July 10, 1923. 1,461,222

H. A. MYERS

MACHINE FOR DELIVERING CORES TO MOLDS

Filed July 9, 1920 5 Sheets-Sheet 1

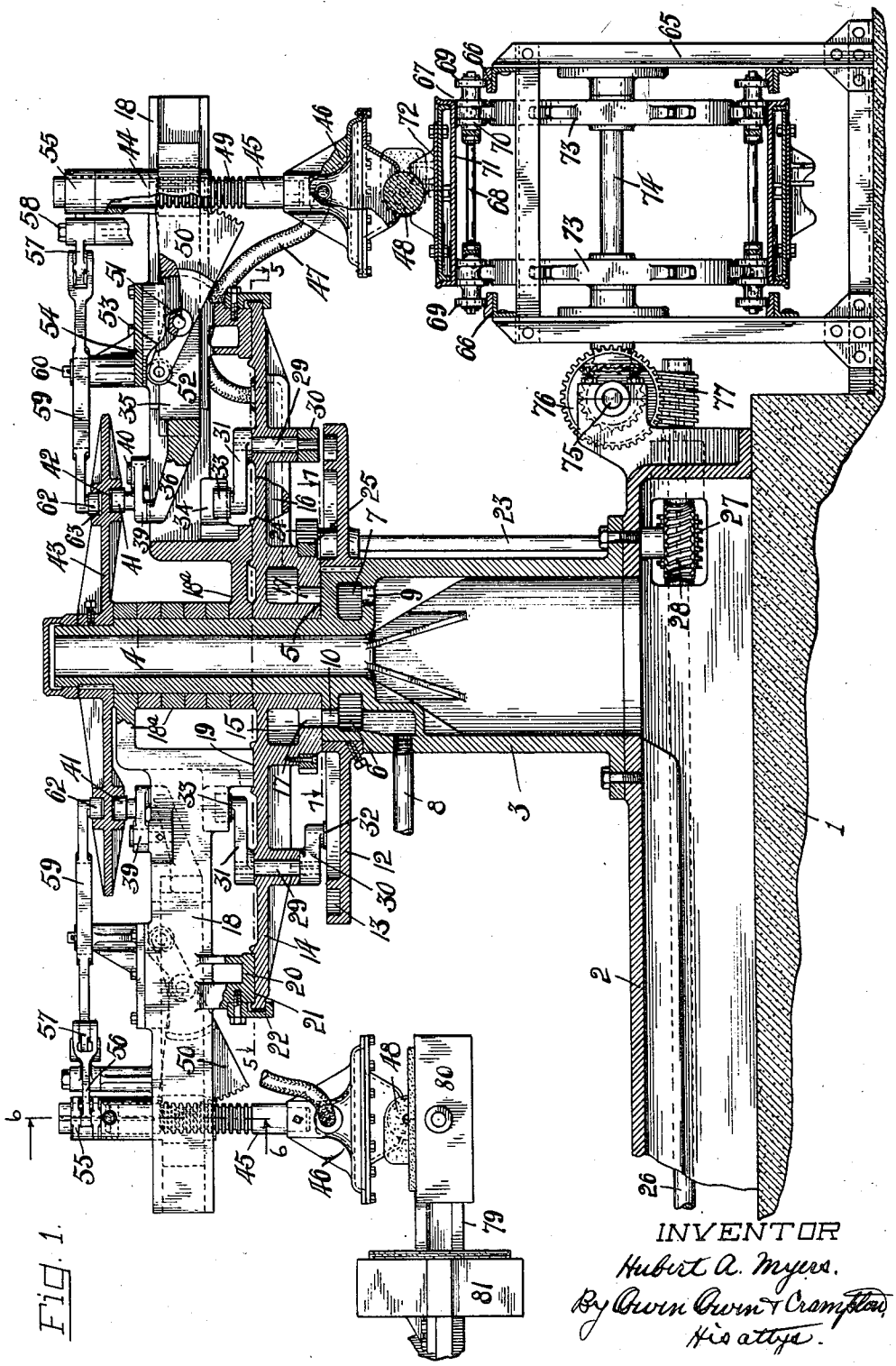


Fig. 1.

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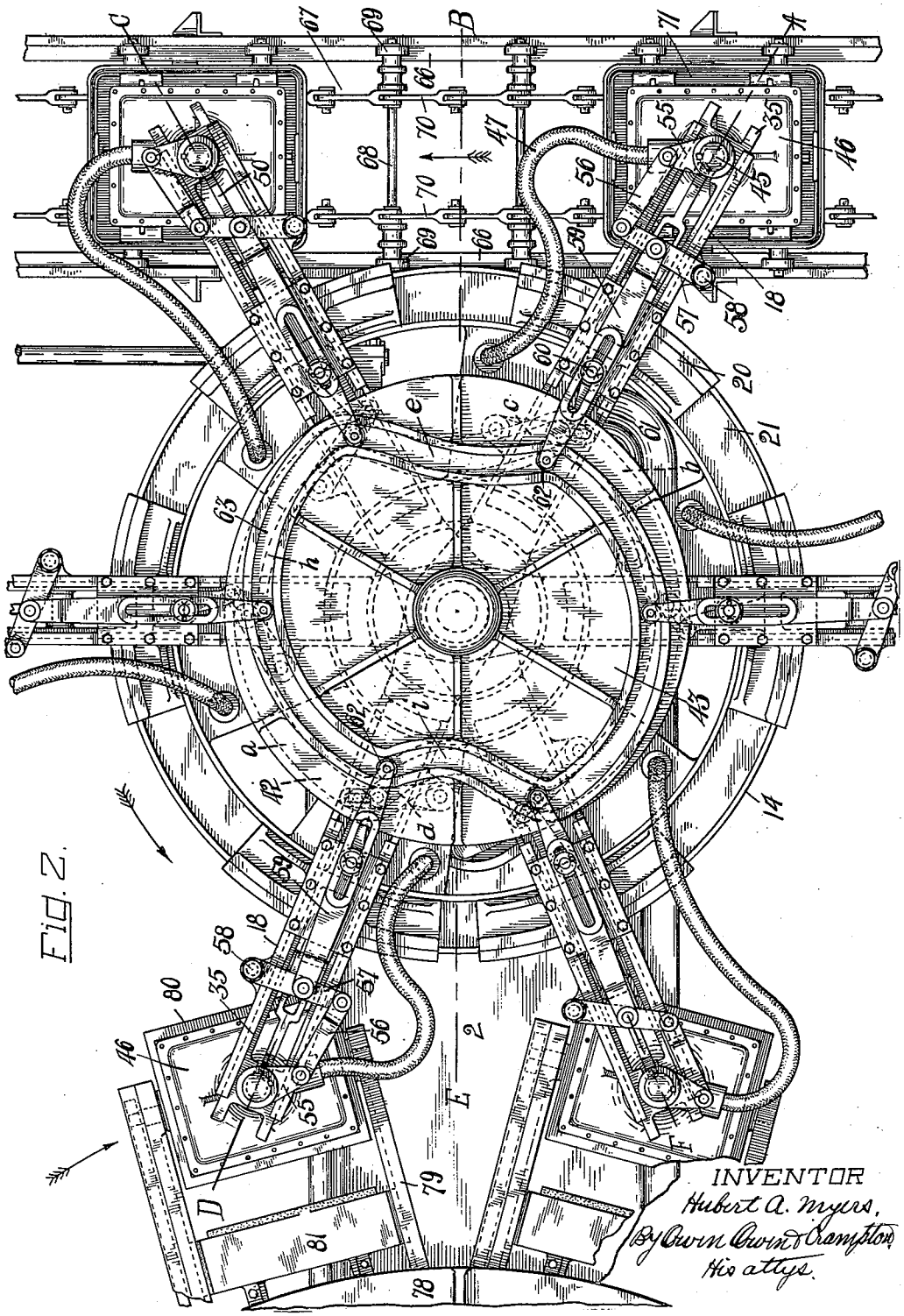


Fig. 2.

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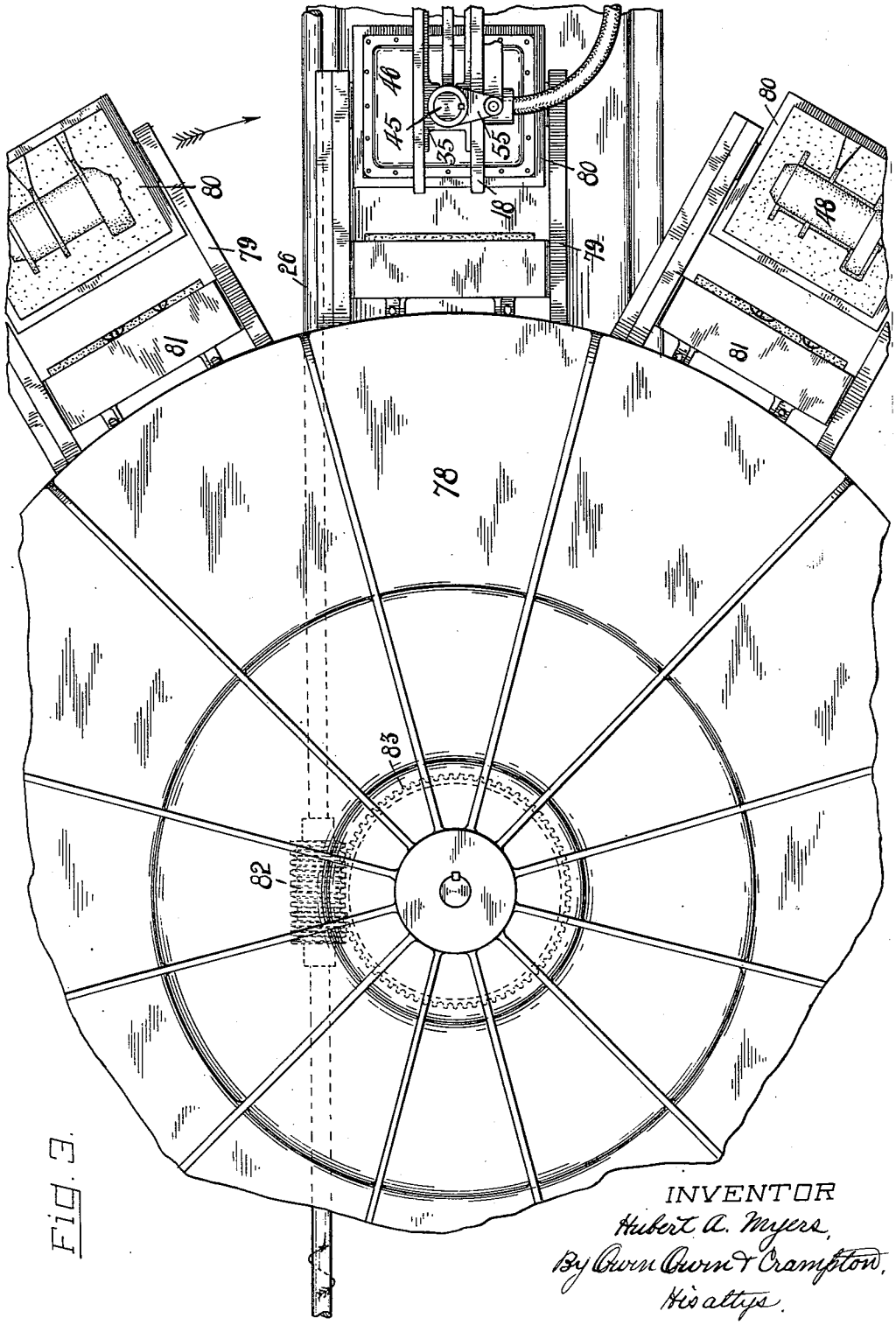


Fig. 3.

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MACHINE FOR DELIVERING CORES TO MOLDS

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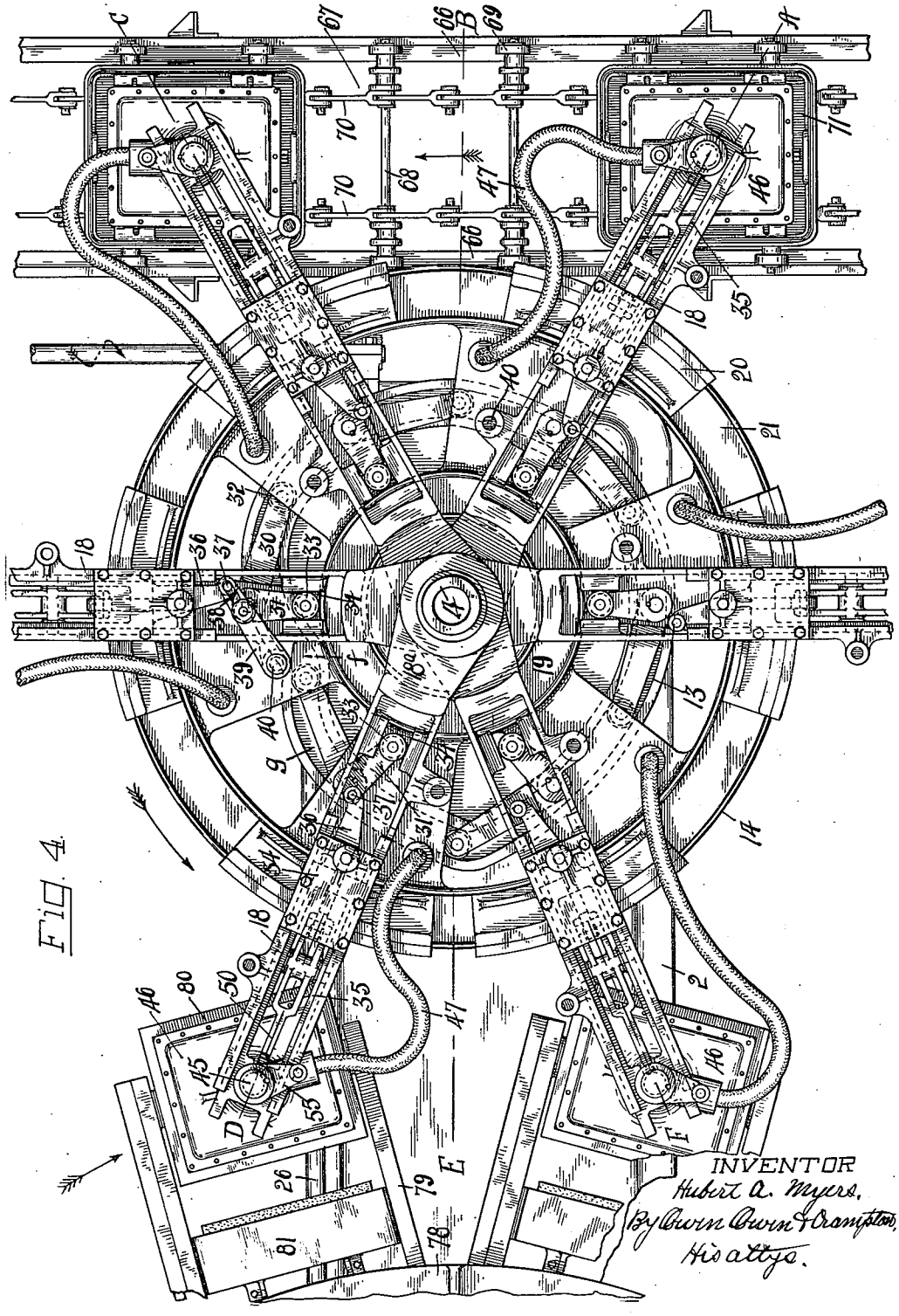


Fig. 4.

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MACHINE FOR DELIVERING CORES TO MOLDS

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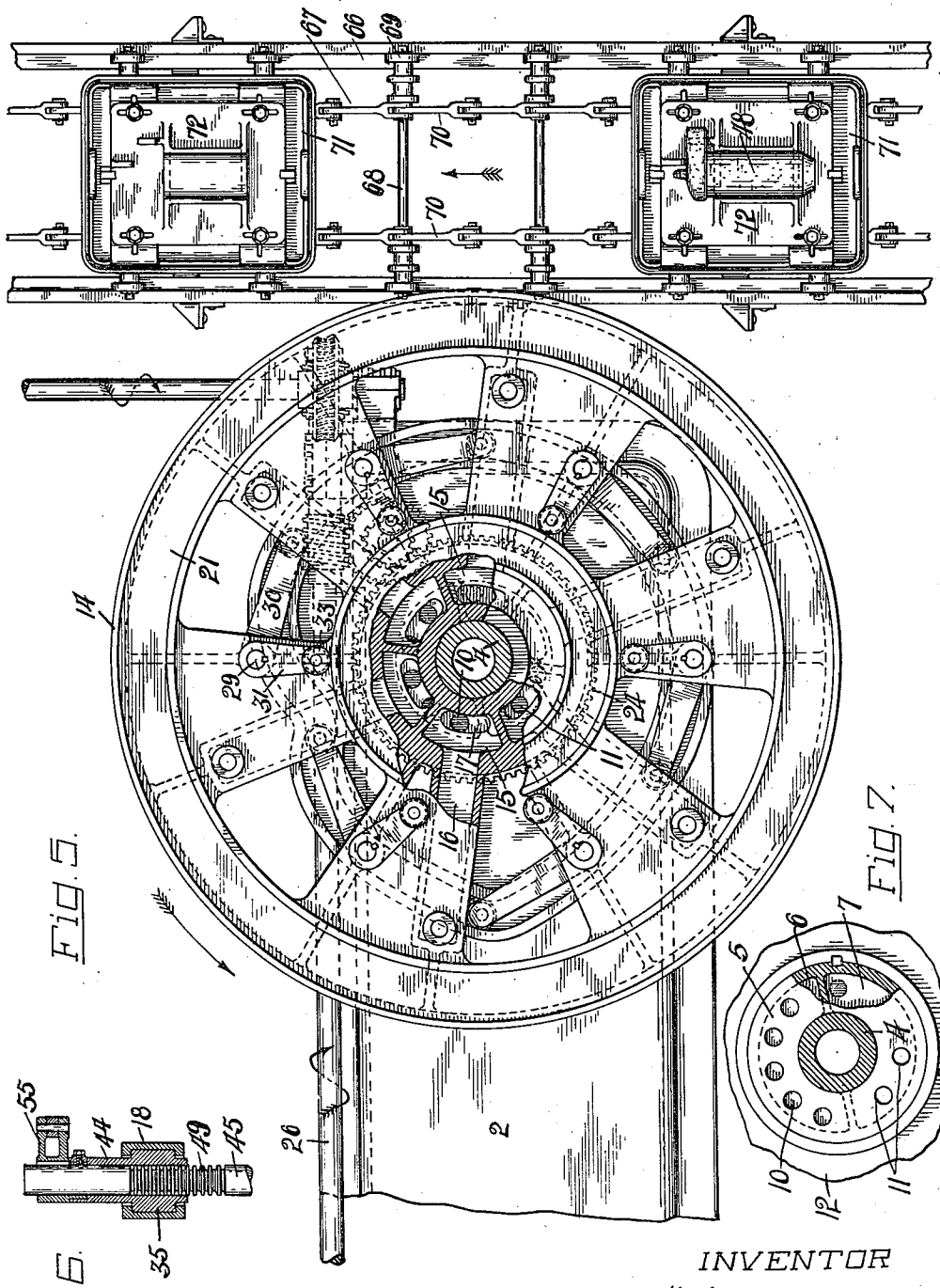


Fig. 5.

Fig. 6.

Fig. 7.

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Patented July 10, 1923. 1,461,222

UNITED STATES PATENT OFFICE.

HUBERT A. MYERS, OF TOLEDO, OHIO, ASSIGNOR TO THE HUBERT A. MYERS COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

MACHINE FOR DELIVERING CORES TO MOLDS.

Application filed July 9, 1920. Serial No. 394,918.

To all whom it may concern:

Be it known that I, HUBERT A. MYERS, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have made an Invention Appertaining to Machines for Delivering Cores to Molds; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to article delivery or transferring means, and particularly to a mechanism for picking up mold cores at one point and transferring them to and setting them in proper position in molds at another point.

The primary object of this invention is the provision of a mechanism of the character described which is automatic in its operation and employs pneumatic means to pick up and hold cores to a carrying member while being transported to distributing or dumping position, and which also has simple and efficient means for performing the carrying function. Further objects and advantages of the invention will be apparent from the following detailed description thereof.

While the invention in its broader aspect is capable of embodiment in numerous forms, a preferred embodiment thereof is illustrated in the accompanying drawings, in which,—

Figure 1 is a central vertical section through the core picking up and transferring mechanism and portions of the core conveying and mold carrying means, with parts of the former in full and parts broken away and with a pair of opposed working arms thereof at right angles to the conveying means. Fig. 2 is a top plan view thereof with parts broken away and with the working arms moved from the position in Fig. 1. Fig. 3 is a top fragmentary view of the mold carrying means with a portion of the core picking up and transferring mechanism in operative relation thereto. Fig. 4 is a top plan view of the mechanism shown in Fig. 2, with the top cam plate and other parts removed and parts broken away. Fig. 5 is a section on the line 5—5 in Fig. 1 with parts broken away. Fig. 6 is a section on the line 6—6 in Fig. 1, and Fig. 7 is a section on the line 7—7 in Fig. 1.

Referring to the drawings, 1 designates a floor or support, and 2 a machine base mounted thereon and having a pedestal 3 rising therefrom, with both of hollow form. The upper end of the pedestal is reduced and forms a vertical journal 4. The pedestal forms an annular seat 5 at the base of the journal, and provided in the pedestal below this seat is a segmental vacuum chamber 6 and a segmental relief chamber 7, each substantially 180° in length and divided from each other by end partitions. The vacuum chamber 6 is in communication with a suction or vacuum creating means through a pipe 8 (Fig. 1), and the relief chamber 7 has an opening 9 which communicates with the atmosphere through the pedestal and base. A plurality of equidistantly spaced openings 10 are provided in the seat 5, throughout substantially the length of the vacuum chamber 6, each of which opens into said chamber, and one or more openings 11 (Fig. 7) are provided in said seat at the rear end of the chamber 7 and open into the chamber.

A cam plate 12 is fixed to the upper end of the pedestal 3 with its top substantially flush with the seat 5 and provided with an endless cam groove or race 13. A turn table 14 is rotatably mounted on the lower end portion of the journal 4 and has the lower end of the hub resting on the seat 5 in close fitting contact therewith. The table hub is provided with a circular series of equidistantly spaced segmental pockets 15, six in the present instance, each having a passage 16 radiating a distance therefrom through the body or spider portion of the table for the purpose hereinafter described. Each pocket 15 has a segmental opening 17 in its bottom wall which successively register with the openings 10 and 11 in the seat 5 as the table revolves.

A plurality of working arms 18, six in the present instance, rest in equidistantly spaced radial positions on the table 14 for limited rotary movements in a common horizontal plane relative thereto, and the arms have relatively thin bearing portions 18^a at their inner ends disposed one above another and receiving the journal 4, as shown in Figs. 1 and 4. Each arm, in the present instance, rests near its inner end

in an annular seat or raceway 19 on the table, and is provided at its under side near its center with a broadened shoe 20, which rests on an annular seat or raceway 21 at the outer edge portion of the table. A channeled flange 22 is provided on the outer side of each shoe 20 for receiving the table edge and holding the arm to the table in a manner to permit it to oscillate relative thereto.

The table 14 is driven at constant speed from a vertical shaft 23 journaled in bearings in the base 1 and cam-plate 12, and has a pinion 24 in mesh with a gear 25 on the lower end of the table hub. The shaft in turn is driven from a power shaft 26 journaled in a side of the base 2 and having a worm 27 in mesh with a worm wheel 28 on the driven shaft.

A short vertical shaft 29, (Figs. 1, 4 and 5) is journaled in the table beneath each working arm 18 and cooperates with arms 30 and 31, projecting from opposite ends thereof, to form a bell crank lever. The lower arm 30 of the lever has a trailing action with respect to the table and is provided with a horizontally turning roll 32 travelling in the cam groove 13, while the other arm, 31, is substantially radially disposed relative to the table axis and carries a horizontally turning roll 33, working in a radially elongated opening 34 in the lower inner end portion of the working arm. It is thus evident that as the table 14 rotates, the arms 18 are caused to revolve therewith, due to the driving action of the respective bell crank levers 29, 30, 31 thereon, and to have advancing or retarding movements imparted thereto relative to the table by the levers when traversing cam portions of the cam groove 13, as hereinafter more particularly described.

Each working arm 18 is of forked form with the furcations thereof horizontally spaced and internally channeled longitudinally thereof to form guides for a slide-frame 35, whereby such member is permitted to have reciprocatory movements in the arm radially of the table. The rear end of the frame 35 is provided with an arm 36 having a pin 37 projecting upward from its free end into a slot 38 provided in the free end of a lever 39 (Figs. 1 and 4), which lever is fulcrumed at its opposite end for horizontal swinging movements on a pivot stud 40 rising from a side of the respective working arm. Each lever 39 is provided on its top intermediate its ends with a roller 41, which travels in an endless cam groove 42 provided in the under side of a cam plate 43 that is fixedly carried by the upper end of the journal 4, (Figs. 1 and 2). This groove is provided at opposite sides of the journal axis with neutral portions *a* and *b* (Fig. 2) and between such neutral portions at both ends thereof with cam portions *c* and *d*. It is evident that when a lever roll 41 is traversing the neutral portions of the cam 42, the slide frame 35 will be held stationary relative to the respective working arms and that when said roll is traversing the cam portions of the groove, the respective slide frame will have predetermined inward and outward movements depending on the form of the cam portions.

Each slide frame 35 has a vertical bearing 44 in its outer end portion receiving a vertical shaft 45 for both rotary and axial movements therein. The lower end of each shaft 45 carries a hollow suction head 46 in communication through a flexible tube 47 with a respective passage 16 of the table, and the bottom of the suction head is provided with an opening adapted to fit over and receive a portion of a core 48 or other article to be picked up and transported from one point to another. Each shaft 45 is provided longitudinally thereof with a series of rack teeth 49, which teeth extend entirely around the shaft and are engaged by a segmental series of teeth on the outer end of a lever 50, one of which is pivoted at 51 for vertical rocking movements in the rear end portion of each slide frame 35. The inner end of each lever 50 is provided with a vertically turning roll 52 which bears upward against a cam-block 53 carried at the under side of a cross bracket 54 on the arm. It is evident by reference particularly to the right hand portion of Fig. 1, that when the slide frame is moved outward in the arm, the cam 53 will cause a rocking of the lever 50 and effect a predetermined raising of the suction head to lift the work piece 48 carried thereby free from engagement with the means hereinafter described, by which it is delivered to picking up position.

In order to impart predetermined rocking movements to the suction head 46 as the table revolves, the upper end of the shaft 45 has an arm 55 projecting therefrom and connected by a link 56 (Fig. 2) to a lever 57 extending cross-wise of the arm at the top thereof and pivoted thereto, as at 58. The lever 57 is pivoted intermediate its ends to the forward end of a bar 59, movable longitudinally of the respective working arm and guided in its movement by a stud 60 projecting through a slot 61 therein from the bracket 54. The rear or inner end of the bar 59 carries a horizontally turnable roller 62, which travels in an endless cam groove 63 provided in the top side of the cam plate 43. This groove is of proper form to impart the desired horizontal rocking movement to each suction head as the table revolves, as hereinafter more particularly described.

The means which conveys the cores 48 to position to be picked up by the picking up and transferring mechanism, is located at one side of said mechanism in position for

the suction heads 46 to swing thereover as they revolve. This conveying means comprises a horizontally disposed elongated frame 65 extending tangentially of a circle concentric to the turning axis of the turn table 14 and forms a pair of horizontally spaced endless tracks 66, 66, which guide the movement of an endless conveyor chain 67. This conveyor chain, in the present instance, has a plurality of transversely spaced cross shafts 68 having rolls 69 at their ends travelling on the respective tracks 66. The cross shafts 68 are connected by links 70 and the conveyor chain is provided in predetermined equidistantly spaced intervals with trays 71 carrying removable plates 72 for supporting cores 48 or other articles to be conveyed. These plates form seats for the cores and may be changed to suit the shape of the core or other member to be supported thereby.

The chain is driven by sprocket wheels 73 (Fig. 1), which are shown, in the present instance, as engaging both the upper and lower lengths of the chain and as being carried by a shaft 74, journaled in the frame 65. The shaft 74 has bevel gear connection with a shaft 75 journaled in the base 2 and this shaft carries a worm wheel 76 in mesh with a drive worm 77 on the power shaft 26.

At the side of the picking up and transferring mechanism opposite the conveyor 67 is a mold carrying means, which, in the present instance, is illustrated as comprising a horizontally rotatable table 78 having a plurality of pairs of mold carrying arms 79 projecting radially therefrom with a mold section or half 80 carried therebetween. Each pair of arms may also carry the other section or half 81 of the associated mold. After placing a core on the mold section 80, the two mold sections are brought together in any suitable manner to enclose the core. As the means for controlling the movements of the mold sections forms no part of the present invention, it is neither shown or described herein.

The mold carrying table 78 is driven from the line shaft 26 which has a worm 82 in mesh with a worm wheel 83 on the hub portion of the table. The table 78, in the present instance, carries twice as many molds as there are working arms on the picking up and transferring mechanism, and it is therefore necessary to gear the two turn tables 14 and 78 so that the table 14 will rotate at twice the speed of the table 78 in order that successive working arms of the table 14 may register with successive molds on the table 78 as the two tables revolve.

In the operation of the mechanism the separate units carrying the core conveying means, the core picking up and transferring mechanism and the mold carrying means are driven from the line shaft 26 with the conveyor chain moving at the speed of revolution of the working arms 18 and with the mold carrying table revolving at half the speed of said arms, it being understood that the movements of the different units are in the direction of the respective arrows indicated in Fig. 2. When each working arm 18 is at the position A of its movement, (Figs 2 and 4), the arm is disposed at the center of its permissible rocking movements relative to the table, 14, by reason of the roller 32 on the bell crank lever 29, 30, 31, traveling in a neutral portion of the cam groove 13. At the same time the slide frame 35 of the arm is approximately at the limit of its outward movement with the roller 41 on the control lever 39 thereof, just leaving the neutral portion *b* of the cam groove 42 and entering the cam portion *c* of such groove. The suction head 46 of the arm is also at this point in its movement in vertical register with a core carrying plate 72 with its core receiving cavity or mouth in proper picking up rigister with the core 48 carried by the plate, such position being obtained by the traveling of the roller 62 in the cam groove 63. As the working arm moves forward from the position A toward the position B, the slide frame 35 is moved inward by the coaction of its control roller 41 with the cam portion *c* of the cam groove 42 to cause the vertical axis of the suction head to have the straight line of movement of the conveyor as the arm and conveyor advance, and this movement of the frame permits a lowering of the suction head into core picking up position by reason of the roller 52 passing inward and upward along the cam block 53 and permitting a rocking of the lever 50. When the arm 18 is approximately at the position B of its movement, the pocket 15 thereof, which is in communication with the respective suction head 46 through the passage 16 and tube 47, moves into communication with the suction chamber 6 in the standard 3, and this communication is maintained until the arm has completed substantially one-half of a revolution, thereby setting up a suction within the head 46 to pick up and hold the engaged core 48 to the head until such suction is cut off at the core releasing point, at the opposite side of the picking up and transferring mechanism. During the movement of the working arm from the position B to substantially the position C the slide-frame 35 is moved outward by coaction of its control roller 41 with the outwardly extending cam portion *c* of the groove 42 so as to maintain the axis of the suction head in centered relation to the core carrying plate 72, or to cause the head axis to have the straight line of movement of the conveyor. At the same time the slide-bar 59 is moved by coaction of its roller with the cam portion *e* of the groove 63 to swing the suction head 46 to maintain proper regis-

ter with the respective core plate. During the outward movement of the slide-frame 35, the lever 50 is operated by the outward passage of the roll 52 on the cam block 53 to effect a raising of the suction head to elevate the core above its carrying plate. During the movement of the working arm between the positions A and B, the cam groove 13 acts on the bell crank lever 29, 30, 31 to impart a very slight gradual retarding movement thereto relative to the turn table 14, and during the movement of the arm between the positions B and C, the arm is advanced by the same means relative to the table so that the difference between the speed of movement of a point on the arm and the conveyor means is compensated for. In other words this variance in the speed of revolution of the arm during the period of travel of its suction head over a core plate in register therewith is necessary due to the relation of the center line of movement of the conveyor to the axis of revolution of the arm, as is apparent. During the travel of a suction head between the position C, at which position it begins to leave its line of linear movement with the conveyor chain 67, and the position D, at approximately which latter position the suction head moves into vertical register with the mold section 80, the roller 32 on the bell crank 29, 30, 31 enters an entrant portion *f* of the cam groove 13, thereby advancing the arm relative to the table so that when the suction head moves over a registering mold section 80, the arm will be at the forward point of such advance as shown in Fig. 4. From this point to approximately the position F the arm is caused to assume the slower speed of movement of the mold section 80 due to the roller 32 of the bell crank lever 29, 30, 31 passing through the outwardly extending portion of the cam groove 13, such slowing up of the speed of the arm being necessary by reason of the relation of the arc of movement of the registering mold center to the arc of movement of the working arm. During the movement of the working arm successively between the positions D and E, and E and F, the sliding frame 35 is first caused to move inward and then outward by reason of the passage of the roller 41 through the cam portion *d* of its groove 42, the movement of the slide frame relative to the arm being such as to cause the axis of the suction head to follow the arc of movement of the mold axis so that the core is maintained during such movement in proper vertical register with the mold cavity. During the inward movement of the slide frame, the lever 50 is rocked to effect a lowering of the suction head to deposit the core in the registering mold cavity and when the arm is approximately at the position E the communication between the suction chamber 6 and suction head is cut off and the suction head opened to the atmosphere through the relief chamber 7, thereby depositing the core in the mold. On the succeeding outward movement of the slide frame 35, which takes place between the positions E and F, the lever 50 is operated to raise the suction head free from the core. During the movement of the suction head from the position C to the position D it has approximately a quarter of a turn imparted thereto to place it in proper registering relation to the mold section 80 due to the roller 62 at the end of the bar 59 traveling in the cam portion *h* of the cam groove 63. The roller 62 then passes through the inwardly and outwardly extending cam portion *i* of the groove 63 to cause a horizontal swinging of the suction head suitable to maintain it in proper register with the mold section.

It is evident from the above description that the several suction heads of the picking up and transferring mechanism move successively into register with the successive core conveying plates 72 and are held in register therewith during approximately the movement thereof between the positions A and C by reason of the inward and outward movement of the respective slide frames 35 and the horizontal rocking movements of the suction heads; that each suction head is moved into picking up engagement with a subjacent core at approximately the position B, after which communication is opened between the suction head and the suction creating means, and the engaged core piece then raised by the suction head and carried to proper depositing position over a mold section 80; and that the suction heads as they successively move into register with the mold sections 80 maintain proper register therewith during their movements approximately between the positions D and F, during which period each suction head is lowered to place the core carried thereby in a mold and the vacuum is released, after which the suction head is again moved to core picking up position.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of the parts, or to the particular combination of elements shown, as it is capable of numerous modifications and changes without departing from the spirit of the claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is,—

1. In a machine of the class described, a revoluble member, a suction head carried by the member for revoluble movements therewith and different movements relative thereto, and mechanism automatically operable to create a suction in the head at one point in its revolution to pick up an article at

such point and to release the suction at a different predetermined point in a revolution of the head to release an article carried thereby, and also to impart predetermined movements to the head relative to the member.

2. In a machine of the class described, a revoluble member, a suction head movably carried by the member for pneumatically picking up an article at one point and releasing it at a different point in a revolution of the head, and means automatically operable to create a suction in the head and then to release it at different predetermined points in a revolution of the member.

3. In a machine of the class described, a revoluble member, a suction head carried by said member and pneumatically operable to pick up a work piece at one point and deliver it to a different point in its revolution, and means automatically operable to raise and lower the head at predetermined points in its revolution.

4. In a machine of the class described, a revoluble member, a suction head carried by said member and pneumatically operable to pick up a work piece at one point and deliver it to a different point in its revolution, and means automatically operable to move the head inward and outward relative to its axis of revolution at different predetermined points in its revolution.

5. In a machine of the class described, a revoluble member, a suction head carried by said member and pneumatically operable to pick up a work piece at one point and deliver it to a different point in its revolution, means automatically operable to raise and lower the head at predetermined points in its revolution, and means automatically operable to move the head inward and outward relative to its axis of revolution at different predetermined points in its revolution.

6. In a machine of the class described, a horizontally revoluble member, a suction head carried by the member for radial and vertical movements relative thereto, means automatically operable to create a suction in the head at one point in its revoluble movement and then release it, means automatically operable to periodically raise and lower the suction head relative to the carrying member, and means periodically operable to radially move the suction head relative to the member.

7. In a machine of the class described, a suction head, means carrying the suction head for revolutional movements, and means associated with the carrying means and operable to impart different predetermined movements to the head relative to the carrying means at predetermined points in its revolution, and means for creating a suction in the head at one point and then releasing it at a different point in its revolution.

8. In a machine of the class described, a rotatable member, a suction head movably carried by the member and pneumatically operable to pick up an article at one point and deliver it to another point in its revolution, and means automatically operable at predetermined points in a revolution of the suction head to retard and advance the head relative to the carrying member.

9. In a machine of the class described, a turn-table, a radially disposed arm turnable with the table and adapted to have limited revoluble movements relative to the table in the plane of its rotation, a suction head carried by the member and pneumatically and automatically operable to pick up an article at one point in a revolution of the member and deliver it to another point in such revolution, and means operable to periodically retard and advance the member relative to the table.

10. In a machine of the class described, a turn-table, a suction head carried by said table for radial, vertical and horizontal oscillatory movements relative thereto, separate means for periodically imparting the separate movements to the head relative to the table, and means for creating a suction in the head at one position in its movement with the table, maintaining the suction until the head is moved to a different predetermined position and then releasing the suction.

11. In a machine of the class described, a turn-table driven at constant speed, a work carrying arm carried by the table for revoluble movements therewith and capable of relative advancing and retarding movements relative thereto, cam operated means for periodically advancing and retarding the arm during a revolution thereof with the table, and means carried by the arm and pneumatically operable to pick up an article at one point and deliver it to another point in a revolution of the arm.

12. In a machine of the class described, a turn-table constantly driven at uniform speed, an arm revoluble with the table and capable of limited advancing and retarding movements relative thereto, means carried by the arm and pneumatically operable to pick up a work piece at one point and deliver it to another point in a revolution of the arm, and means for imparting predetermined advancing and retarding movements to the arm relative to the table at different predetermined points in its revolution.

13. In a machine of the class described, a rotatable means, a suction head, means carrying the suction head for revoluble movements with the rotatable means and for different predetermined movements relative

thereto, and separate means operable to impart different movements to the head at predetermined points in its revolution.

14. In a machine of the class described, a revoluble arm, a slide frame carried by the arm for longitudinal movements therein, work picking up and carrying means movably carried by the frame, means automatically operable to raise and lower the work picking up means when the frame is reciprocating, and means for reciprocating the frame at different predetermined points in a revolution of the arm.

15. In a machine of the class described, a revoluble member, means movably carried by said member and pneumatically operable to pick up an article at one point and deliver it to another point in its revolution, and means automatically operable to impart predetermined rocking movements to the work picking up and carrying means during predetermined portions of its revolution with the member.

16. In a machine of the class described, a revoluble arm, a frame carried by the arm for movement longitudinally thereof, a work picking up head carried by the frame for differential movements relative thereto, means for imparting predetermined reciprocatory movements to the frame at each revolution of the arm, means to raise and lower the head, and means automatically operable during predetermined portions of a revolution of the arm to impart predetermined horizontal rocking movements to the head.

17. In a machine of the class described, a revoluble arm, a frame carried by the arm for movements longitudinally thereof, means automatically operable to impart predetermined reciprocatory movements to the frame relative to the arm at each revolution thereof, a head carried by the frame and automatically operable to pick up articles at one point and deliver them to another point in a revolution of the arm, and means automatically operable by movements of the frame in the arm to impart predetermined raising and lowering to the head.

18. In a machine of the class described, an article conveyor having linear movements, a revoluble member, an article picking up and carrying head carried by said member for different movements relative thereto, means for creating a suction in the head during a predetermined portion of its revolution and releasing the suction at a predetermined article delivery point, and means automatically operable to move the head into article picking up register with the conveyer means and maintaining such register during a predetermined portion of a revolution of the head.

19. In a machine of the class described, an article conveyer having linear movements, a revoluble member adapted to pass over the conveyer during a portion of its revoluble movement, an article picking up head carried by the member, separate means automatically operable to impart vertical, radial and horizontal rocking movements to the head to maintain it in article picking up register with the conveyer during a predetermined portion of a revolution of the head, and means for creating a suction in the head at one point in its revolution and releasing it at another point in its revolution.

In testimony whereof I have hereunto signed my name to this specification.

HUBERT A. MYERS.