Aug. 10, 1965 H. E. FELLOWS 3,199,157

FOUNDRY SYSTEM FLASK UNLOADING APPARATUS

Original Filed Sept. 9, 1957 2 Sheets-Sheet 1

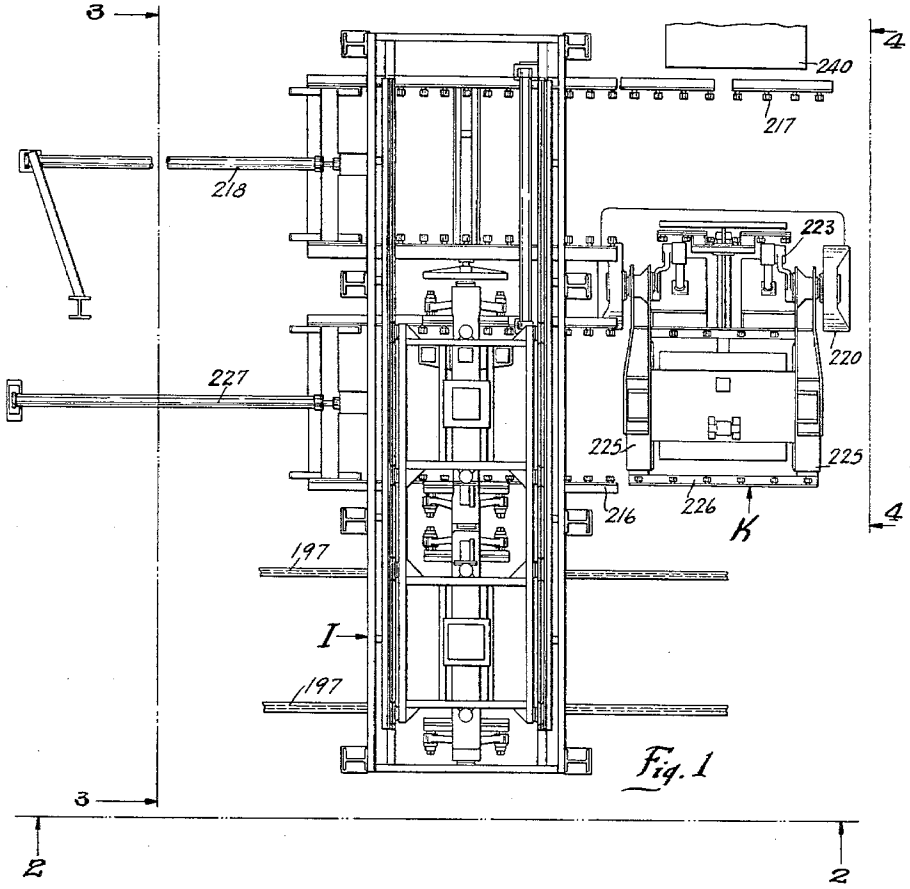


Fig. 1

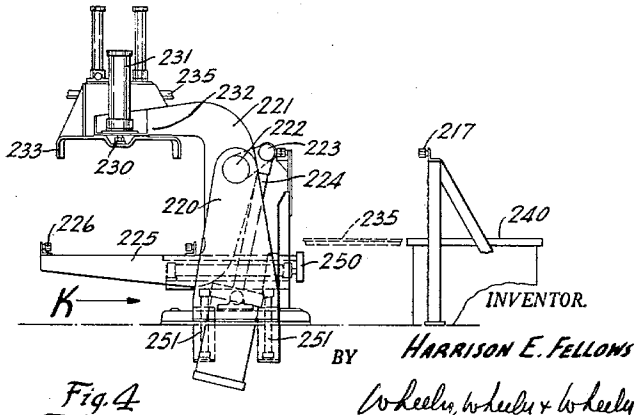


Fig. 4

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FOUNDRY SYSTEM FLASK UNLOADING APPARATUS

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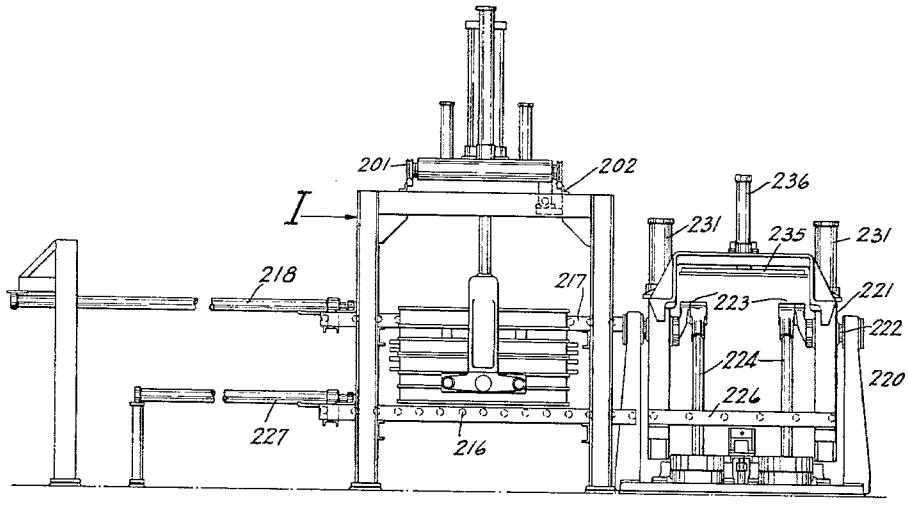


Fig. 2

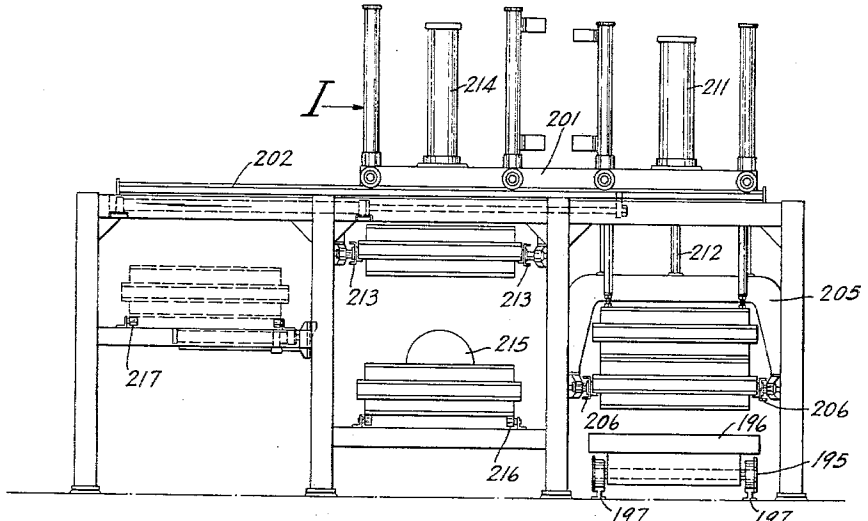


Fig. 3

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FOUNDRY SYSTEM FLASK UNLOADING APPARATUS

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Original application Sept. 9, 1957, Ser. No. 682,854, now Patent No. 3,068,537, dated Dec. 18, 1962. Divided and this application Aug. 9, 1962, Ser. No. 215,926

3 Claims. (Cl. 22—33)

The present application is a division of my application, Serial No. 682,854, filed Sept. 9, 1957, entitled "Foundry System and Apparatus," now United States Patent No. 3,068,537, granted Dec. 18, 1962.

This invention relates to a foundry system flask unloading apparatus.

The system disclosed in my parent application is of a type in which interlocking conveyor systems provide for the handling of flasks upon a circuitous path which includes all phases of foundry operation. The present invention is concerned with a portion of the system in which a mold in which a casting has been completed is opened by removing the cope and placing the drag mold on a rollover machine which inverts it, at the same time supporting the lower casting for withdrawal from the inverted drag mold. The inverting device comprises a C-clamp which incorporates mold receiving conveyor means at one level and is pivoted at a much higher level to register the inverted mold with a discharge conveyor at such higher level, while lowering the finished casting to a casting discharge conveyor. After the casting has been withdrawn, the drag is delivered to a shakeout mechanism en route to the point of beginning.

In the drawings:

FIG. 1 is an enlarged detail view in plan of the portion of the apparatus in which successive molds are opened for the removal of the previously made casting.

FIG. 2 is a view taken from the standpoint of line 2—2 of FIG. 1.

FIG. 3 is a view taken from the standpoint of line 3—3 of FIG. 1.

FIG. 4 is a view taken from the standpoint of line 4—4 of FIG. 1.

As disclosed in the parent application above identified, the castings are poured while the closed molds are mounted on flat cars 196 of conveyor 195 which are movable continuously or intermittently upon rails 197. In any event, the filled molds on their respective cars ultimately arrive at station I. The mechanism at this station is separately illustrated in FIGS. 2 and 3.

A double carriage 201 reciprocable on track 202 reciprocates transversely to the track 197 upon which the cars 196 operate. Mounted on the carriage to move therewith along the track 202 are two separate hoists.

At the righthand end of the carriage 201 as viewed in FIG. 3 is a hoist so located that the yoke 205 is directly over a filled mold which has just arrived on one of the cars 196 of conveyor 195. This yoke 205 is supplied with laterally acting rams and clamping bars 206 strongly constructed, being called upon to lift the complete mold and its contents. The ram cylinder 211 is provided with fluid connections to raise and lower the ram piston 212 connected to yoke 205. In the raising operation, the mold is lifted unitarily from the conveyor car 196 as shown in FIG. 3.

A second hoist is mounted on carriage 201 at the lefthand end of the carriage as viewed in FIG. 3. Its clamping bars 213 are raised and lowered by means of a ram which includes cylinder 214. Bars 213 are laterally operable in the same manner as above described and are disposed at a level to engage the cope flask only. When the bars are engaged with the cope flask of a previously set out mold, the cope flask will be elevated to withdraw it

from the casting 215 as shown in FIG. 3. With the newly arrived mold elevated by the righthand ram and the cope flask of a previously set out mold elevated by the lefthand ram, the carriage will move to the left as viewed in FIG. 3.

Meantime the drag flask of the previous set out mold will have been pushed out of the way on the set out conveyor 216 by means of a ram 227, which advances the drag flask to a rollover machine as hereinafter described. Accordingly, the complete mold picked up from the car and moved to the left by carriage 201 can now be deposited on the set out conveyor 216 while the elevated cope flask will be deposited on its set out conveyor 217 to be advanced by ram 218 toward a shakeout (not shown).

As soon as the full mold and the cope flask transferred by carriage 201 have been deposited on the respective set out conveyors 216 and 217, the carriage returns to the position which is illustrated in FIG. 3 where the cope flask of the recently set out mold is lifted from its drag flask by the left hoist 213, 214 and a complete, newly arrived mold is lifted from the conveyor car by the right hoist 206–212 to repeat the cycle.

The rollover machine to which the drag flask and casting are advanced by ram 227 is disposed at station K and illustrated in FIGS. 1, 2 and 4. The frame 220 pivotally supports C-clamps 221 whose trunnions 222 are provided with cranks 223 operable by means of ram pistons 224 to invert the C-clamps and contents. The lower jaws 225 of the C-clamps support a section 226 of the set out conveyor 216 onto which the drag flask and casting are pushed by ram 227. For holding the drag flask during inversion, it is clamped to the conveyor section 226 by flanged clamps 233 mounted on pistons 230 of ram cylinders 231 which are mounted on the upper jaws 232 of the C-clamps 221. Meantime a plate 235 disposed centrally between the yokes 233 is advanced downwardly by the pistons of rams 236 to engage the casting.

The C-clamps 221 are now rolled over upon their high trunnions to invert the drag flask and casting over the elevated set out conveyor 217 upon which the cope flask has been deposited. The drag flask will be deposited on conveyor 217 directly in front of a cope flask from the same mold so that when ram 218 acts to advance the newly arrived cope flask, an inverted drag flask will be in position to be pushed ahead of it along conveyor 217. With the drag flask deposited upside down on the spaced rollers of conveyor 217 in consequence of the rollover of C-clamp 221, the rams 236 of the C-clamp will be used to lower the plate 235 between the conveyor rolls as shown in FIG. 4 to register the casting with the casting discharge conveyor 240 along which the casting may be advanced in any desired manner to the cross shakeout on which it is freed of core sand.

In a preferred arrangement, the laterally operable ram 250 is vertically reciprocable by rams 251 (FIG. 4). When casting 215 is lowered on plate 235, ram 250 is elevated to the level of the casting as shown in dotted lines and is energized to push the casting from the plate onto conveyor 240.

Since both the flasks and the base frames are used to support the mold and since both have means for interlock with the conveyor elements and for devices which are positioned along the conveyor to act on the work, I shall sometimes refer generically to the flasks and base frames as mold carriers.

I claim:

1. The combination with first and second conveyors, of a C-clamp having upper and lower jaws and provided with a fulcrum upon which the clamp is bodily invertible, the lower jaw of the C-clamp comprising a section of the first conveyor, the upper jaw of the C-clamp comprising

means for engaging a flask at spaced points, a supplemental upper jaw on the C-clamp independently retractable between said points and comprising a casting support upon which a casting may be lowered from a flask engaged at said points following C-clamp inversion, the second conveyor comprising supports adapted to receive the inverted flask following C-clamp inversion and between which the supplemental jaw may be lowered to withdraw the casting from a flask so supported on the second conveyor.

2. The combination with means for lifting a cope flask from the drag flask of a mold in which a casting has been made, of first and second conveyors, the first conveyor comprising a drag flask support, means for inverting the drag flask and simultaneously transferring it from the first conveyor to the second conveyor, it being received on the second conveyor in inverted position, and means for clamping the drag flask and separately clamping the casting therein during inversion of the drag flask and casting, said last mentioned means comprising an independently movable member upon which the casting may be lowered from the drag flask following inversion.

3. In a machine for removing castings from workpieces comprising molds for castings, the combination with a first conveyor, of a second conveyor at a different level,

a clamp having relatively movable jaws, conveyor means on one of said jaws registrable with said first conveyor, means for moving the other of said jaws toward said one jaw to clamp a workpiece fed thereto upon the said first conveyor, means pivoting said clamp for inversion to invert a workpiece clamped thereon, said last means being offset from said one jaw in the direction of the second conveyor, whereby inversion of the clamp and the workpiece clamped to the one jaw will move the workpiece to the level of the second conveyor, the said one jaw being smaller than the workpiece whereby the ends of the workpiece project from the one jaw, the second conveyor including means to receive and support the projecting ends of the workpiece, said other jaw including means for lowering from the inverted workpiece so supported a casting made therein, and means including a third conveyor for the removal of said casting.

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