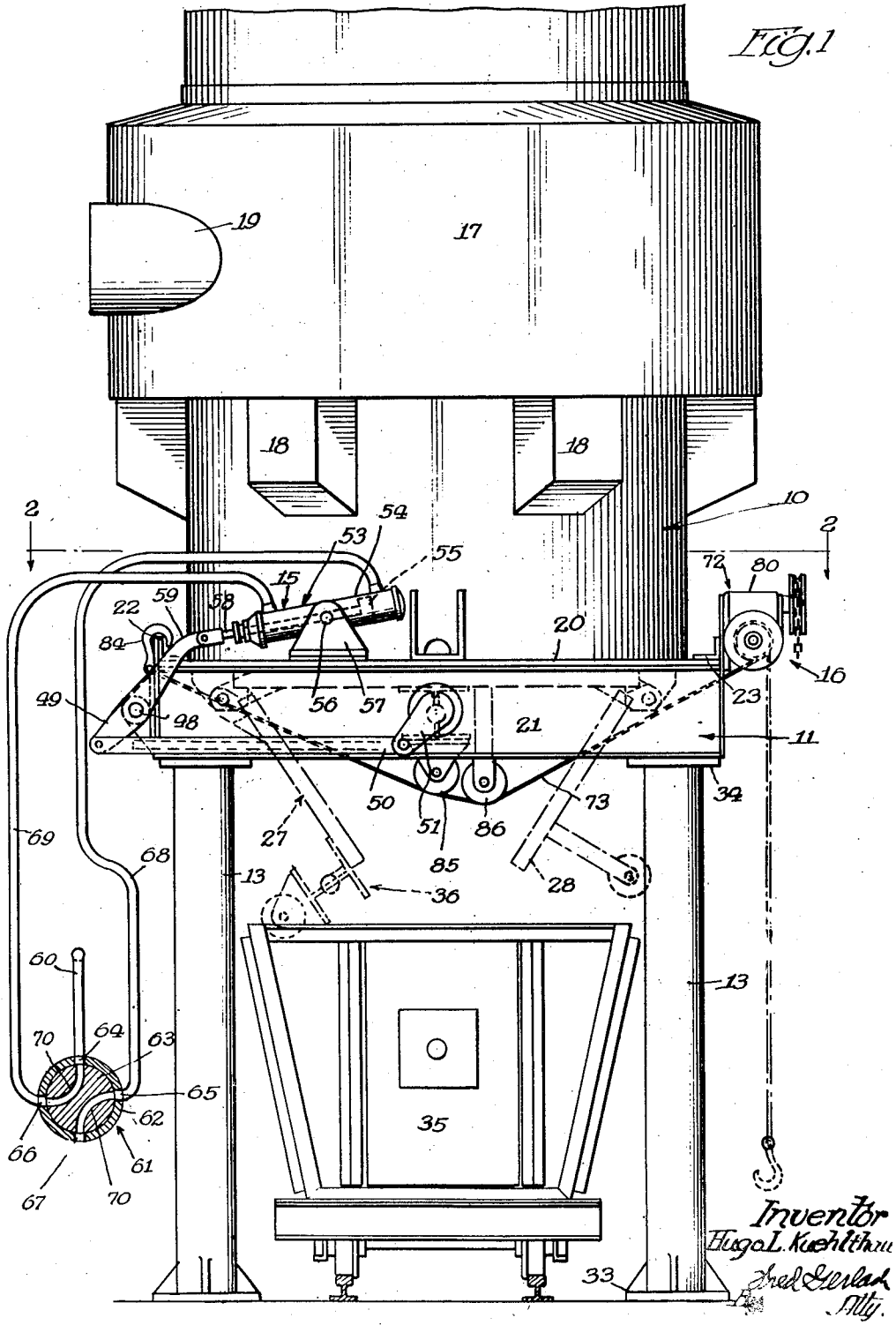
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CUPOLA

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FIG. 1



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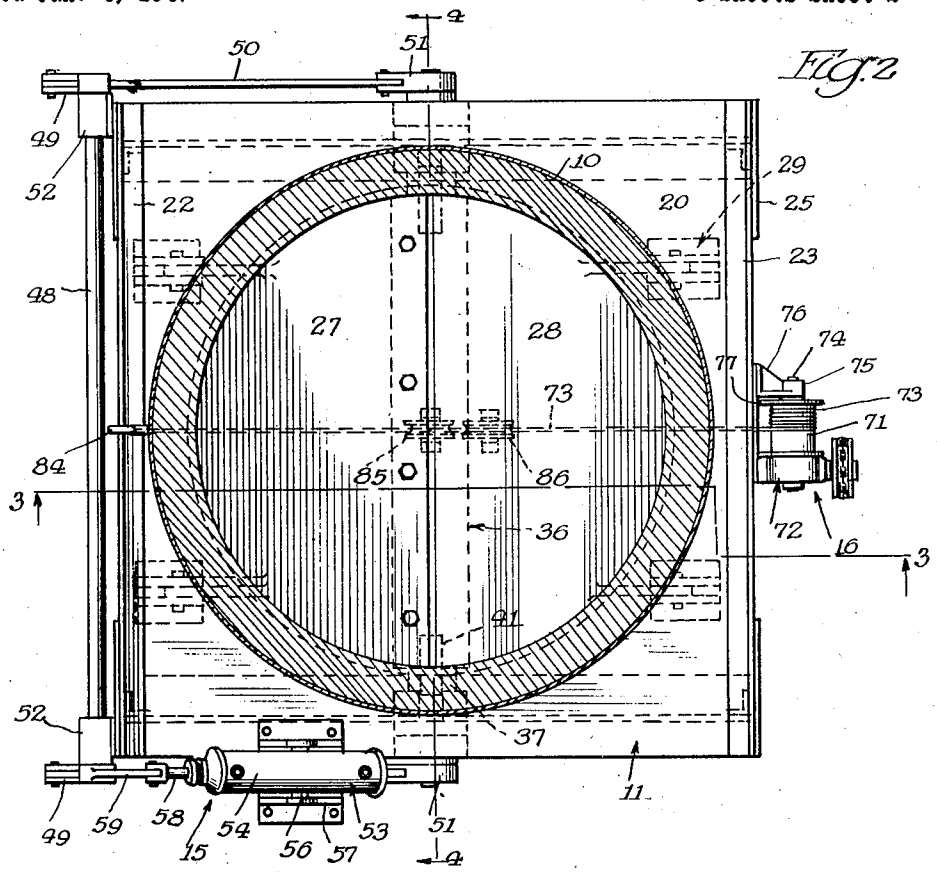


Fig. 2

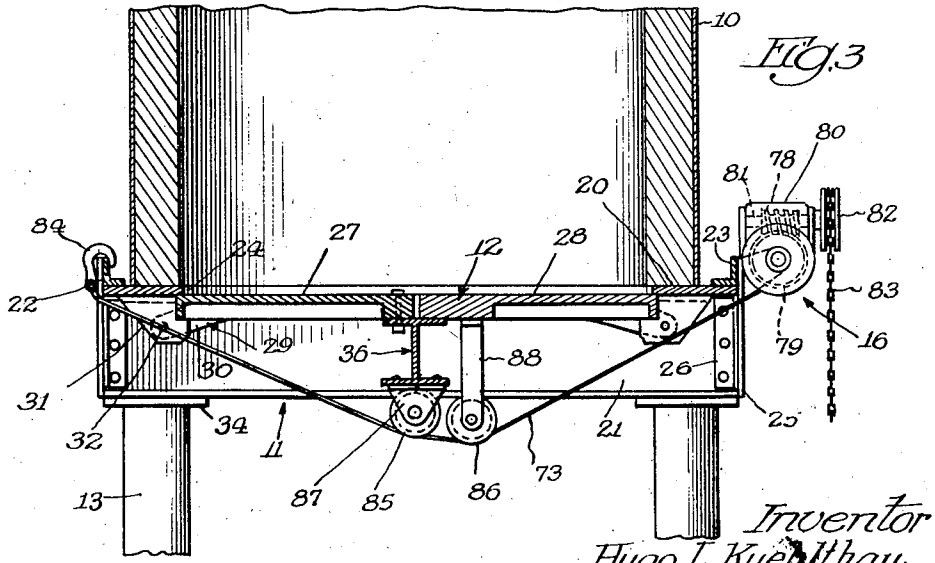


Fig. 3

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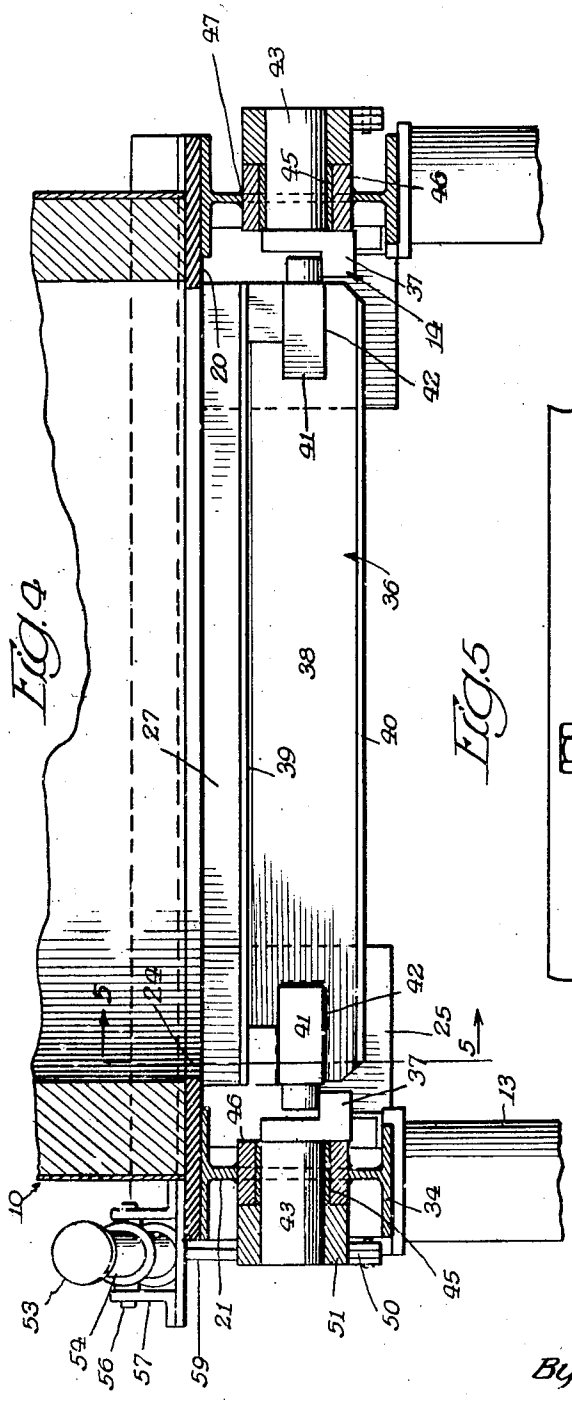


FIG. 4

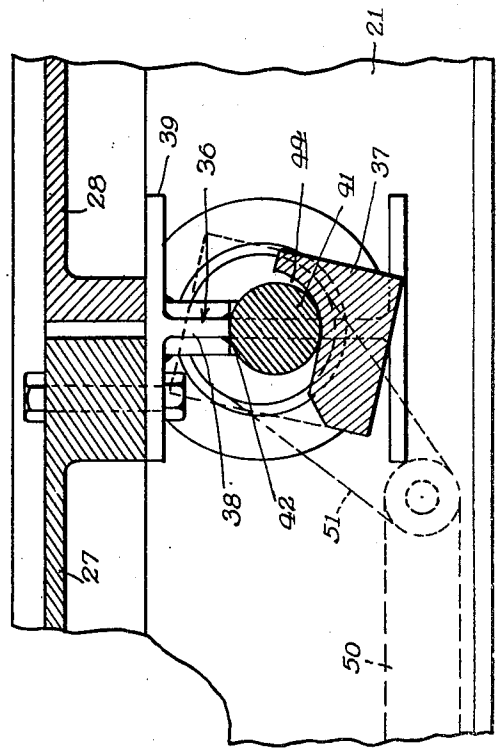


FIG. 5

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UNITED STATES PATENT OFFICE

2,513,569

CUPOLA

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Application January 4, 1947, Serial No. 720,161

7 Claims. (Cl. 266—25)

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The present invention relates generally to cupolas. More particularly the invention relates to that type of cupola which serves as an instrumentality or medium for melting metal, is supported in an elevated position by way of a plurality of laterally spaced legs and comprises an upstanding cylindrical shell having at the lower end thereof a drop bottom in the form of a pair of oppositely disposed, complemental, hinged doors.

In connection with operation of a cupola of the aforementioned type it has heretofore been the practice to utilize a vertically extending prop to maintain the doors constituting the shell bottom in their closed position. At the conclusion of a metal melting operation the prop is jerked from under the doors by the cupola operator. As soon as the prop is jerked from its operative position the doors swing downwards and the residual materials within the cupola fall onto the subjacent portion of the floor over which the cupola is mounted. After opening of the doors the discharged materials are shoveled into a suitable receptacle in order that they may be taken to a dump. The practice of utilizing an upstanding prop for holding the doors in their closed position during operation of the cupola is subject to certain objections. In the first place the cupola operator in connection with jerking of the prop from under the doors is likely to be injured, especially when the doors are heavy and there is a large amount of residual materials within the cupola shell. Secondly, the use of a prop precludes a receptacle from being placed under the cupola so as to receive or catch the residual materials after downward swinging of the doors.

One object of the invention is the provision, in connection with a cupola of the type under consideration, of a novel latch arrangement which, when in its operative or locked position, serves to hold the bottom forming doors in their closed position and, when released, permits the doors to swing downwards into their open position. By employing such a latch arrangement injury to the cupola operator is avoided and it is possible prior to opening or unlatching of the doors to insert under the cupola a receptacle for receiving the residual materials within the cupola directly upon opening of the doors.

Another object of the invention is to provide in addition to the latch arrangement remotely controlled power means for shifting the latch arrangement into and out of its operative or latched position.

A further object of the invention is the provision of novel power means for swinging the cupola doors upwards into their closed position preparatory to effecting shift of the latch arrangement into its operative or latched position.

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Other objects of the invention will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter specified and are more particularly defined by claims at the conclusion hereof.

In the drawings which accompany and form a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a fragmentary side view of a cupola embodying the invention;

Figure 2 is a horizontal section taken on the line 2—2 of Figure 1 and illustrating in detail the construction and arrangement of the power means for shifting the latch arrangement into and out of its operative or latched position;

Figure 3 is a fragmentary vertical section taken on the line 3—3 of Figure 2 and showing the construction, design and arrangement of the power means for swinging the bottom forming doors of the cupola upwards into their closed position;

Figure 4 is an enlarged vertical section taken at right angles to Figure 3 and on the line 4—4 of Figure 2, and illustrating the design and construction of the latch arrangement for releasably holding the doors in their closed position; and

Figure 5 is an enlarged vertical transverse section taken on the line 5—5 of Figure 4 and showing one of the latches constituting the latch arrangement.

The cupola which is shown in the drawings constitutes the preferred form or embodiment of the invention. It is designed primarily for use in a foundry to melt metal and as its principal components comprises a shell 10, a bottom structure 11 having a drop bottom 12, legs 13 for supporting the shell in an elevated position with respect to the floor of the foundry or other establishment in which the cupola is disposed, a latch arrangement 14 for latching or retaining the drop bottom in its operative or closed position, power means 15 for shifting the latch arrangement into and out of its latched position and power means 16 for swinging the drop bottom into its closed position.

The cupola shell 10 is of standard or conventional construction and has the interior or inner periphery thereof lined with refractory material.

It is cylindrical so far as contour or configuration is concerned and embodies at a point slightly above the bottom structure 11 an annular wind box 17 and a circular series of equidistantly spaced tuyères 18. The wind box is provided with a tangentially arranged nipple 19 whereby it may be connected to receive air under pressure from a compressor or other source (not shown). The tuyères 18 are located beneath the wind box 17 and serve to introduce air under pressure from the wind box into the interior of the shell in order to promote combustion of the combustible material with which the shell is charged.

The bottom structure 11 of the cupola comprises in addition to the drop bottom 12, a square bottom plate 20, a pair of parallel, laterally spaced I-beams 21 and a pair of parallel, laterally spaced angle bars 22 and 23. The bottom plate 20 underlies and projects outwards from the lower end of the cupola shell 10 and has a central circular opening 24 which is substantially the same in diameter as the shell interior. The I-beams 21 underlie, and extend lengthwise of, two opposed marginal portions of the bottom plate 20. They are arranged so that the webs thereof extend vertically and have the upper flanges thereof suitably fixedly secured to the superjacent marginal portions of the bottom plate 20. The angle bars 22 and 23 extend at right angles to the I-beams 21. They correspond in length to the I-beams and embody horizontal, inwardly extending legs and vertical, outwardly disposed legs. The horizontal legs of the angle bars rest on, and are welded or otherwise fixedly secured to, the other two side marginal portions of the bottom plate 20 of the cupola bottom structure 11. The ends of the angle bars are connected to the ends of the I-beams by way of vertically extending gusset plates 25 and vertically extending angle bars 26 in order that the bottom structure 11 is rigid. The upper marginal portions of the plates 25 are welded or riveted to the ends of the vertical legs of the angle bars 22 and 23 and the outer side margins of the gusset plates are connected to the ends of the webs of the I-beams by way of the vertically extending angle bars 26. The drop bottom 12 constituting a part of the cupola bottom structure 11 consists of a pair of oppositely disposed, complemental, semi-circular doors 27 and 28 and these are connected to the bottom plate 20 by way of hinges 29 in order that they are capable of swinging downwards from a closed position wherein they are horizontal into an open position wherein they hang down under the supporting structure 11. The doors are so arranged that when they are in their normal or closed position the chordal margins thereof are in aligned and abutting relation. As well understood in the art the drop bottom is covered with sand before the cupola is placed in operation. There are preferably two hinges for each of the doors. Each hinge comprises a door carried hinge arm 30, a pair of angle brackets 31 and a pivot pin 32. The hinge arms 30 of the hinges are connected to the under sides of the doors and extend outwards as shown in dotted lines in Figure 2. The pairs of angle brackets 31 are connected to, and depend from, the bottom plate 20 and are arranged in straddled relation with the outer ends of the hinge arms 30. The pivot pins 32 extend through aligned holes in the vertical parts of the angle brackets 31 and the outer ends of the hinge arms 30.

The legs 13 of the cupola are four in number and extend vertically. The lower ends of the legs have floor engaging feet 33 and the upper ends of the legs have rigid horizontal plates 34 which underlie, and are welded, riveted or otherwise fixedly secured to, the ends of the bottom flanges of the I-beams 21. As shown in Figure 1, the legs 13 are spaced laterally apart a sufficient distance to permit a wheel equipped open top receptacle 35 to be moved under the cupola shell 10. It is contemplated that after operation of the cupola the receptacle 35 will be moved into the position shown in Figure 1 wherein it is disposed under the cupola shell. It is also contemplated that after proper positioning of the receptacle the doors 27 and 28 constituting the drop bottom 12 will be swung downwards into their open position to the end that the residual materials within the cupola shell will fall directly into the receptacle. The top of the receptacle is at least as large as the opening 24 in the bottom plate 20 in order that the receptacle when properly positioned beneath the drop bottom will catch all of the residual materials upon opening of the bottom.

The latch arrangement 14 serves releasably to hold the doors constituting the drop bottom in their operative or closed position and comprises an I-beam 36 and a pair of latches 37. The I-beam extends at right angles to the I-beams 21 and consists of a web 38, a top flange 39 and a bottom flange 40. One side portion of the top flange of the I-beam 36 underlies and is bolted to the chordal margin of the door 27 and the other side portion of said top flange is adapted when the drop bottom of the cupola is in its closed position to underlie and support the chordal margin of the door 28, as best shown in Figures 3 and 5. The ends of the I-beam 36 terminate inwards of the I-beams 21 (see Figure 4) and are provided with a pair of studs 41. The latter extend lengthwise of the I-beam 36 and have the inner end portions thereof disposed within cutouts 42 in the ends of the web 38 of the I-beam 36. The cutout defining portions of the web are welded to the inner ends of the studs in order that the studs are held in fixed or rigid relation with the I-beam 36. The outer ends of the studs are cylindrical and when the two doors are in their closed position are disposed directly inwards of the central portions of the webs of the I-beams 21. The latches 37 are mounted on the inner ends of a pair of laterally spaced coaxial stub shafts 43. They embody arcuate seats 44 for the outer ends of the studs 41 and are adapted after the doors 27 and 28 are swung upwards into their closed position, to be swung into a position wherein they underlie said outer ends of the studs and thus hold the doors in their closed position. Reverse swinging or rotation of the latches disengages them from the outer ends of the studs and frees the doors so that they drop downwards into their open position. The arcuate seats are so designed and arranged that when the latches are swung into their latched position while the doors are but partially closed they will cam the doors upwards into fully closed position. The stub shafts 43 are rotatably mounted in bearings 45 which fit within collars 46. As shown in Figure 4 the collars extend through aligned holes in the central portions of the webs of the I-beams 21. The hole defining portions of said webs are welded to the central portions of the collars 46 in order that the collars are held in fixed or rigid relation with the I-beams 21. The stub shafts 43 are connected to-

gether for conjoint rotation by way of a rock shaft 48, a pair of arms 49, a pair of links 50 and a pair of arms 51. The rock shaft 48 extends horizontally and is located beneath and outwards of the angle bar 22 of the bottom structure 11. It extends in parallel relation with said angle bar and has its ends journalled in a pair of bearings 52. As best shown in Figure 2, such bearings are mounted on certain of the gusset plates 25. The arms 49 are fixedly connected to, and project downwards from, the ends of the rock shaft 48. The arms 51 are connected to, and project downwards from, the outer ends of the stub shafts 43 and are arranged in parallel relation with the arms 49. The links 50 extend horizontally and have certain of the ends thereof pivotally connected to the outer ends of the arms 49. The other ends of the links are pivotally connected to the outer or distal ends of the arms 51. When the rock shaft 48 is rocked in a counterclockwise direction as viewed in Figure 1 it operates, through the medium of the arms 49, the links 50, the arms 51 and the stub shafts 43, conjointly to swing the latches 37 out of their latched position wherein, as previously pointed out, they underlie the outer ends of the studs 41. Reverse rocking of the rock shaft operates to swing the latches into their latched position. It is contemplated that after the bottom forming doors 27 and 28 are swung upwards into their operative or closed position the rock shaft will be rocked so as to cause the latches to swing into latched relation with the studs 41. At the conclusion of operation of the cupola the rock shaft is rocked so as to disengage the latches from the studs. As soon as the latches are swung out of engagement with the studs the doors, in response to the action of gravity, swing downwards.

The power means 15 for shifting the latch arrangement 14 into and out of its latched position comprises a cylinder-piston device 53 and this is positioned over one of the I-beams 21 and consists of a cylinder 54 and a piston 55. The cylinder 53 is provided on the central portion thereof with a pair of aligned outwardly extending trunnions 56 and is pivotally supported by way of a U-shaped bracket 57 which, as shown in Figures 1 and 2, is mounted on the bottom plate 20 of the bottom structure 21. The trunnions 56 fit rotatably within bearing forming holes in the sides of the bracket 57 and permit the cylinder to tilt in a vertical plane. The piston 55 is slidably mounted in the cylinder 54 and is provided with a rod 58 which extends slidably through a packing gland at one end of the cylinder and has its outer end pivotally connected to the upper end of an upwardly extending arm 59. The lower end of such arm is fixedly connected to the rock shaft 48. When the piston is slid in one direction it operates, through the medium of the piston rod 58 and the arm 59, to rock the rock shaft 48 in one direction. Opposite sliding movement of the piston results in rocking of the rock shaft in the opposite direction. As heretofore pointed out rocking of the rock shaft in one direction effects swinging of the latches 37 into their operative or latched position and reverse rocking of the rock shaft operates to swing the latches into their unlatched position with respect to the studs 41 on the outer ends of the I-beam 36. The cylinder-piston device 53 is controlled by, and forms a part of a fluid pressure system comprising a supply pipe 60 and a 2-way valve 61. The supply pipe 60 is connected to an air compressor or any other suitable source (not shown) of air under pressure. The 2-way valve 61 is located any suitable distance from the cupola and consists of a casing 62 and a rotatable plug 63. The casing has a top port 64, a pair of side ports 65 and 66, and a bottom port 67. The discharge end of the air supply pipe 60 is connected to the top port 61. The side port 65 is connected to one end of the cylinder 54 of the cylinder-piston device 53 by a flexible pipe 68 and the side port 66 is connected to the other end of the cylinder by a flexible pipe 69. The bottom port 67 is open to atmosphere and serves as a venting medium. The plug 63 of the 2-way valve 61 embodies a pair of diametrically opposite arcuate ducts 70. Each of these ducts extends through an arc of 90° and is adapted to bridge and establish communication between two adjoining ports in the valve casing 62. When the plug is positioned as shown in Figure 1 one of the ducts 70 effects communication between the ports 64 and 66 and the other duct effects communication between the ports 65 and 67. This arrangement of the plug results in air under pressure flowing from the air supply pipe 60 into one end of the cylinder 54 via the port 64, the one duct 70 and the pipe 69 and also results in venting of the other end of the cylinder by way of the pipe 68, the port 65, the other duct 70 and the port 67. The air under pressure entering the one end of the cylinder causes sliding movement of the piston 55 in one direction. When the plug 63 of the valve 61 is turned throughout an arc of 90° from the position shown in Figure 1 one of the ducts 70 bridges and establishes communication between the ports 64 and 65 and the other duct 70 establishes communication between the ports 66 and 67. In connection with such positioning of the plug air under pressure is delivered from the air supply pipe 60 into the other end of the cylinder via the port 64, the one duct 70, the port 65 and the pipe 68 and the one end of the cylinder is vented by way of the pipe 69, the port 66, the other duct 70 and the port 67. Upon entry of air under pressure into said other end of the cylinder the piston is caused to slide in the opposite direction. As heretofore pointed out sliding movement of the piston in one direction results in swinging of the latches 37 into their latched position and sliding movement of the piston in the opposite direction results in swinging of the latches into their unlatched position wherein they free the bottom forming doors 27 and 28 so that they swing downwards into their open position.

The power means 16 for swinging the doors constituting the drop bottom 12 upwards into their closed position is in the form of a winch comprising a rotatable drum 71, a gear unit 72 for turning the drum, and a cable 73. The drum and gear unit are positioned in side by side relation adjacent the central portion of the angle bar 23. The drum extends around and is fixedly secured to a horizontally extending shaft 74, the ends of which are journalled in bearings 75. The latter are connected by way of brackets 76 to a vertically extending plate 77 which is welded or otherwise fixedly secured to the central portion of the vertical flange of the angle bar 23. The gear unit 72 comprises a worm 78 and a worm wheel 79 and these are disposed in a gear box 80. The worm wheel surrounds, and is keyed to one end of, the shaft 74 and is in mesh with, and adapted to be driven by, the worm 78. The latter is mounted on a horizontally extending shaft 81 which is journalled in suitable bearings in the gear box. One end of the shaft projects outwards of the gear box and is provided with a chain wheel

82. An endless chain 83 is trained around the chain wheel 82. When the chain is pulled in one direction it operates through the medium of the chain wheel 82, the shaft 81, the worm 78 and the worm wheel 79 to turn the drum 71 in one direction. Reverse pulling of the chain results in reverse turning of the drum. One end of the cable 73 is anchored to, and wound around, the drum and the other end of the cable is provided with a hook 84. When it is desired to use the power means 16 to swing the bottom forming doors 27 and 28 upwards into their operative or closed position the hook 84 is hooked onto the central portion of the vertical leg of the angle bar 22. When the hook is so hooked the central portion of the cable underlies the doors 27 and 28. After hooking of the hook onto the angle bar 22 the drum is turned so as to draw up on the cable. As the cable is drawn up or wound around the drum it operates to swing the doors upwards. Upward thrust resulting from drawing up of the cable is transmitted to the door 27 by a sheave 85 and is transmitted to the door 27 by way of a sheave 86. The sheave 85 extends vertically, is mounted rotatably on an inverted U-shaped bracket 87, the intermediate part of which fits against, and is connected to, the central portion of the bottom flange 40 of the I-beam 36. The sheave 86 extends vertically and is mounted rotatably on one end of an elongated bracket 88. The other end of the bracket 88 is connected to the chordal margin of the door 28. The bracket 88 is of such length that when the two doors 27 and 28 are in their closed position the sheave 86 is disposed at a lower level than the sheave 85. As a result of this the door 28, in connection with a door closing operation, closes slightly ahead of the door 27. As shown in Figure 3, the central portion of the cable 73 is trained around the sheaves 85 and 86.

After use of the cupola the wheel equipped receptacle 35 is wheeled into place under the drop bottom 12. Thereafter the valve 62 is manipulated so as to cause air under pressure to enter the right hand end of the cylinder 54 as viewed in Figure 1. This results in the piston being shifted to the left and operating through the medium of the piston rod 58, the arm 59, the rock shaft 48, the arms 49, the links 50, the arms 51 and the stub shafts 43 to swing the latches 37 into their unlatched position. As soon as the latches are swung into such position the doors 27 and 28 are released and drop downwards by gravity. In connection with downward swinging of the doors the residual materials in the cupola shell fall into the receptacle 35. When it is desired to close the bottom forming doors the hook 84 on the outer end of the cable 73 is hooked onto the central portion of the angle bar 22 and the central portion of the cable is trained around the sheaves 85 and 86. After the hook is hooked in place the drum 71 of the winch is turned so as to wind up the cable. In connection with winding up of the cable the doors are caused to swing upwards into their closed position. As soon as the doors reach such position the valve 62 is shifted into its other position in order so to control the cylinder-piston device that the latter operates to swing the latches into their latched position wherein, as previously pointed out, they underlie the studs 41 on the end of the I-beam 36. After the latches are in place the hook 84 is unhooked from the angle bar 22.

The herein described cupola may be manipulated with facility so far as opening and closing of the bottom forming doors is concerned and this is directly attributable to the fact that it includes the latch arrangement 14, the power means 15 for shifting the latch arrangement into and out of its latched position, and the power means 16 for swinging the doors into their closed position.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

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

1. In a cupola of the type that comprises an elevated shell adapted for use in melting material therein and provided with a horizontal frame-like bottom structure including a bottom hinged to swing upwards and downwards into and out of a closed position wherein it extends across the lower end of the shell, and a structural element underlying and extending across the bottom and rigidly connected to the latter, the combination of a latch arrangement adapted releasably to hold the bottom in its closed position and embodying a pair of studs connected fixedly to, and projecting outwards from, the ends of the structural element and a pair of latches associated with the studs, respectively, and mounted on the bottom structure so that when the bottom is in its closed position they are capable of being swung about a horizontal axis into and out of a latched position wherein they underlie said studs, and means mounted on the bottom structure and including a horizontal rock shaft for connecting the latches for conjoint swinging movement.

2. In a cupola of the type that comprises an elevated shell adapted for use in melting material therein and provided with a horizontal frame-like bottom structure including a bottom hinged to swing upwards and downwards into and out of a closed position wherein it extends across the lower end of the shell, and a structural element underlying and extending across the bottom and rigidly connected thereto, a latch arrangement adapted releasably to hold the bottom in its closed position and embodying a pair of studs connected fixedly to, and projecting outwards from, the ends of the structural element and a pair of latches associated with the studs, respectively, and mounted on the bottom structure so that when the bottom is in its closed position they are capable of being swung about a horizontal axis into and out of a latched position wherein they underlie said studs, means mounted on the bottom structure and including a horizontal rock shaft for connecting the latches for conjoint swinging movement, and power means mounted on said bottom structure and arranged and adapted to effect rocking of the rock shaft in either direction.

3. In a cupola of the type that comprises an elevated shell adapted for use in melting material therein and provided with a horizontal frame-like bottom structure including a bottom hinged to swing upwards and downwards into and out of a closed position wherein it extends across the lower end of the shell, and a structural element underlying and extending across the bottom and connected rigidly to the latter, the combination of a latch arrangement adapted releasably to hold the bottom in its closed position and embodying a pair of studs connected fixedly to, and

projecting outwards from, the ends of the structural element and a pair of latches associated with the studs, respectively, and mounted on the bottom structure so that when the bottom is in its closed position they are capable of being swung about a horizontal axis into and out of a latched position wherein they underlie said studs, means mounted on the bottom structure and including a horizontal rock shaft for connecting the latches for conjoint swinging movement, and fluid pressure means adapted and arranged to effect rocking of the rock shaft in either direction and including a cylinder-piston device mounted on the bottom structure and operatively connected to said rock shaft.

4. In a cupola of the type that comprises an elevated cylindrical shell adapted for use in melting material and provided with a frame-like bottom structure including a drop bottom in the form of a pair of oppositely disposed, complemental, semi-circular doors hinged to swing upwards and downwards into and out of a closed position wherein they extend across the lower end of the shell, and an elongated structural element underlying and extending across the chordal margin of one of the doors, connected rigidly thereto and adapted to underlie and support the chordal margin of the other door when the two doors are in their closed position, the combination of a latch arrangement adapted releasably to hold the bottom in its closed position and embodying a pair of studs connected fixedly to, and projecting outwards from, the ends of the structural element and a pair of latches associated with the studs, respectively, and mounted on the bottom structure so that when the bottom is in its closed position they are capable of being swung about a horizontal axis into and out of a latched position wherein they underlie said studs, and means on said bottom structure for connecting the latches together for conjoint swinging movement.

5. In a cupola of the type that comprises an elevated cylindrical shell adapted for use in melting material and provided with a frame-like bottom structure including a drop bottom in the form of a pair of oppositely disposed, complemental, semi-circular doors hinged to swing upwards and downwards into and out of a closed position wherein they extend across the lower end of the shell, and an elongated structural element underlying and extending across the chordal margin of one of the doors, connected rigidly thereto and adapted to underlie and support the chordal margin of the other door when the two doors are in their closed position, the combination of a latch arrangement adapted releasably to hold the bottom in its closed position and embodying a pair of studs connected fixedly to, and projecting outwards from, the ends of the structural element and a pair of latches associated with the studs, respectively, and mounted on the bottom structure so that when the bottom is in its closed position they are capable of being swung about a horizontal axis into and out of a latched position wherein they underlie said studs, and means mounted on the bottom structure and including a horizontal rock shaft for connecting the latches for conjoint swinging movement.

6. In a cupola of the type that comprises an elevated cylindrical shell adapted for use in melting material and provided with a frame-like bottom structure including a drop bottom in the form of a pair of oppositely disposed, complemental, semi-circular doors hinged to swing upwards and downwards into and out of a closed position wherein they extend across the lower end of the shell, and an elongated structural element underlying and extending across the chordal margin of one of the doors, connected rigidly thereto and adapted to underlie and support the chordal margin of the other door when the two doors are in their closed position, the combination of a latch arrangement adapted releasably to hold the bottom in its closed position and embodying a pair of studs connected fixedly to, and projecting outwards from, the ends of the structural element and a pair of latches associated with the studs, respectively, and mounted on the bottom structure so that when the bottom is in its closed position they are capable of being swung about a horizontal axis into and out of a latched position wherein they underlie said studs, means mounted on the bottom structure and including a horizontal rock shaft for connecting the latches for conjoint swinging movement, and power means mounted on said bottom structure and arranged and adapted to effect rocking of the rock shaft in either direction.

7. In a cupola of the type that comprises an elevated cylindrical shell adapted for use in melting material and provided with a frame-like bottom structure including a drop bottom in the form of a pair of oppositely disposed, complemental, semi-circular doors hinged to swing upwards and downwards into and out of a closed position wherein they extend across the lower end of the shell, and an elongated structural element underlying and extending across the chordal margin of one of the doors, connected rigidly thereto and adapted to underlie and support the chordal margin of the other door when the two doors are in their closed position, the combination of a latch arrangement adapted releasably to hold the bottom in its closed position and embodying a pair of studs connected fixedly to, and projecting outwards from, the ends of the structural element and a pair of latches associated with the studs, respectively, and mounted on the bottom structure so that when the bottom is in its closed position they are capable of being swung about a horizontal axis into and out of a latched position wherein they underlie said studs, means mounted on the bottom structure and including a horizontal rock shaft for connecting the latches for conjoint swinging movement, and fluid pressure means adapted and arranged to effect rocking of the rock shaft in either direction and including a cylinder-piston device mounted on the bottom structure and operatively connected to said rock shaft.

HUGO L. KUEHLTHAU.

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