A MULTIPLE MOLDING MACHINE.

BY JAMES COOKE MILLS.

A new invention covering certain useful improvements in methods of forming sand molds has recently been introduced in the iron and steel world, and is acknowledged to be an important factor in foundry practice.

In the present state of the art it is almost universal practice in the formation of sand molds to fill the loose sand into the flask upon an up-facing pattern and then to compact the sand either by tamping or by pressure. The advantage of this method is that the interstices of the pattern are filled with sand by gravity, while the impact of the sand against the pattern face causes a certain degree of compression. As a consequence a perfect imprint of the pattern is thus initially formed and the subsequent tamping or pressure will impart the proper degree of hardness to all portions of the molding-face.

In multiple molding, where it is necessary to form molding-faces upon opposite sides of the flask, the lower face only can be formed by this method. It has therefore been found impracticable to form a good imprint of the pattern upon the upper face of the sand for the reason that the movement of the pattern into the sand will cause the projecting portions to carry the sand away from the face of the depressions or interstices of the pattern, leaving soft spots in the molding-face, which will not retain the proper shape. Thus gravity, which assists in the formation of the molding-face against the up-turned pattern, has precisely the opposite effect in the formation of the face by the down-turned pattern.

With the present invention difficulty of forming an imprint of the down-turned pattern is overcome by increasing the velocity of movement of the pattern relative to the body of loose sand to such an extent as to practically eliminate gravity as a factor and to compact the sand against the pattern-face by inertia. This may be accomplished either by moving the sand-

holder upward relatively to the stationary pattern or by moving the pattern downward relatively to a stationary sand-holder; but in either case the essential factor is the requisite velocity of the moving part. In carrying out the improved method the inventor, John A. Rathbone, employs a molding machine such as shown in the accompanying illustrations.

With all its complexity, the machine is simple in operation and its action is positive. The operator sets an iron flask on the flask frame so as to engage the pins with the holes in the lower lugs of the flask.

having been turned, the electro-magnets hold the sand frame while the mold frame is carefully drawn away from the drag pattern by the reverse action of the ram. The drawing of the lower or cope pattern is done in precisely the same way. The flask frame is raised from the mold head containing the cope pattern, by small pneumatic rams, leaving the completed mold free for stacking. The yoke is swung back and the mold lifted off. The patterns are cleaned by a jet of air through pressure hose.

The next mold is made in the same manner, except

that the sprue for the mold now formed between the first and second flasks is cut through it automatically by the machine. So mold after mold is made until, determined mainly by convenience in pouring, the topmost one is in position, when a larger pouring basin is shaped upon it and, if thought best, a pouring weight is added. Except for the top mold, no weight is needed, as the lower molds' joints are made good by the weight of the upper molds upon them.

It is generally supposed that the lower molds must be strained by the head of the liquid metal above, but, by a judicious ap-

portioning of the section of the gate to the massiveness of the casting, it may be caused to just feed it without straining and, for most of the work for which multiple molding is suitable, it is sufficient that the gate should be thinned down so that it has set by the time the second mold above is filled and the head is on the point of being increased by the filling of the sprue above.

A NEW BRITISH LOCOMOTIVE.

BY F. C. COLEMAN.

The competition between rival railroads on long-distance runs, and the changes in urban local travel due to the opening of new suburbs and the competition of street railways, have led to a live forward movement in British locomotive engine construction. The latest of these giant locomotives built for long-

Fig. 1.—View Showing Yoke Swung Forward, the Drag Pattern, and Sand Frame Held by Magnets.

Fig. 2.—Side View of the Machine With Flasks Removed and Cope Pattern Ready for Operations.

A MULTIPLE MOLDING MACHINE.

Within the frame and secured to the mold head is the cope pattern. He riddles the facing sand over the pattern until it is entirely covered, and places the narrow sand frame over the flask with the pins engaged. The molding sand is then shoveled in, completely filling it, and leveled off smooth flush with the edge. By turning the smaller valve to the right, the yoke mechanism is brought forward by the action of a pneumatic ram and made secure in its position by a toggle joint behind. The drag pattern is now in place ready for ramming. The operator turns the air valve to the right, and the mold frame under the pressure of ten tons exerted by the ramming head makes a tremendous thrust upward, thus effectually ramming both cope and drag molds simultaneously by the same motion. The vibrator to jolt the drag pattern is automatically set in action. The switch

Cylinders, four, 10 1/2 inches by 30 inches. Driving wheels, 6 feet diameter. Heating surface, 2,737 square feet. Boiler pressure, 175 pounds.

A NEW BRITISH EXPRESS LOCOMOTIVE.