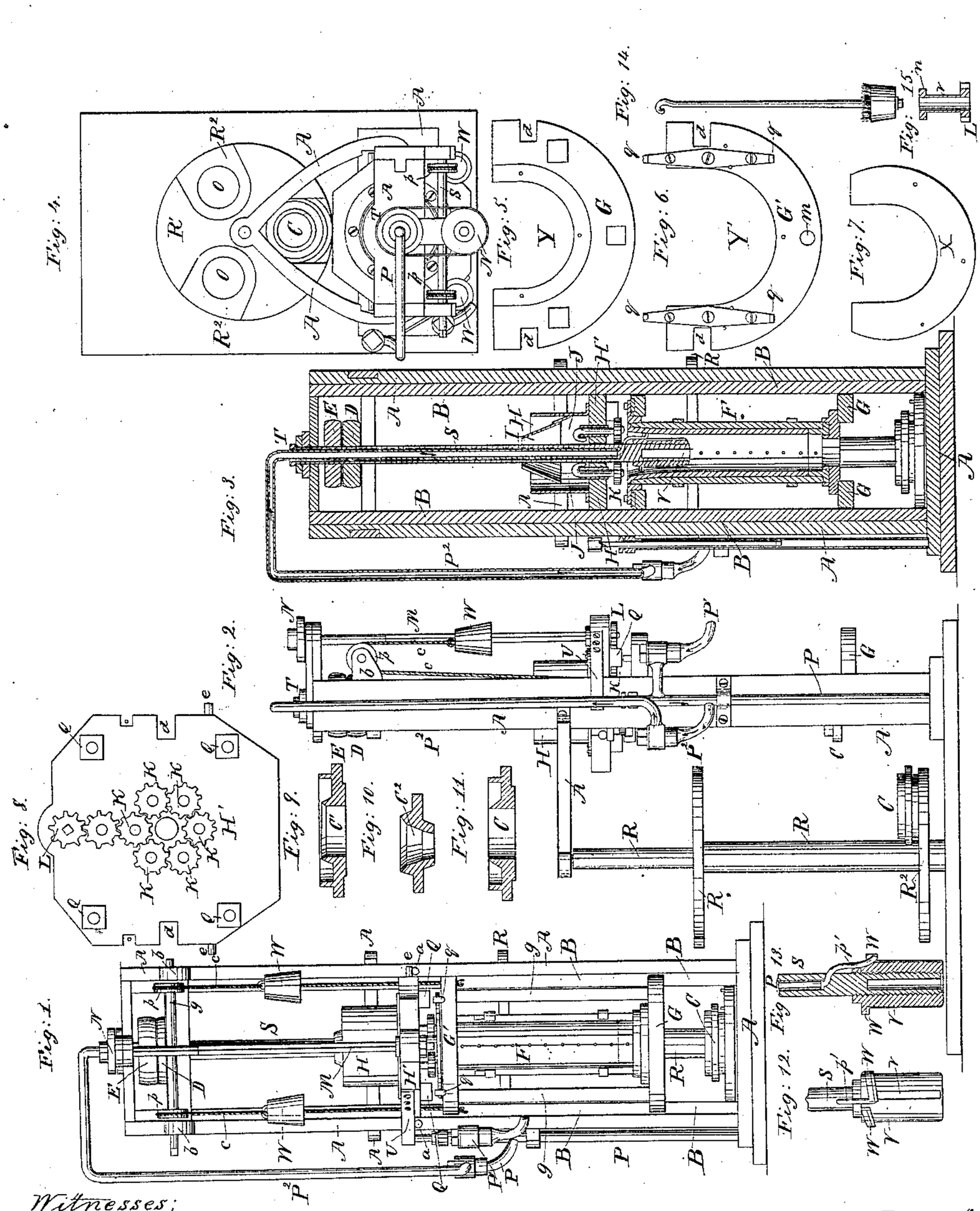
B. S. Benson,

Pine-Molding Machine.

No. 32,956. Patented July 30, 1861.



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BENJAMINE S. BENSON, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN PIPE-MOLDING MACHINES.

Specification forming part of Letters Patent No. **32,956,** dated July 30, 1861.

To all whom it may concern:

Be it known that I, BENJAMINE S. BENSON, of the city of Baltimore and State of Maryland, have invented a new and Improved Machine or Apparatus for Preparing the Molds for Casting Metallic Pipes; and I do hereby declare the following to be a correct description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of my apparatus or machine; Fig. 2, a side elevation; Fig. 3, a transverse vertical central section; Fig. 4, a top view or plan; and Figs. 5 to 15, inclusive, detail views of separate parts on an enlarged scale.

The same part is marked by the same letter of reference wherever it occurs.

The nature of the invention embraced in this application consists in the construction of a pipe-molding machine in which the flask is packed as it is moving downward, and in which the molding-sand is moistened at the moment of its being packed by water introduced through the packer-shaft, as hereinafter more particularly set forth.

To enable others skilled in the art to make and use my machine, I will proceed to describe its construction and operation, referring to the drawings, where—

A marks the frame of the machine, which should be something more than double the height of the longest flask designed to be used. On the inside of the side pieces of this frame are attached guides B, on which the flask-holder G G′ slides up and down. The flask-holder consists of a bottom piece or bed, G, Fig. 5, and a top piece, G′, Fig. 6, connected together by the side rails, *g g*, Fig. 1. In the bed G is a recess for the reception of the molding-chill C, Fig. 11, which receives and supports the lower end of the flask F. Both the top and bottom pieces have mortises *d* in them, to fit and receive the guides B, on which the flask-holder slides. The top piece, G′, has a similar recess to that of the bed G, for the reception of the top of the flask. These recesses are adapted to flasks and chills of various dimensions by inserting yokes or collars X, Fig. 7, of the required size in the recesses. From the top of the piece G′ project upward the stops *q*, which come in contact with blocks Q on the under side of the hopper-bed H′, (see Fig. 8,) to protect the gearing on the under side of that bed from injury when the hopper is resting on top of the flask-holder.

The flask-holder just described receives and holds the flask F, which is of the usual construction, except that it has a narrow ledge or rim projecting into the bore at bottom to support the sand when the flask is removed from the molding-chill, as hereinafter more fully explained. The flask is supported at bottom on the molding-chill C, and at top is held in place by the collar X, Fig. 7, which closely fits and embraces it.

The flask-holder, flask, and hopper are counterpoised by the weights W, which are attached to cords *c*, which pass over pulleys *p* on the shaft *s*, and are attached to the top piece, G′, of the flask-holder. The weights W will vary with the size of the flask and the quantity of sand employed.

Above the flask-holder is the hopper H, which moves up and down in the frame, being guided by the guides B, which it receives into the mortises *d*. (See Fig. 8.) It is prevented from descending too far by the pins *e*, resting on the pins *a*, projecting from the side framing. Its bottom is a stout bed-piece, H′, (seen in bottom view in Fig. 8,) which has in it the mortises *d*, to receive the guides B, and from which also project the pins *e*, which rest upon pins *a* when the hopper has descended to the lowest point, and the blocks Q, which co-operate with the pins *q* on the piece G′, to keep the hopper from coming into immediate contact with the flask-holder and injuring the gearing placed between them.

Inside of the hopper, which is a simple receptacle for the molding-sand, is placed a cone, I, the office of which is to throw the sand out toward the circumference of the hopper to prevent its running too rapidly and in too great masses into the flask. Rotating bent fingers J project up into the hopper below the hollow cone I, and through the bed-piece H′. They have on their lower ends cog-wheels K, (see Fig. 8,) gearing into each other, and driven by cog-wheel L on the square shaft M. The office of these fingers is to throw the sand into the flask in proper and regular quantities during the operation of packing. The wheel L is shown in vertical central section in Fig. 15. It has a cylindri-

cal hollow shaft, *l*, which projects up through the bed H′ and is held in place by a flange, *n*, at top. The hollow in shaft *l* is square in cross-section, so made to receive the square rod or shaft M, up and down which the wheel L slides as the hopper rises and falls. The upper end of shaft M has on it a pulley, N, driven by a band from pulley T on the upper end of the main shaft S. Thus the shaft M rotates the wheel L without interfering with its vertical movements. The shaft S has also on its upper end the fast and loose pulleys D and E, by means of the former of which it is driven by a band from any suitable prime mover. This shaft is hollow to receive the water-pipe *p*, which descends to its lower end and is there jointed, by a water-tight movable joint, to the revolving water-pipe *p′*, which delivers water to the molding-sand in proper quantity to moisten it sufficiently at the moment of packing.

To the lower end of shaft S is keyed or otherwise attached the revolving pattern V, with wings or packers *w*. This pattern consists of a metallic cylinder (see Figs. 12 and 13) equal in size to the pipe proposed to be molded. At its upper end are attached the packers or wings *w*, which are arranged spirally, like screw-threads. The pattern V has let into its sides two or more metal plates, *v*, Fig. 12, which project very slightly above the general surface of the cylinder. Their object is to prevent the binding of the pattern in the mold. The delivery end of the revolving water-pipe *p′* is just in the rear of the lower end of one of the packing-wings *w*.

Alongside of the frame is placed a pump, P, the piston-rod of which is attached by arm U to the bed H′ of the hopper. As the hopper rises, the water flows from the reservoir in the direction of the arrows through supply-pipe P′ into the pump. As the hopper descends, the water is driven up pipe P^2 and passes down to the delivery end of revolving pipe *p′*, where a continuous and regular supply of water is kept up during the process of packing, and stops the moment the operation of packing ceases.

Near the machine is placed a reel, R, which receives the flask F after it is packed in order to black the mold. It also supports the empty flask, when brought from the pit before packing, while it is being keyed up and adjusted preparatory to being placed in the holder. Its lower disk, R′, is perforated with holes O, in which are set the blacking-chills C′, which support the flask during the operation of blacking the mold. The upper disk, R^2, of the reel (see Fig. 4) has recesses to receive collars or yokes, which embrace and support the upper ends of the flasks.

Three chills of different form are employed in the operation of molding. The first (represented in vertical section in Fig. 11) is called the "molding-chill," and is placed in the flask-holder to support the flask while being packed. Its orifice is equal in diameter to the pipe to be molded, and its inner annular projection is conical. The second chill (represented in Fig. 9) is called the "blacking-chill," and resembles the molding-chill in all respects, except that the conical ring is here beveled to expose to the blacking that portion of the mold which is to form the bead around the lower end of the pipe. The third chill is called the "casting-chill," and is shown in Fig. 10. It remains in the pit and supports the flask during the operation of casting. It is tapered, as shown, to receive the lower end of the core.

The operation of blacking the mold is performed by means of the peculiarly-constructed brush, (represented in Fig. 14,) consisting of a conical stock, the base of which is supplied with camel's hair instead of common bristles. The diameter of the stock at its greatest width is nearly equal to that of the mold to be blacked, and the hair of the brush projects far enough to press gently against the sides of the mold. The brush is supported by a hooked rod projecting upward from the center of the stock. It is lowered through the mold by means of a cord of proper length, and is removed from the bottom of the mold. The mode of operation is as follows: The brush is passed into the top of the mold and a proper quantity (say a bucketful) of blacking of the proper composition is poured in above it. The brush is then, by means of the cord, lowered through the bore of the mold fast enough to allow the blacking to apply itself thoroughly to the surface of the mold. The soft camel's hair passes over the surface of the sand and applies the blacking to every part of it without in the least breaking down the mold or marring its smoothness. The brush is not drawn up through the mold when the blacking is completed, but removed from its lower end and the cord alone drawn up.

Having thus fully described the construction of my machine, the operation of preparing a mold by it is as follows: The flask, having been properly keyed up, is placed upon the molding-chill in the flask-holder, and directly under the pattern V. It is held securely in place by the yoke at top and the chill below. The flask-holder is then raised until the pattern V projects from the lower end of the flask. Revolution is now communicated to the main shaft S and pattern V, and the sand from the previously-filled hopper is supplied in an even and continuous stream to the interior of the flask. It falls upon the inwardly-projecting rim of the lower end of the flask, and is there packed by the action of the sprial wings or packers projecting from the pattern V. At the same time that the flask begins to be packed it begins to descend by reason of the downward pressure of the spiral wings upon the packed sand. This descending motion of the flask operates the pump and causes a small stream of water to fall upon the sand as it is being packed, and gives it the requisite consistence and adhesiveness. The water flows

only so long as the flask is descending. The flask, having descended until it has cleared the pattern V, is removed to the reel, where it is placed upon the blacking-chill. Here the molding of the head of the pipe is completed by hand, and the blacking of the mold is performed by the improved brush in the manner hereinbefore described. The blacking-chill, as before stated, is so formed as to expose every portion of the interior of the lower end of the mold to the action of the brush. When the mold is blacked, it is removed to the pit and placed upon the casting-chill. It is there dried by artifical heat and the core inserted, when it is ready to receive the melted metal.

The molding-sand, when placed in the hopper, is only very slightly moistened, not sufficiently so to adhere to the flask or packer-shaft nor to pack well. It is therefore necessary that water should be added to give it the proper consistence to pack so closely as to withstand the pressure of the melted metal when poured into the mold. I am not aware that any molding-machine hitherto used has applied water to the molding-sand at the moment of its being packed—a feature of great importance and value, and essential to the successful operation of my apparatus.

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

The introduction of water or other suitable fluid through a tube or packer-shaft to moisten the sand in the flask at the moment it is being packed, substantially in the manner and for the purpose described.

The above specification signed and witnessed this 13th day of April, A. D. 1861.

BENJAMINE S. BENSON.

Witnesses:

CHAS. F. STANSBURY,

F. G. MYER.