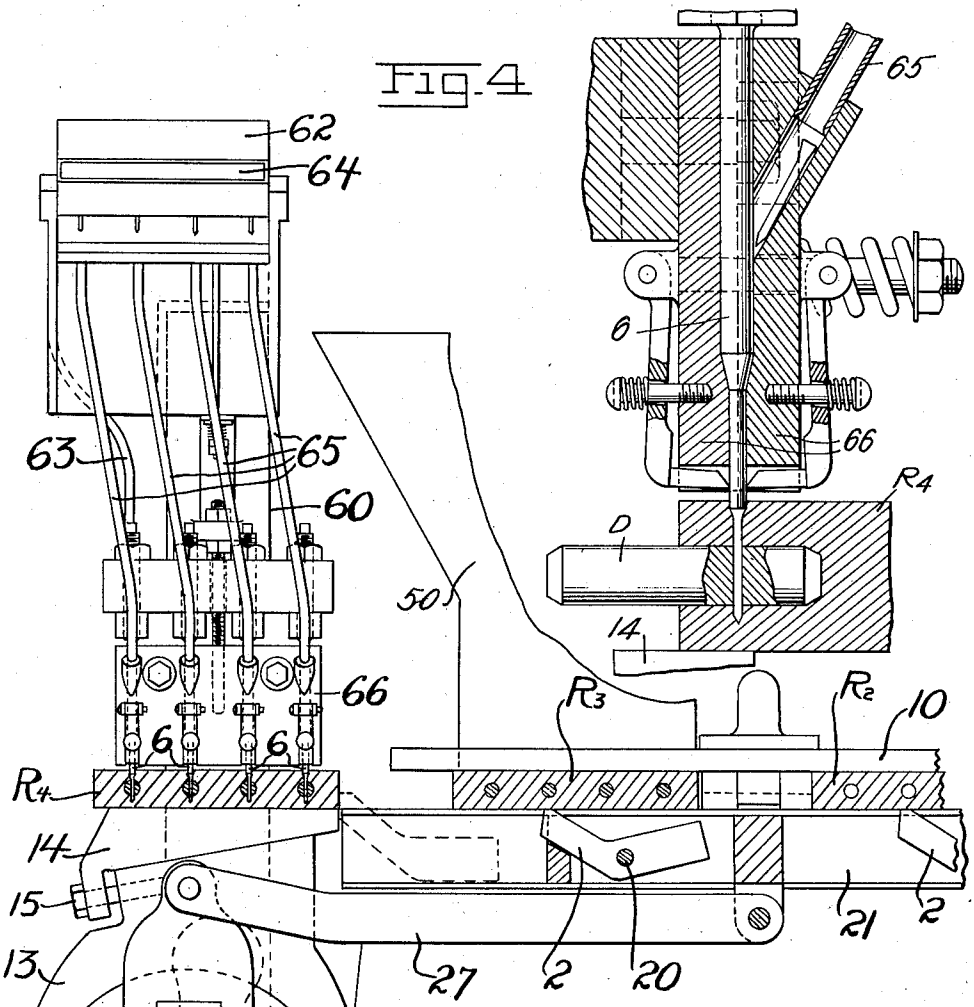
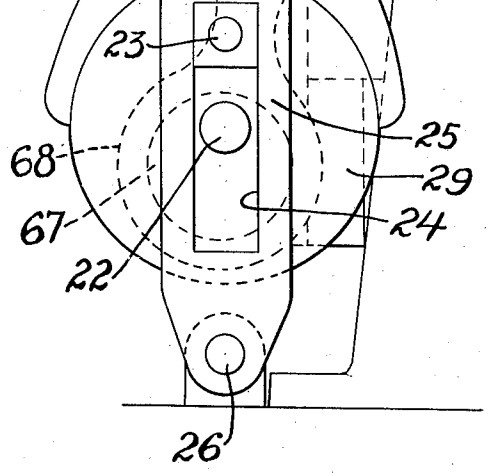


Fig. 3



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DOWELING MACHINE

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Application February 15, 1932, Serial No. 592,856

9 Claims. (Cl. 144—1)

My invention relates to machines generally employed in the construction of doors, but useful in the construction of various framing members and in the preparation for their assembly. Such machines are generally designated doweling machines, and operate upon the rails which are later to be incorporated in the door.

Heretofore it has been customary to employ automatic machinery for the step of boring holes in the ends of the rails, depositing glue within such holes, and driving home dowels to leave them projecting from the ends of the rails, after which the rails were incorporated in doors by inserting the ends of the dowels within corresponding holes in the edges of the stiles, and drawing the door together in a clamp. Since these dowels do not always hold securely, it is sometimes customary to drive nails through the face of the rail and stile, either or both, and into or through the dowels, to secure them in place in both the rail and stile, and yet this operation, in addition to requiring hand work and thus adding to the cost of the door, frequently failed to gain its objective because of the fact that the nailer, having nothing by which to guide the nail, and operating in any event as an individual, in many instances missed the dowel, or so nearly missed it as to fail to hold securely, and in consequence the door was still liable to come apart at the joints.

Accordingly, it is an object of the present invention to provide as an integral part of the doweling machine a device which will automatically drive nails into the inserted or embedded ends of the dowels which project from the rails, and which, because they are machine-driven and machine-controlled, will always be properly positioned and driven through the thickest part of the dowel so as to hold most securely, and these nails, because they are machine-driven and accurate, will serve as a guide for the hand-nailing of the opposite end of the dowels when they are inserted in the holes in the respective stiles.

Thus it can be seen that it is my general object to provide a means whereby the door may be securely doweled, and the dowels securely and accurately held in position by nails driven through them, and to perform a part, at least, of this work automatically and in the same run through the machine as is required for the other operations, and therefore at lessened cost.

It is a further object to devise a machine for the purpose above, which will depart as little as possible from the now familiar form and manner of operation of the present three-in-one doweling machine, and which, if desired, may be added to present machines, with but little alteration thereof.

My invention comprises the novel combination and arrangement, as shown in the accompanying drawings, described in the specification, and as will be more particularly defined by the claims terminating the same.

In the accompanying drawings I have shown my invention in typical forms and combined with a typical three-in-one doweling machine, it being understood that the principles thereof, within the scope of the claims, may be incorporated in various forms and machines.

Figure 1 is a general plan view of such a machine, a portion thereof being omitted since it is a duplication of the part shown.

Figure 2 is an end view of the machine from the delivery end, and illustrating particularly the nailing head.

Figure 3 is a longitudinal vertical section through the machine at the delivery end.

Figure 4 is a vertical axial section through a portion of a nailing head.

The rails R are suitably supported—for instance, upon the ledges 1—for movement transversely and edgewise past a plurality of stations, designated for convenience S^1, S^2, S^3 and S^4 (see Figure 1.) Suitable guides position them or hold them down, as for instance the hold-down plate 10, and thus supported and guided, they are engaged by feed means such as the dogs 2 pivotally mounted at 20 in reciprocable bars 21, whereby these dogs, as they reciprocate, engage the rear edge of each rail, draw it forward a given distance, then return, passing underneath the following rail, until in position to engage that rail's rear edge, when they rise again, and upon the next forward stroke engage this succeeding rail and advance it. Thus the rails are advanced preferably step by step past each of the several stations, and the rails so advanced are designated R^1, R^2, R^3 and R^4, respectively, corresponding to the respective stations, S^1, S^2, S^3 and S^4.

At station S^1 it is customary to provide a plurality of drills 3, supported in a reciprocable head 30, and rotatively driven by intermeshed gears 31. By means familiar in the art, and which may consist of cams 32, the head 30 may be reciprocated at timed intervals corresponding to the period when the rail is at rest opposite the station S^1. The rotating drills are moved inwardly toward the end of the rail, and bore holes, properly spaced therein and properly spaced from the rear edge of the rail. They are immediately withdrawn, and the device is so timed that the dogs

will now pick up this rail R^1 and advance it to the position of the rail R^2, in registry with the station S^2.

At this latter station glue nozzles 4, supplied from a suitable source with glue, are projected within the holes previously bored in the rail, the feed means accurately positioning the rail for proper entry of the glue nozzles 4 into these holes. These nozzles may be rotated while in the holes by the gears 40 and the pinion 41 rolling over a fixed rack 42, thus to distribute the glue round about the walls of the holes. Reciprocation of the glue head 43 is suitably controlled, as, for instance, by the cam member 44, corresponding to the cam 32, and preferably mounted upon the same shaft 11.

The rail is now advanced to the station S^3, in the same manner as before, at which station are located dowel hoppers 50 to contain dowels already prepared. Plungers 5 at the station S^3 are supported by a head 51, reciprocable in the main frame, to discharge dowels from the bottom of each hopper, and to project them into the holes into which glue has been previously inserted. Control of the movement of the plunger head 51 may be controlled by cam means illustrated at 52, and likewise preferably operable from the shaft 11.

After insertion of the dowels the rail is again advanced to the station S^4, where nailing heads, to be described hereafter in detail, drive nails into and set their heads beneath the upper surface of the rail, precisely in alignment with and usually at right angles to the axis of the several dowels. The operation of this nailing head may be controlled from the same members as control the other parts of the machine, or, as is best shown in Figure 3, the control may be from a shaft 22 which is designed to control the feed mechanism, and in consequence the nailing head is timed directly with the feed mechanism, and indirectly with the boring, gluing and dowel-inserting mechanism.

The nailing heads can take any suitable form. As is best shown in Figures 2 and 3, a fixed post 60 serves as a guide for a vertically sliding head 61 carrying a series of nail sets 6. Supported upon the upper end of the post 60 is a tiltable hopper 62 connected by a link 63 with the reciprocable slide 61, so as to agitate the nails in the hopper 62, and to cause them to fall in proper position in a nail guide 64, whence they are delivered one by one through a chute 65 to jaws 66 fixed upon the post 60, and through which the plungers 6 are movable to engage the head of the nail and drive it on through the jaws and into the rail R^4, positioned immediately therebelow. The plungers, of course, and the associated jaws, are positioned, with respect to the rail advanced by the dogs 2, precisely to register with the dowels D which have previously been inserted therein.

Upon the shaft 22, adjacent the post 60, is a crank disk 29, the crank pin 23 of which engages within the slot 24 of a lever 25, pivoted at its lower end at 26, and the upper end of which lever is connected by a link 27 to the bars 21 whereon are mounted the several dogs 2. Reciprocation of the vertically sliding head 61 may conveniently be accomplished by providing upon the shaft 22 an eccentric 67, the strap 68 of which is directly connected to the sliding head 61.

In a machine especially designed for the purpose, the ledge 10 may extend to include all four stations, but the machine may be adapted for incorporation in the common three-in-one doweling machine, as herein illustrated, and for that purpose I may support a saddle 13 upon the crank disk 29, this saddle having an adjustable head 14 thereon, by means of which and the adjusting screw 15 the upper surface of the sliding head 14 can be positioned to receive the rails as they pass off the end of the ledge 1 (see Figure 3).

It is believed the operation of the machine will now be clear, and the individual parts are old. I have therefore not gone into details of the drilling, gluing, or dowel-inserting devices, nor of the nailing head, and any form which is found suitable may be employed. Rails are passed once through the machine, and when delivered have the dowels glued in their holes, and securely and accurately nailed in place. While it is desirable to nail through the stile and dowel, after the door is assembled, the accurately positioned nail in the rail serves as a guide for the hand nailer, who cannot see the dowel, and who otherwise must guess at its location. Thus his work is rendered easier and more accurate, and holds better.

What I claim as my invention is:

1. In combination, in a doweling machine, means to support and guide a door rail for bodily transverse movement, means to advance the rail through the machine, means operable during its advance to secure a dowel in place therein, projecting from its end, and means timed with and spaced from the dowel-securing means to thereafter drive a nail through the rail and the rail-engaged end of the dowel.

2. In combination, in a doweling machine, means to support and guide a door rail for bodily transverse movement, means to advance the rail step by step past a plurality of stations, means at one station to secure a dowel in place, projecting from the end of the rail, and means at a subsequent station, timed with the advancing means, to drive a nail through the rail and the embedded end of the dowel.

3. In combination, in a doweling machine, means to support and guide a door rail for bodily transverse movement, means to advance the rail past a plurality of stations, including a drilling station, a gluing station, and a dowel-inserting station, to secure a dowel in place, projecting from the end of the rail, and means at a subsequent station, timed with the advancing means, to drive a nail through the rail and the inserted end of the dowel.

4. In combination, in a doweling machine, a plurality of means operable automatically in succession upon a framing member to bore a hole therein, insert glue within such hole, insert a dowel end into the hole, and drive a nail through the framing member and into the dowel, at right angles to its axis.

5. In combination, in a doweling machine, a feed table, means to advance a door rail supported thereon step by step across said table, to stop at a plurality of stations, gangs of drills at one station engageable with opposite ends of the rail to bore holes therein, glue nozzles at a subsequent station to deliver glue into such holes, dowel hoppers at a subsequent station and means to deliver dowels therefrom into the holes, and nailing heads at a subsequent station to drive nails through the rail and into the inserted ends of the dowels, and means controlling said devices at the several stations to operate when the rail has halted in registry with the device at each such station.

6. In combination, in a doweling machine, a plurality of automatic means intermittently and simultaneously operable upon door elements comprising means to bore holes in an element, means to place glue in holes bored in an element, means to insert dowels in holes in an element, and means to drive nails through an element and dowel ends inserted therein.

7. The combination of claim 6, and further means operative only when the automatic means are in the inoperative position, to advance a door element in turn from one to another of the several automatic means in the order set forth.

8. A continuous process of preparing door elements for assembly by traversing them past a plurality of stations, halting them at each of the several stations in timed succession, and during such traverse performing upon each element as it is halted at the several stations in turn operations comprising, first boring holes in the element to receive dowels, next inserting glue in such holes, next inserting dowels in the holes, and finally driving nails through the element and dowels inserted therein.

9. The process of preparing door elements for assembly which consists in subjecting each element to a series of successive automatic operations comprising placing the element opposite a boring station, boring holes therein to receive dowels, moving the element next to a glue station, inserting glue into the bored holes, moving the element next to a dowel supply station, inserting dowels in the holes, moving the element next to a nailing station, and driving nails through the element and dowels to secure them therein.

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