Jan. 30, 1945. M. G. CLAY 2,368,116

FLASK FILLING APPARATUS

Filed April 26, 1943 5 Sheets-Sheet 1

FIG. 2

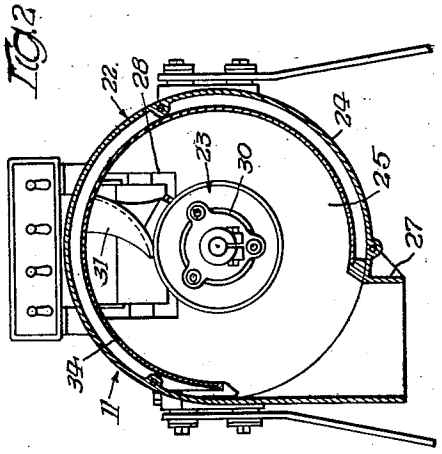
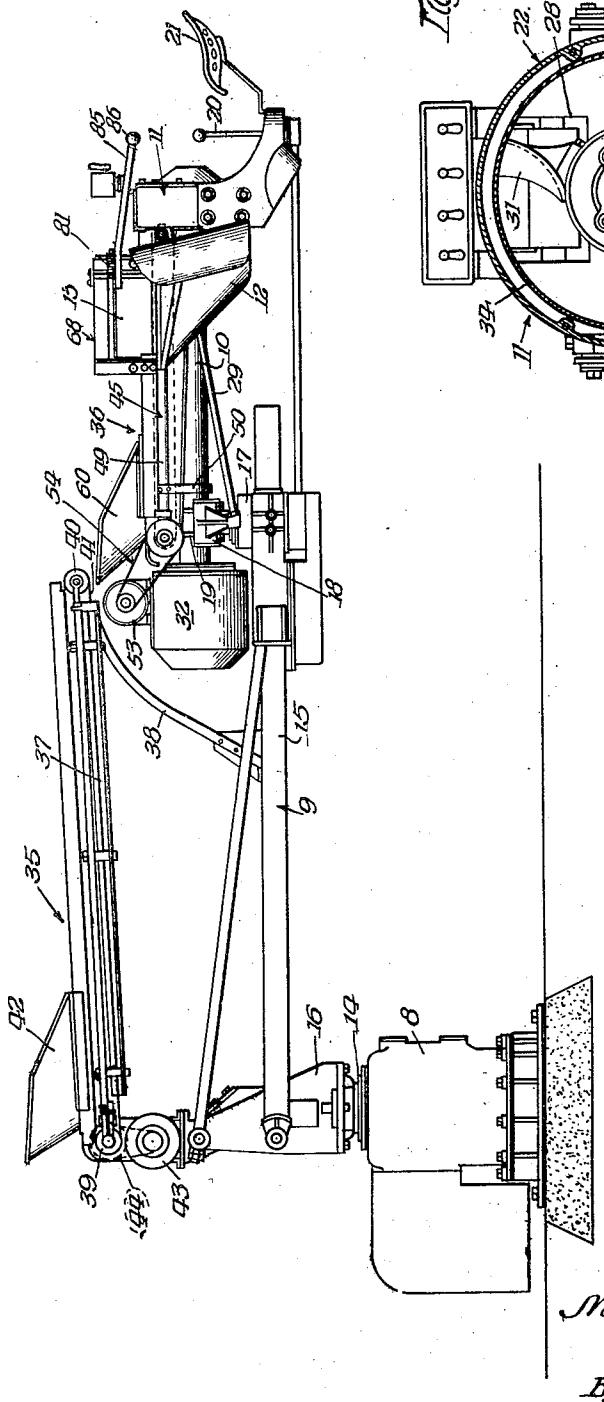


FIG. 1

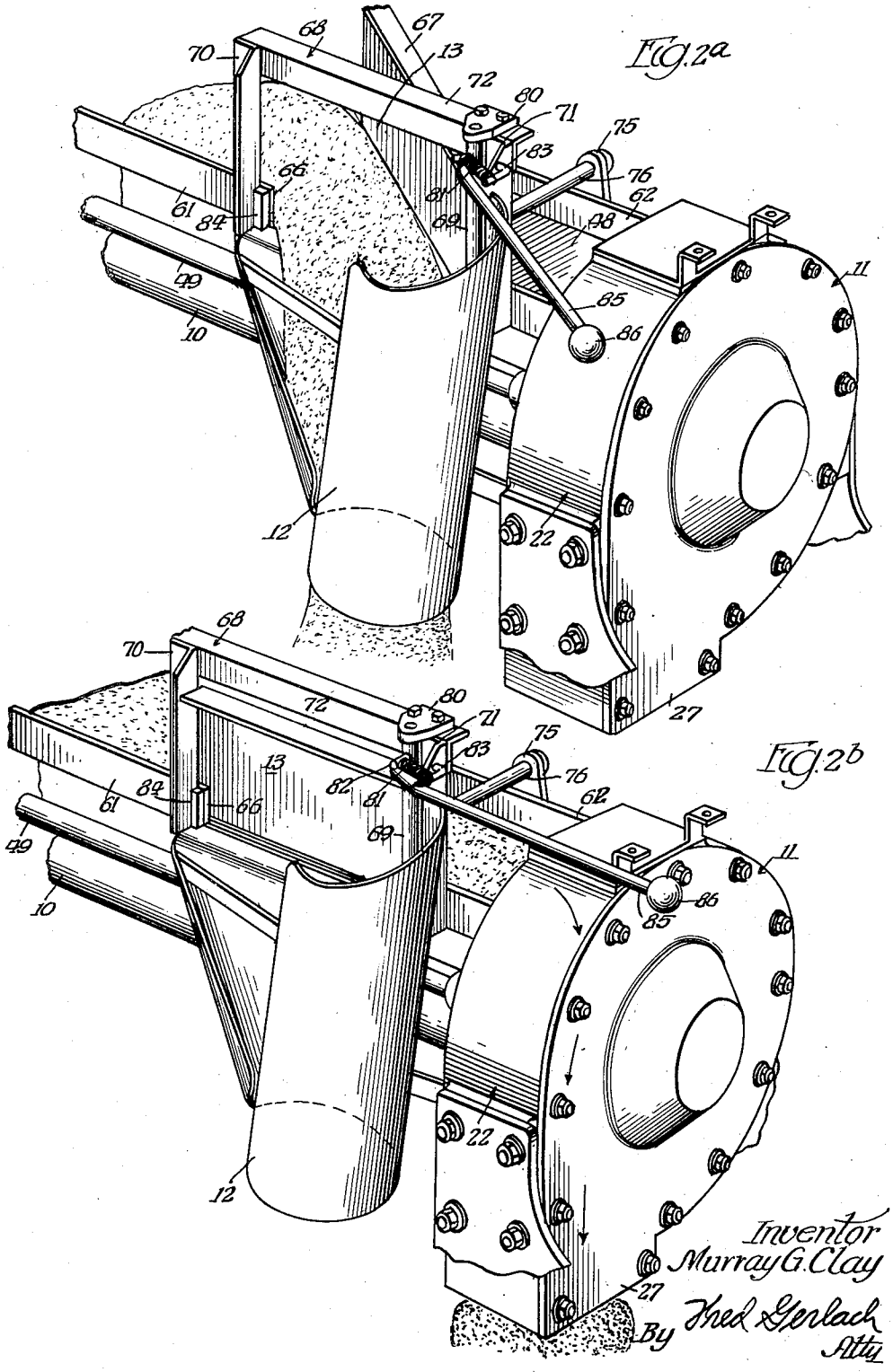


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FLASK FILLING APPARATUS

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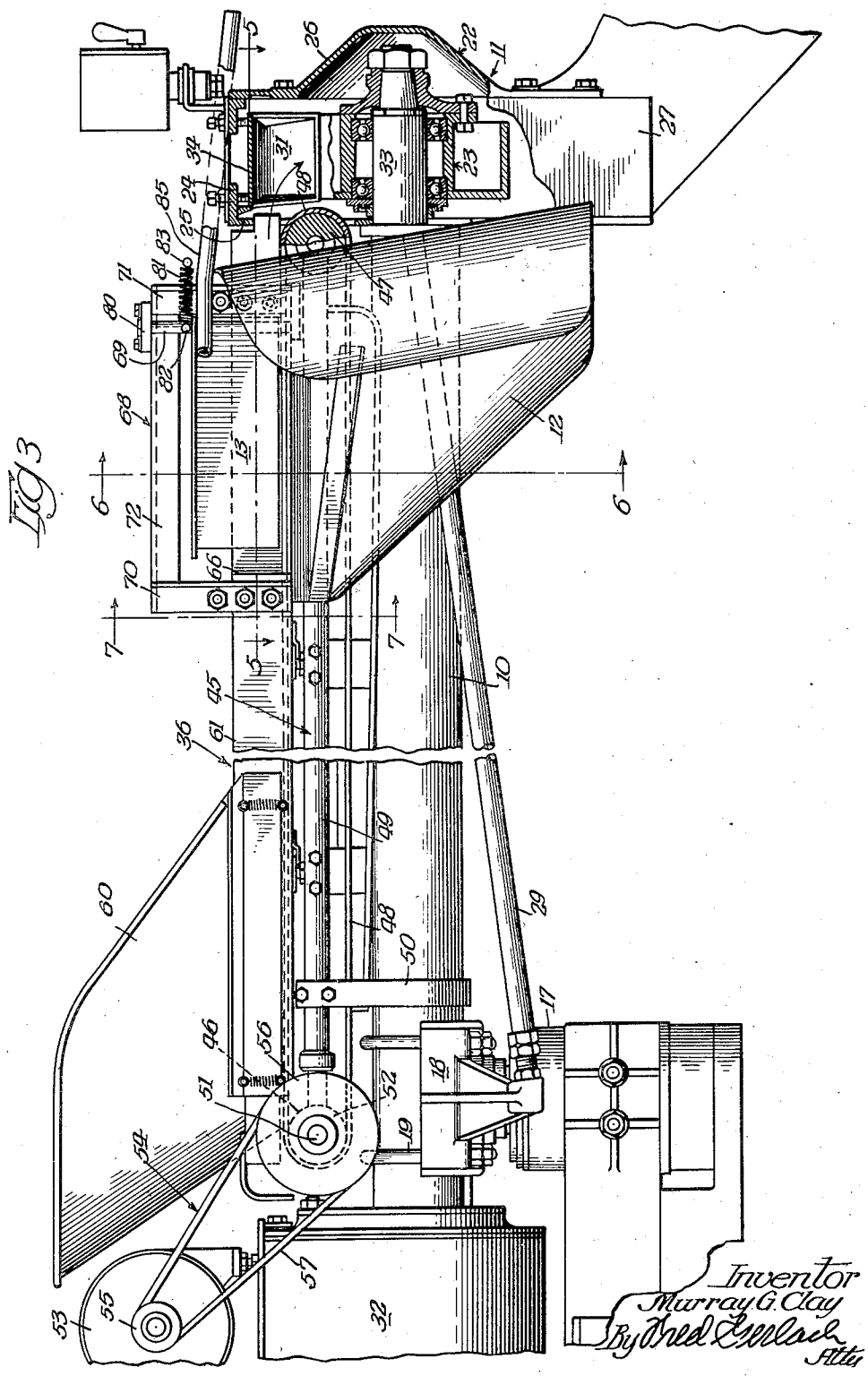


FIG 3

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FLASK FILLING APPARATUS

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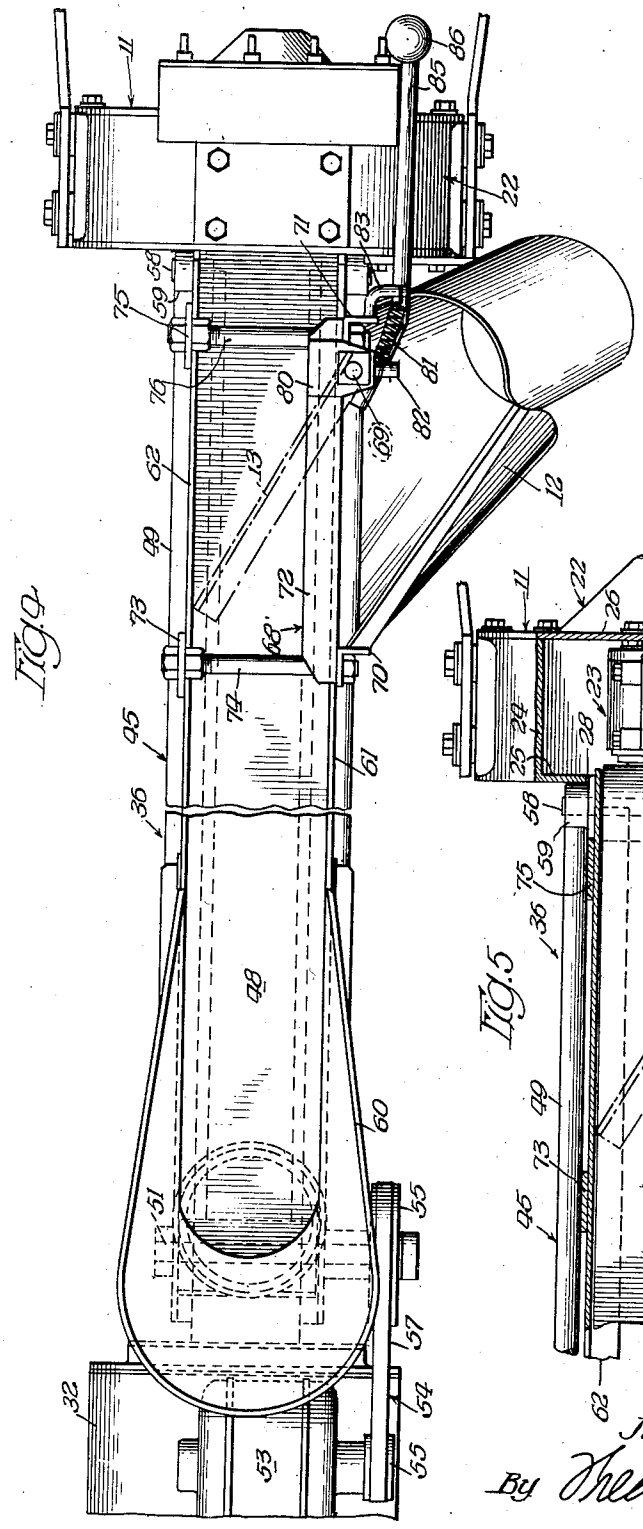


FIG. 4

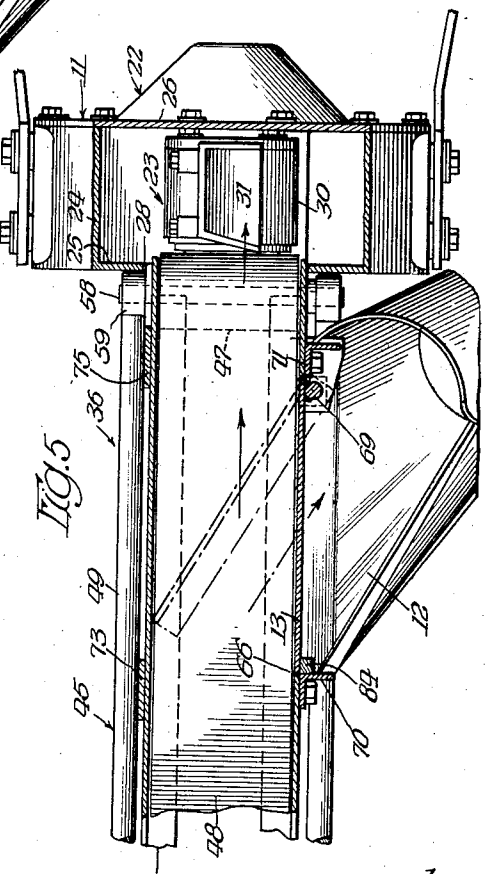


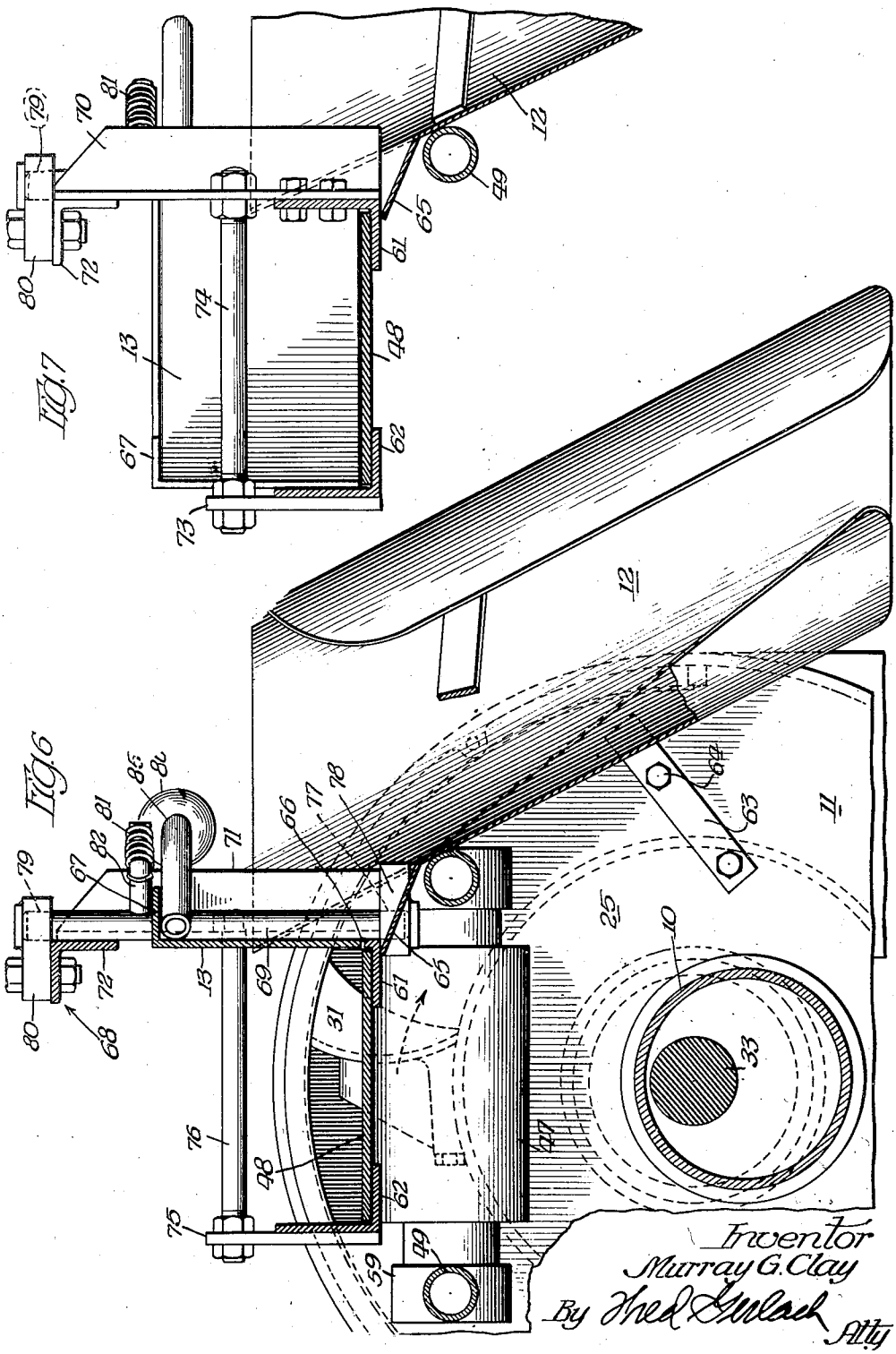
FIG. 5

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FLASK FILLING APPARATUS

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Patented Jan. 30, 1945 2,368,116

UNITED STATES PATENT OFFICE

2,368,116

FLASK FILLING APPARATUS

Murray G. Clay, Chicago, Ill., assignor to The Beardsley & Piper Company, Chicago, Ill., a corporation of Illinois

Application April 26, 1943, Serial No. 484,559

18 Claims. (Cl. 22—36)

The present invention relates generally to apparatus for filling flasks with molding sand in connection with the formation of castings. More particularly the invention relates to that type of flask filling apparatus which is known in the art as a "Sandslinger" and as its principal or primary parts comprises: (1) a movably mounted rotary projector which consists of a casing with a sand inlet at the top thereof and a downwardly facing outlet at its bottom, and a blade equipped motor driven rotor in the casing, and operates during drive of the rotor to form the sand that is delivered into the casing via the inlet into wads and to discharge the wads downwards through the outlet into a subjacent flask; and (2) a power driven endless conveyor which is associated and movable with the projector and serves in connection with operation of the projector to deliver sand in stream form through the inlet into the interior of the projector-casing.

It has heretofore been the practice in connection with the filling of a flask having a delicate pattern therein manually to apply facing sand around the entire pattern or the delicate parts thereof and then to pack the facing sand in place and fill the flask by delivering wads of backing sand into the flask by way of an apparatus of the aforementioned type. If the apparatus were used initially to fill the flask the wads would, because of their compactness and velocity, damage the pattern and thus preclude the making of a satisfactory casting. Because of the work and effort incident to applying the facing sand by hand around the pattern the aforementioned practice is objectionable and not only is costly but also requires a comparatively large amount of time.

One object of the invention is to provide a flask filling apparatus of the type under consideration which includes means whereby in connection with the filling of a flask having a delicate pattern therein, sand, such as facing sand, may be delivered directly from the endless conveyor and in stream form into the flask preliminary or preparatory to wad ramming of the flask by the rotary projector. By employing such means the cost and time incident to filling a flask having a delicate pattern therein are materially reduced and the objection to the previous foundry practice or technique is obviated.

Another object of the invention is to provide a flask filling apparatus of the last mentioned character in which the means for delivering sand from the power driven endless conveyor into the flask in stream form comprises a downwardly extending chute at one side of the casing of the rotary projector and a plow type deflector which is movably mounted above the upper end of the chute so that it is shiftable back and forth between an operative position wherein it extends diagonally across the upper reach of the conveyor and an inoperative position wherein it is located at one side of the conveyor, and serves when in its operative position to deflect the sand on the upper reach of the conveyor into the chute for discharge into the subjacent flask.

A further object of the invention is to provide a flask filling apparatus of the last mentioned character in which the plow type deflector is urged into its inoperative position by spring means and has associated with it a handle which is disposed within reach of the operator of the apparatus and serves as a medium for permitting the operator to move the deflector into its operative position.

A still further object of the invention is to provide a flask filling apparatus which is generally of new and improved construction and has greater capabilities of use and is more efficient than previously designed apparatus for the same general purpose.

Other objects of the invention and the various advantages and characteristics of the present flask filling apparatus will be apparent from a consideration of the following detailed description.

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

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 side elevation of a flask filling apparatus embodying the invention;

Figure 2 is an enlarged vertical transverse section taken on the line 2—2 of Figure 1 and illustrating the construction and design of the rotary projector;

Figure 2^a is a fragmentary perspective of the apparatus showing the plow type deflector in its operative position wherein it serves to deflect sand in stream form into the chute from the conveyor.

Figure 2^b is a similar fragmentary perspective of the apparatus showing the plow type deflector in its inoperative position and the projector projecting wads of sand downwards;

Figure 3 is an enlarged fragmentary side ele-

vation of the apparatus, certain parts being broken away and other parts being shown in section for purposes of illustration;

Figure 4 is an enlarged plan view of the flask filling apparatus and illustrating the design and arrangement of the plow type deflector and chute constituting the means for delivering sand directly to the flask to be filled or rammed;

Figure 5 is a horizontal section taken on the line 5—5 of Figure 3 and showing the plow type deflector in its inoperative position wherein it is disposed at one side of the power driven endless conveyor and permits the conveyor to feed sand in stream form into the projector for wad forming and projecting purposes;

Figure 6 is an enlarged vertical transverse section taken on the line 6—6 of Figure 3 and showing in detail the manner in which the plow type deflector is pivotally supported so that it is shiftable into and out of its operative position wherein it extends diagonally across the upper reach of the endless conveyor; and

Figure 7 is an enlarged vetical section taken on the line 7—7 of Figure 3 and showing the plow type deflector in its operative position and also illustrating the construction and design of the frame structure which is associated with, and serves to support, the plow type deflector and chute.

The apparatus which is shown in the drawings constitutes the preferred form or embodiment of the invention. It is designed for use in a foundry or like establishment and serves as a medium for filling or ramming flasks with molding sand in connection with the formation or production of castings. As its parts the flash filling apparatus comprises a base 8, a jib 9, an arm 10, a rotary projector 11, a chute 12, and a plow type deflector 13.

The base 8 together with the jib 9, the arm 10 and certain auxiliary parts serves to support the projector 11 so that it is movable universally to a limited extent in a horizontal plane and hence may be manipulated or shifted so as to fill all portions of a subjacent flask. As shown in Figure 1, the base 8 is mounted on the floor of the foundry or other establishment in which the apparatus is used. Instead of being mounted on the floor the base may, if desired, be mounted on a wheeled truck so that the apparatus may be moved from place to place. The upper portion of the base 8 is provided with a bearing 14, the axis of which extends vertically.

The jib 9 extends horizontally and comprises a pair of elongated, parallel, laterally spaced jib members 15, but one of which is shown in the drawings. It also comprises a housing type bracket 16 at its inner end and a bearing 17 at its outer end. The bracket 16 overlies the base 8 and is provided with a depending pivot shaft (not shown) which is journalled in the bearing 14 at the upper portion of the base. This pivot shaft together with the bearing 14 permits the jib 9 to swing horizontally throughout an arc of 360 degrees. The inner or proximal ends of the jib members 15 straddle and are suitably secured to the sides of the housing type bracket 16. The bearing 17 is arranged so that the axis thereof extends vertically, and is suitably mounted on the outer or distal ends of the jib members 15. A vertically extending pivot shaft (not shown) is journalled in the bearing 17 and this shaft is provided at its upper end with a horizontally extending cradle 18.

The arm 10 extends horizontally and is in the form of a tube. The inner end of the arm fits in the cradle and is fixedly secured thereto by way of U-bolts 19. The outer end of the arm 10 carries the rotary projector 11. The pivot shaft which is journalled in the bearing 17 and is provided at its upper end with the cradle 18 permits the arm 10 to swing horizontally substantially throughout an arc of 360 degrees. As a result of the manner in which the jib and arm are mounted the projector 11 may, as previously pointed out, be shifted universally to a limited extent in a horizontal plane. If desired the flask filling apparatus may be provided with mechanism for automatically moving the projector in response to control movements of an upstanding lever 20. Such mechanism is disclosed in, and forms the subject matter of, an application for United States Letters Patent filed by Elmer O. Beardsley and me on August 23, 1940, Serial No. 353,882. The control lever 20 is of the joy stick variety and is suitably supported in front of the projector 11. A seat 21 for the operator of the apparatus is located and supported in front of the control lever 20.

The rotary projector 11 operates to form molding sand into wads and to project such wads downward in rapid succession into a subjacent flask for flask filling purposes. It is positioned at the distal end of the arm 10 and comprises a casing 22 and a rotor 23. The casing 22 is substantially cylindrical and embodies an annular wall 24, an inner end wall 25, and an outer end wall 26. The annular wall 24 of the projector-casing is positioned so that the axis thereof extends horizontally, and has a downwardly extending tangentially arranged discharge member 27. The latter constitutes the outlet for the casing 22 of the projector. The inner end wall 25 extends across, and serves to close, the inner end of the annular wall 24 and has in the upper portion thereof a rectangular opening forming a sand inlet 28. The central portion of the outer or rear face of the inner end wall 25 is welded or otherwise fixedly secured to the distal end of the arm 10. The projector is additionally secured in place at the distal end of the arm 10 by way of a pair of braces 29. The latter are arranged in straddled relation with the arm 10 and have the inner ends thereof secured to the cradle 18 and their outer ends attached or fixed to the inner end wall 25 of the projector-casing. The outer end wall 26 serves as a closure for the outer end of the annular wall 24 and is removably secured in place so that upon removal thereof access may be had to the interior of the casing. The rotor 23 of the projector 11 is disposed in the central portion of the casing 22 and consists of a hub 30 and a blade 31. It is driven from an electric motor 32 through the medium of a shaft 33. The motor 32 is fixedly connected to the inner or proximal end of the arm 10. The shaft 33 extends longitudinally through the arm 10 and has the inner end thereof suitably connected to the armature shaft of the motor 32. The outer end of the shaft 33 extends through a hole in the central portion of the inner end wall 25 of the projector-casing and is keyed or otherwise fixedly secured to the hub 30 of the rotor 23. The blade 31 is connected to, and extends outwardly from, the hub 30 of the rotor and is adapted to swing around the inner periphery of the annular wall 24 during drive of the rotor by the electric motor 32. When the rotor is driven the blade 31 operates to form the sand within the casing into wads and to sling or project the wads downwards through the discharge member 27

into the subjacent flask. The blade is preferably rotated between 1200 and 1800 R. P. M. The sand which enters the projector-casing via the inlet 28 flows into the upper portion of the casing. During drive of the rotor by the electric motor the blade 31 picks up the sand in the upper portion of the casing and swings it around an arcuate liner 34 until the discharge member 27 is reached. During travel around the liner the sand, as the result of the action of centrifugal force, is formed or packed into a wad which when the blade reaches the discharge member 27 is projected therethrough. The liner 34, as shown in Figure 2, fits against the inner periphery of the annular wall 24 of the projector-casing and extends from the low side of the discharge member 27 to the high side of such discharge member. Sand is delivered into the interior of the casing of the projector 11 by way of an endless conveyor 35 over the jib 9 and an endless conveyor 36 over the arm 10.

The endless conveyor 35 comprises an elongated frame structure 37, one end of which is supported on the upper end of the housing type bracket 16 and the other end of which is disposed over the projector driving electric motor 32 and is supported by way of a bracket 38 on the central portion of the jib 9. In view of the manner in which the frame structure 37 is supported or mounted the endless conveyor 35 is caused to move or swing conjointly with the jib. In addition to the frame structure 37 the endless conveyor 35 comprises a drive pulley 39, an idler pulley 40, and an endless belt 41 around the two pulleys. The drive pulley is rotatably mounted at the inner end of the elongated frame structure 37, that is, the end that is supported by the housing type bracket 16. The idler pulley is rotatably mounted at the other or outer end of the frame structure 37. The endless belt 41 comprises upper and lower reaches and is adapted to be driven by the drive pulley 37 so that the upper reach thereof feeds from the inner end of the frame structure 37 to the outer end of said structure. A hopper 42 is mounted on the inner end of the frame structure 37 and serves to direct sand from an overhead source of supply onto the inner or receiving end of the upper reach of the belt 41. The drive pulley 39 is driven from an electric motor 43 by way of a belt and pulley connection 44. When the motor 43 is driven the belt operates to feed sand in stream form from the hopper 42 and discharge the sand downwards as it passes over the idler pulley 40 at the outer end of the elongated frame structure 37. The electric motor 43 for driving the endless conveyor 35 is mounted on the upper end of the housing type bracket 16.

The endless conveyor 36 serves to convey the sand from the discharge end of the endless conveyor 35 into the interior of the projector-casing 22. It is bodily movable with the projector carrying arm 10 and comprises an elongated frame structure 45, a drive pulley 46, an idler pulley 47, and an endless belt 48. The elongated frame structure 45 extends lengthwise of the arm 10 and consists of a pair of tubular rods 49. The latter overlie and are spaced outwards from the arm 10 and are supported in parallel relation with the arm by way of upstanding U-shaped brackets 50. The drive pulley 46 is located at the inner end of the elongated frame structure 45 and is provided with a fixed supporting shaft 51, the ends of which are journalled in bearings 52 at the inner ends of the tubular rods 49 constituting the elongated frame structure 45. As shown in Figures 1 and 2, the drive pulley 46 is located directely in front of the electric motor 32 for driving the rotary projector 11 and is driven by an electric motor 53 through the medium of a pulley and belt connection 54. The motor 53 is mounted on the upper portion of the electric motor 32 and is arranged so that the armature shaft thereof extends transversely of the arm 10. The pulley and belt connection 54 consists of a pulley 55 on one end of the armature shaft of the electric motor 53, a pulley 56 on one end of the shaft 51, and an endless belt 57 around these two pulleys. The idler pulley 47 is located at the outer end of the elongated frame structure 45 and extends across the rectangular inlet forming opening 28 in the upper portion of the inner end wall 25 of the projector-casing. It is disposed in parallel relation with the drive pulley 45 and embodies a supporting shaft 58, the ends of which are journalled in bearings 59 on the outer ends of the tubular rods 49. The endless belt 48 is trained around the pulleys 46 and 47, as best shown in Figure 3, and embodies a horizontal upper reach and a horizontal lower reach. A hopper 60 is suitably mounted on the inner end of the elongated frame structure 45 of the endless conveyor 36. It is adapted to receive sand from the discharge end of the belt of the endless conveyor 35 and to deliver the sand into the inner end of the upper reach of the belt 48 of the endless conveyor 36. The electric motor 53 for driving the endless conveyor 36 is so constructed and arranged that during operation thereof it drives the belt 48 so that the upper reach thereof feeds from the hopper 60 towards the projector. When the flask filling apparatus is in operation as the result of the supply of current to the electric motors 32, 43 and 53, the endless conveyor 35 operates to feed sand in stream form from the hopper 42 into the hopper 60 and the endless conveyor 36 serves to feed the sand in stream form from the hopper 60 into the upper portion of the casing of the projector via the inlet 28. The feed of sand towards the projector is continuous irrespective of the position into which the projector is shifted or manipulated. The side margins of the upper reach of the endless belt 48 of the endless conveyor 36 are supported by way of a pair of horizontal angle bars 61 and 62. These two angle bars are located above, and slightly inwards of, the tubular rods 49 constituting the elongated frame structure 45 of the endless conveyor 35 and are suitably supported in fixed relation with the projector carrying arm 10. They embody horizontal inwardly extending legs and vertical upwardly extending legs at right angles to the horizontal legs. The horizontal legs of the two angle bars underlie and serve slidably to support the side margins of the upper reach of the belt 48, as shown in Figures 6 and 7. The vertical legs of the angle bars 61 and 62 lap the side edges of the upper reach of the conveyor belt 48 and serve to hold said upper reach against lateral displacement relatively to the drive pulley 46 and the idler pulley 47.

The chute 12 and the plow type deflector 13 serve as a medium for delivering sand in stream form from the belt 48 of the endless conveyor 36 directly into the subjacent flask. They are generally brought into play in connection with the application of facing sand to the pattern in the flask, especially if the pattern is a delicate one and would be likely to be damaged if directly contacted by wads of sand from the projector 11.

The chute 12 is located adjacent and outwards of the angle bar 61 and is positioned directly behind the casing 22 of the projector 11. It is preferably formed of sheet metal and is infundibular or funnel shaped. As shown in the drawings, the chute is inclined outwards and forwards so that the lower or discharge end thereof is disposed adjacent the discharge member 27 of the projector casing 22. The upper or receiving end of the chute terminates adjacent the upper edge of the upwardly extending vertical leg of the angle bar 61 and is suitably connected to the elongated frame structure 45 of the endless conveyor 38. The front central portion of the chute is welded or otherwise fixedly secured to one end of an attaching strip 63. The other end of such strip is fixedly secured to the inner end wall 25 of the projector-casing by way of cap screws 64. The upper inner portion of the chute is shaped to form a mouthpiece 65 and this underlies the inwardly extending horizontal leg of the angle bar 61, as shown in Figure 6. The portion of the upwardly extending vertical leg of the angle bar 61 that is directly above the mouthpiece 65 is provided with a rectangular cutout 66. The edge portion of the upwardly extending vertical leg of the angle bar 61 that defines the bottom of this cutout is substantially flush with the top face of the upper reach of the belt 48 (see Figure 6). The cutout 66 is disposed directly behind the projector and is longer than the space between the upwardly extending vertical legs of the angle bars 61 and 62.

The plow type deflector 13 is in the form of a vertically extending rectangular plate, the length of which corresponds to the length of the cutout 66. It is pivotally mounted as hereinafter described so that it is shiftable back and forth between an inoperative position wherein the lower portion thereof fits within the cutout and is longitudinally aligned with, and serves to complete, the upwardly extending vertical leg of the angle bar 61 and an operative position wherein it extends diagonally across the upper reach of the belt 48 and serves to direct the sand from the upper reach of the belt through the cutout 66 and thence over the mouthpiece 65 and downwards through the chute 12 into the subjacent flask. The upper margin of the plate constituting the plow type deflector 13 is provided with an outwardly extending right angle flange 67. The pivotal mount for the deflector comprises an inverted U-shaped frame 68 and a vertically extending pivot shaft 69. The frame 68 comprises a pair of vertically extending angle bars 70 and 71, and a horizontally extending angle bar 72. The angle bar 70 is located directly rearwards of the rear end of the cutout 66 and has the lower end thereof bolted to the adjacent portion of the upwardly extending vertical leg of the angle bar 61. The angle bar 71 is located directly forwards of the front end of the cutout 66 and has its lower end bolted to the adjacent portion of the upwardly extending vertical leg of the angle bar 61. The horizontally extending angle bar 72 extends between and is welded to the upper ends of the vertically extending angle bars 70 and 71. It consists of an inwardly extending horizontal leg and a depending vertical leg and is positioned above the outwardly extending right angle flange 67 along the upper margin of the deflector 13. The rear end of the frame 68 is reenforced by way of an elongated vertically extending strip 73 and a cross bolt 74 and the front end of the frame is reenforced by way of an elongated vertically extending strip 75 and a cross bolt 76. The strip 73 is transversely aligned with the angle bar 70 and has the lower end thereof welded or otherwise fixedly secured to the upwardly extending vertical leg of the angle bar 62. The cross bolt 74 extends through, and serves to cross connect, the upper ends of the strip 73 and the angle bar 70. The strip 75 is transversely aligned with the angle bar 71 and has the lower end thereof fixedly secured to said upwardly extending vertical leg of the angle bar 62. The cross bolt 76 extends through, and serves to cross connect, the upper ends of the strip 75 and the angle bar 71. The central portion of the vertically extending pivot shaft 69 fits against and is welded to the front end of the outer face of the deflector 13. The lower end of the pivot shaft is rotatably mounted in a vertically extending socket 77 in a lug type bracket 78 and the upper end of the pivot shaft extends into a hole in the front end of the outwardly extending right angle flange 67 and is rotatably mounted in a socket 79 in a lug type bracket 80. The bracket 78, as shown in Figure 6, is secured to, and projects outwardly from, the inwardly extending horizontal leg of the angle bar 61. The lug type bracket 79 is vertically aligned with the bracket 78 and is bolted to, and projects outwardly from, the inwardly extending horizontal leg of the angle bar 72 of the frame 68. The mount consisting of the frame 68 and the vertically extending pivot shaft 69 permits the plow type deflector 13 to swing laterally back and forth between its operative and inoperative positions. When the deflector is in its operative position wherein it extends diagonally across the upper reach of the belt 48 and serves to direct the sand from the belt into the chute 12 the rear or distal edge thereof abuts against the upwardly extending vertical leg of the angle bar 62. By reason of the fact that the pivot shaft for the deflector is located at the front end of the deflector, the deflector when in its operative position is automatically held in such position as the result of the sand impinging thereagainst. A tension spring 81 serves to urge the plow type deflector 13 into its inoperative position wherein the lower portion thereof fits within the cutout 66. One end of this spring is anchored to a radially extending pin 82 on the upper end of the pivot shaft 69 and the other end of the spring is anchored to an L-shaped pin 83. The latter, as best shown in Figure 4, is fixedly secured to the upper end of the angle bar 71 constituting part of the frame 68. A block 84 is connected to the lower end of the angle bar 70 (see Figure 5) and serves as a stop for preventing the plow type deflector from being urged or swung outwards past its normal or inoperative position. In order to permit the operator of the apparatus readily to swing or shift the plow type deflector 13 into its operative position a horizontally extending lever 85 is provided. This lever is located at one side of the rotary projector 11 and has the rear end thereof welded or otherwise fixedly secured to the central portion of the pivot shaft 69. The front end of the lever is located adjacent the operator's seat 21 of the apparatus and is provided with a handle 86. When it is desired to swing the plow type deflector 13 into its operative position the operator grasps the handle 86 and shifts its outwards from the projector. This results in the lever 86 swinging the de-

flector inwards into its sand deflecting position. When the handle equipped lever 85 is released at a time when the endless conveyor 36 is not in operation or no sand is being fed by the belt 48 the tension spring 81 serves to swing the plow type deflector 13 into its inoperative position.

When it is desired to fill or ram a flask having a delicate pattern therein the arm 10 is manipulated so as to bring the lower end of the chute 12 over the flask. Thereafter the apparatus is started by closing the circuits for the electric motors 32, 43 and 53. As soon as the apparaturs is started the operator arranges for facing sand to be delivered into the hopper 42 at the receiving end of the endless conveyor 35. At the same time the operator swings the plow type deflector 13 inwards into its operative position by swinging outwards the handle equipped lever 85. When the facing sand reaches the hopper 60 from the discharge end of the endless conveyor 35 it is fed forwards by the upper reach of the belt 48 of the conveyor 36 until it strikes the deflector 13. As soon as it strikes the deflector it is deflected through the cutout 66 and thence over the mouthpiece 65 and through the chute 12 into the flask. By shifting the arm 10 the chute may be caused to fill any desired portions of the flask with sand in loose or stream form. After a sufficient or desired quantity of facing sand has been introduced into the flask the operator arranges for backing sand to be delivered into the hopper 42 and swings the plow type deflector 13 into its inoperative position. As soon as the deflector is in its inoperative position the backing sand is fed by the upper reach of the belt 48 into the casing of the projector and the latter, as hereinbefore pointed out, projects the sand in wad form and at high speed downwards through the discharge member 27. By manipulating or shifting the projector the operator may completely fill the subjacent flask with wads from the projector 11. By initially delivering facing sand in stream or loose form into the flask by way of the chute 12 the delicate parts of the pattern are not damaged. During completion of the flask filling operation the wads from the projector 11 pack the facing sand around the pattern.

As a result of being provided with the chute 12 and the plow type deflector 13 the flask filling apparatus has increased capabilities of use and may be used or employed expeditiously to fill a flask having a delicate pattern therein. The chute and deflector make it possible to fill a receptacle other than a flask with loose sand as distinguished from sand in compact or wad form. Because of the simplicity of the chute and plow type deflector the apparatus may be constructed at a comparatively low cost.

The apparatus may, of course, be used to carry out foundry technique or practice other than that specifically described and is characterized by the fact that the chute and plow type deflector constitute simple means whereby the sand may be by-passed around the projector and directed in stream form directly into the subjacent flask.

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. An apparatus of the character described comprising in combination means for feeding material in stream form, means disposed at the discharge end of the feeding means and arranged to receive the material from said feeding means and project it in the form of successive wads into a receptacle, and a plow type deflector positioned adjacent the feeding means and ahead of the second mentioned means and movably mounted so that it is shiftable back and forth between an operative position wherein it serves to deflect the material in stream form laterally from the feeding means and prevent feed thereof to said second mentioned means, and an inoperative position wherein it permits the feeding means to feed the material to said second mentioned means.

2. A foundry apparatus of the character described comprising in combination means for feeding sand in stream form, a power driven projector arranged to receive the sand from the feeding means and project it in the form of successive wads into a flask, and a plow type deflector in associated relation with the feeding means and ahead of the projector, mounted so that it is shiftable back and forth between an operative position wherein it serves to deflect the sand directly from the feeding means into the flask, and an inoperative position wherein it does not affect the feed of sand to the projector.

3. A flask filling apparatus of the character described comprising in combination means for feedings and in stream form, a power driven rotary projector positioned at the discharge end of the feeding means and adapted to receive sand therefrom and project it in the form of successive wads into the flask, and a plow type deflector in associated relation with the feeding means positioned ahead of the deflector and movably mounted so that it is shiftable back and forth between an operative position wherein it serves to deflect the sand in stream form laterally from the feeding means and prevent feed thereof to the projector, and an inoperative position wherein it permits the feeding means to feed the sand to the projector.

4. A flask filling apparatus of the character described comprising in combination a power driven endless conveyor for feeding sand in stream form, a power driven projector located at the discharge end of the conveyor and adapted to receive sand therefrom and project it in the form of successive wads into the flask, and a plow type deflector positioned adjacent the conveyor and ahead of the projector and movably mounted so that it is shiftable back and forth between an operative position wherein it extends diagonally across the conveyor and serves to deflect the sand in stream form laterally therefrom, and an inoperative position wherein it permits the conveyor to feed the sand to the projector.

5. A flask filling apparatus of the character described comprising in combination a power driven endless conveyor for feeding sand in stream form, a power driven rotary projector located at the discharge end of the conveyor and adapted to receive sand therefrom and project it in the form of successive wads into the flask, and a plow type deflector disposed adjacent the conveyor and ahead of the projector and movably mounted so that it is shiftable back and forth between an operative position wherein it extends transversely across the conveyor and serves to deflect the sand in stream form laterally therefrom, and an inoperative position wherein it is disposed at one

side of the conveyor and permits the conveyor to feed sand to the projector.

6. A flash filling apparatus of the character described comprising in combination a power driven endless conveyor for feeding sand in stream form, a power driven rotary projector located at the discharge end of the conveyor and adapted to receive sand therefrom and project it in the form of successive wads into the flask, and a plow type deflector positioned adjacent the conveyor and ahead of the projector and pivotally mounted so that it may be swung back and forth between an operative position wherein it extends across the conveyor and serves to direct the sand in stream form laterally therefrom, and an inoperative position wherein it is disposed at one side of the conveyor and permits the sand to be fed to the projector.

7. A flash filling apparatus of the character described comprising in combination a conveyor for feeding sand in stream form, a power driven projector located at the discharge end of the conveyor and adapted to receive sand therefrom and project it in the form of successive wads into the flask, a chute positioned at one side of the conveyor and ahead of the projector, and a plow type deflector positioned in associated relation with the chute and the conveyor and mounted so that it is shiftable back and forth between an operative position wherein it extends across the conveyor and serves to deflect the sand in stream form from the conveyor into the chute, and an inoperative position wherein it permits the conveyor to feed sand to the projector.

8. A foundry apparatus of the character described comprising in combination a horizontal endless power driven conveyor for feeding sand in stream form, a power driven rotary projector located at the discharge end of the conveyor and adapted to receive the sand therefrom and project it in the form of successive wads downwards into a subjacent flask, a downwardly extending chute positioned adjacent the projector and having the upper end thereof disposed at one side of the conveyor and ahead of the projector, and a plow type deflector positioned in associated relation with the conveyor and chute and movably mounted so that it is shiftable back and forth between an operative position wherein it extends across the conveyor and serves to direct the sand in stream form from the conveyor into the chute for discharge into the flask, and an inoperative position wherein it is disposed at one side of the conveyor and permits the sand to be fed by the conveyor to the projector.

9. A foundry apparatus of the character described comprising in combination a horizontal endless power driven conveyor for feeding sand in stream form, a power driven rotary projector located at the discharge end of the conveyor and adapted to receive the sand therefrom and project it in the form of successive wads downwards into a subjacent flask, a downwardly extending chute positioned adjacent the projector and having the upper end thereof disposed at one side of the conveyor and ahead of the projector, and a plow type deflector positioned directly above the conveyor and adjacent the chute and pivotally mounted so that it may swing back and forth between an operative position wherein it extends diagonally across the conveyor and serves to direct the sand in stream form from the conveyor into the chute for discharge into the flask, and an inoperative position wherein it is disposed at one side of the conveyor and across the upper end of the chute and permits the sand to be fed by the conveyor to the projector.

10. A foundry apparatus of the character described comprising in combination means for feeding sand in stream form, a power driven projector arranged to receive the sand from the feeding means and project it in the form of successive wads into a flask, a plow type deflector in associated relation with the feeding means and ahead of the projector, mounted so that it is shiftable back and forth between an operative position wherein it serves to deflect the sand directly from the feeding means into the flask, and an inoperative position wherein it does not affect the feed of sand to the projector, and spring means for urging said deflector into its inoperative position.

11. A flask filling apparatus of the character described comprising in combination a power driven endless conveyor for feeding sand in stream form, a power driven rotary projector located at the discharge end of the conveyor and adapted to receive sand therefrom and project it in the form of successive wads into the flask, a plow type deflector positioned adjacent the conveyor and ahead of the projector and pivotally mounted so that it may be swung back and forth between an operative position wherein it extends across the conveyor and serves to deflect the sand in stream form laterally therefrom, and an inoperative position wherein it is disposed at one side of the conveyor and permits the sand to be fed to the projector, and spring means for urging said deflector into its inoperative position.

12. A foundry apparatus of the character described comprising in combination means for feeding sand in stream form, a power driven projector arranged to receive the sand from the feeding means and project it in the form of successive wads into a flask, a plow type deflector in associated relation with the feeding means and ahead of the projector, mounted so that it is shiftable back and forth between an operative position wherein it serves to deflect the sand directly from the feeding means into the flask, and an inoperative position wherein it does not affect the feed of sand to the projector, and a lever type handle for use in shifting the deflector and connected to said deflector and accessible from a point adjacent the projector.

13. A flask filling apparatus of the character described comprising in combination a power driven endless conveyor for feeding sand in stream form, a power driven rotary projector located at the discharge end of the conveyor and adapted to receive sand therefrom and project it in the form of successive wads into the flask, a plow type deflector disposed adjacent the conveyor and ahead of the projector and movably mounted so that it is shiftable back and forth between an operative position wherein it extends transversely across the conveyor and serves to deflect the sand in stream form directly therefrom, and an inoperative position wherein it is disposed at one side of the conveyor and permits the conveyor to feed sand to the projector, an elongated substantially horizontal lever extending along one side of the projector, having one end thereof connected to the deflector and its other end serving to form a handle in front of the projector, and adapted for use in shifting said deflector.

14. A flask filling apparatus of the character described comprising in combination a power driven endless conveyor for feeding sand in

stream form, a power driven rotary projector located at the discharge end of the conveyor and adapted to receive sand therefrom and project it in the form of successive wads into the flask, a plow type deflector positioned adjacent the conveyor and ahead of the projector and pivotally mounted so that it may be swung back and forth between an operative position wherein it extends across the conveyor and serves to direct the sand in stream form directly therefrom, and an inoperative position wherein it is disposed at one side of the conveyor and permits the sand to be fed to the projector, spring means for urging said deflector into its inoperative position, and an elongated substantially horizontal lever extending along one side of the projector, having one end thereof connected to the deflector and its other end serving as a handle, and adapted for use in swinging said deflector.

15. In a flask filling apparatus of the character described the combination of an arm having one end thereof pivoted so that it is free to swing horizontally, a horizontal power driven endless conveyor mounted over and longitudinally of the arm and adapted to feed sand in stream form from said one end of the arm to the other end of the arm, a power driven projector mounted on said other end of the arm and adapted to receive sand from the discharge end of the conveyor and project it in the form of successive wads into the flask, and a plow type deflector above the discharge end of the conveyor and ahead of the projector and movably mounted so that it is shiftable back and forth between an operative position wherein it extends transversely across the conveyor and serves to deflect the sand in stream form directly therefrom, and an inoperative position wherein it is disposed at one side of the conveyor and permits the conveyor to feed sand to the projector.

16. In a flask filling apparatus of the character described the combination of an arm having one end thereof pivoted so that it is free to swing horizontally, a horizontal power driven endless conveyor mounted over and longitudinally of the arm and adapted to feed sand in stream form from said one end of the arm to the other end of the arm, a power driven rotary projector mounted on said other end of the arm and adapted to receive sand from the discharge end of the conveyor and project it in the form of successive wads into the flask, a downwardly extending chute mounted adjacent said other end of the arm and ahead of the projector and having the upper end thereof disposed at one side of the conveyor, and a plow type deflector positioned above the conveyor and adjacent the upper end of the chute and movably mounted so that it is shiftable back and forth between an operative position wherein it extends across the conveyor and serves to direct that sand in stream form from the conveyor into the chute for discharge therefrom in stream form, and an inoperative position wherein it is disposed at one side of the conveyor and permits the sand to be fed by the conveyor to the projector.

17. A foundry apparatus of the character described comprising in combination an endless power driven conveyor having a substantially horizontal upper reach for feeding sand in stream form, a pair of laterally spaced parallel angle bars at the sides of the conveyor and embodying inwardly extending legs for supporting the side margins of the upper reach of the conveyor and forwardly extending legs, the upwardly extending leg of one of the angle bars having an elongated substantially full depth cutout therein, a power driven projector located at the discharge end of the upper reach of the conveyor and adapted to receive the sand therefrom and project it in the form of successive wads into a flask, and an elongated plow type deflector shaped to feed within the outout, having one end thereof pivoted at a point adjacent the end of the cutout that is nearer the projector, and adapted to swing back and forth between an operative position wherein it extends transversely across the upper reach of the conveyor, abuts against the upwardly extending flange of the other angle bar and serves to deflect the sand from said upper reach of the conveyor through the cutout, and an inoperative position wherein it extends along the cutout and permits the sand to be fed to the projector.

18. A foundry apparatus of the character described comprising in combination an endless power driven conveyor having a substantially horizontal upper reach for feeding sand in stream form, a pair of laterally spaced parellel angle bars at the sides of the conveyor and embodying inwardly extending legs for supporting the side margins of the upper reach of the conveyor and forwardly extending legs, the upwardly extending leg of one of the angel bars having an elongated substantially full depth cutout therein, a power driven projector located at the discharge end of the upper reach of the conveyor and adapted to receive the sand therefrom and project it in the form of successive wads into a flask, an elongated plow type deflector shaped to feed within the cutout, having one end thereof pivoted at a point adjacent the end of the cutout that is nearer the projector, and adapted to swing back and forth between an operative position wherein it extends transversely across the upper reach of the conveyor, abuts against the upwardly extending flange of the other angle bar and serves to deflect the sand from said upper reach of the conveyor through the cutout, and an inoperative position wherein it extends along the cutout and permits the sand to be fed to the projector, and spring means for urging the deflector into its inoperative position.

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