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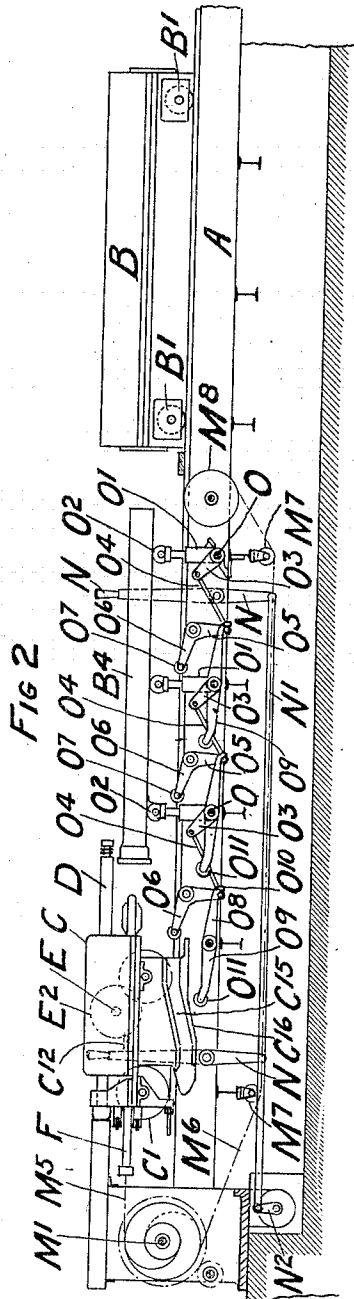
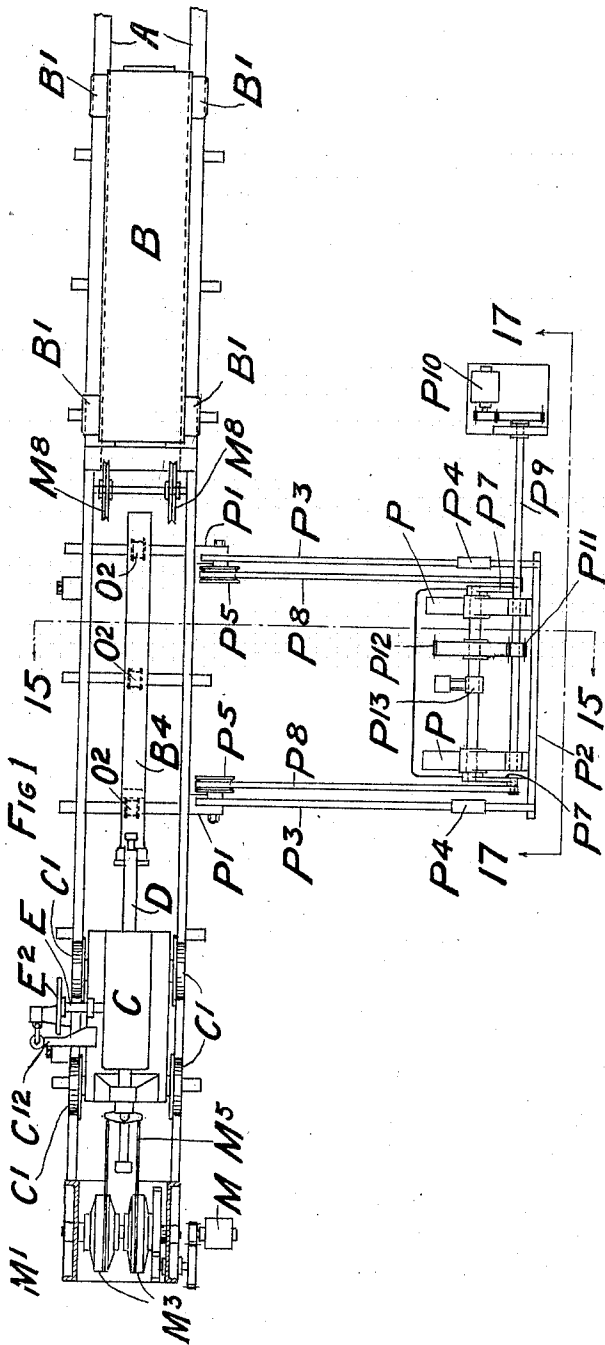
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1,723,792

MACHINE FOR DRAWING PIPES FROM MOLDS

Filed Jan. 19, 1928

6 Sheets-Sheet 1



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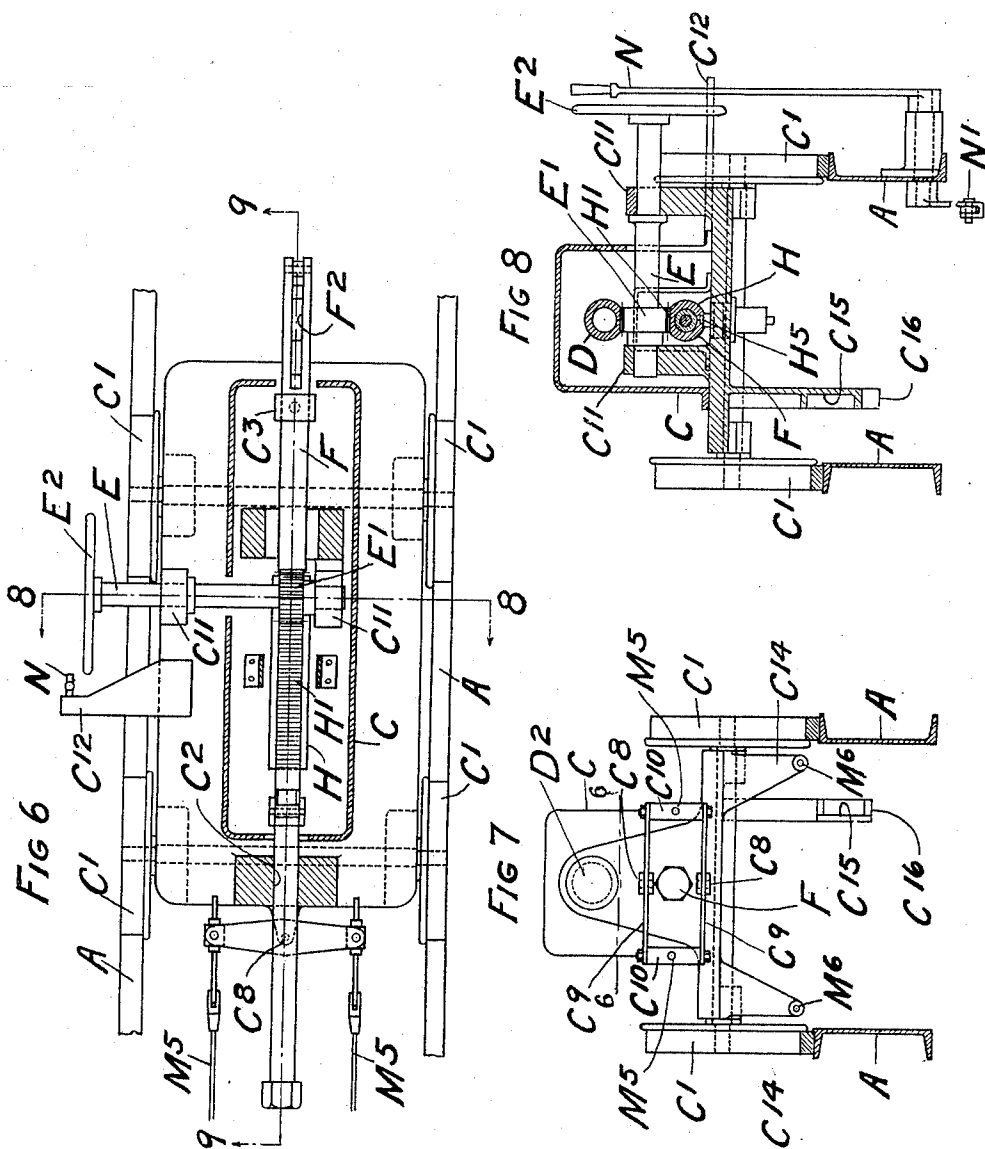
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MACHINE FOR DRAWING PIPES FROM MOLDS

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MACHINE FOR DRAWING PIPES FROM MOLDS

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6 Sheets-Sheet 4

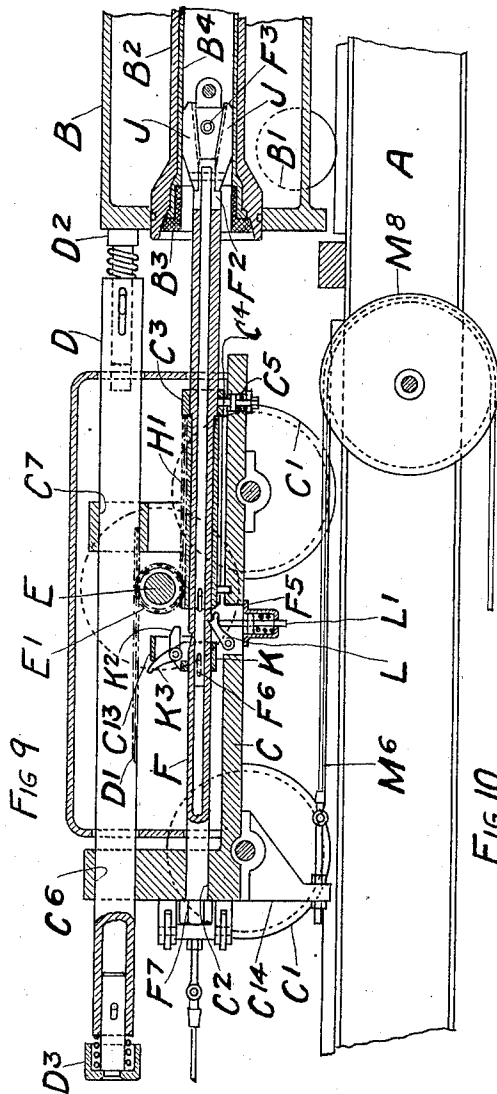


FIG 9

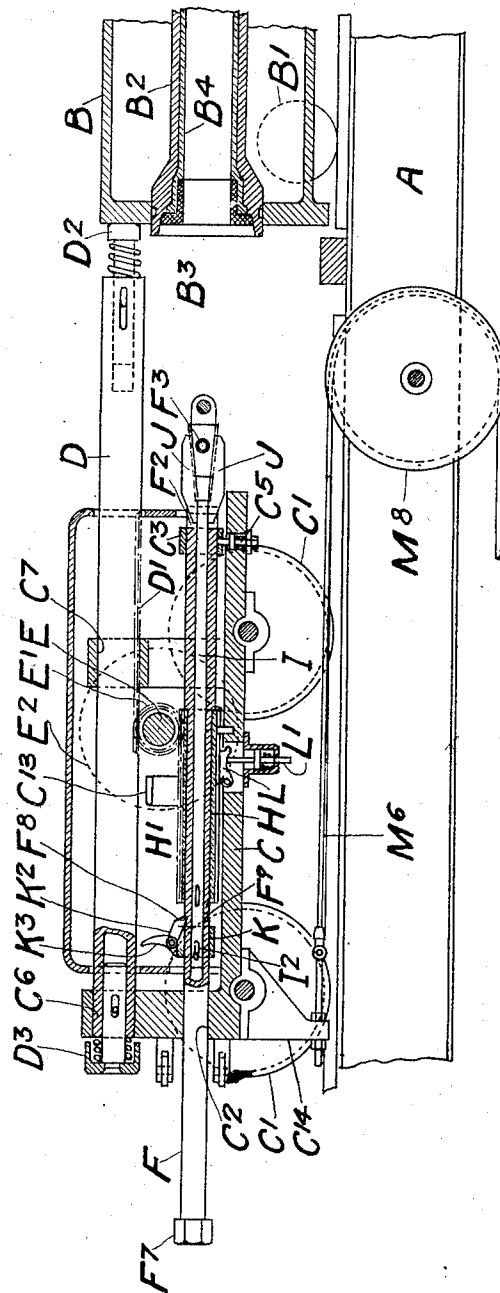


FIG 10

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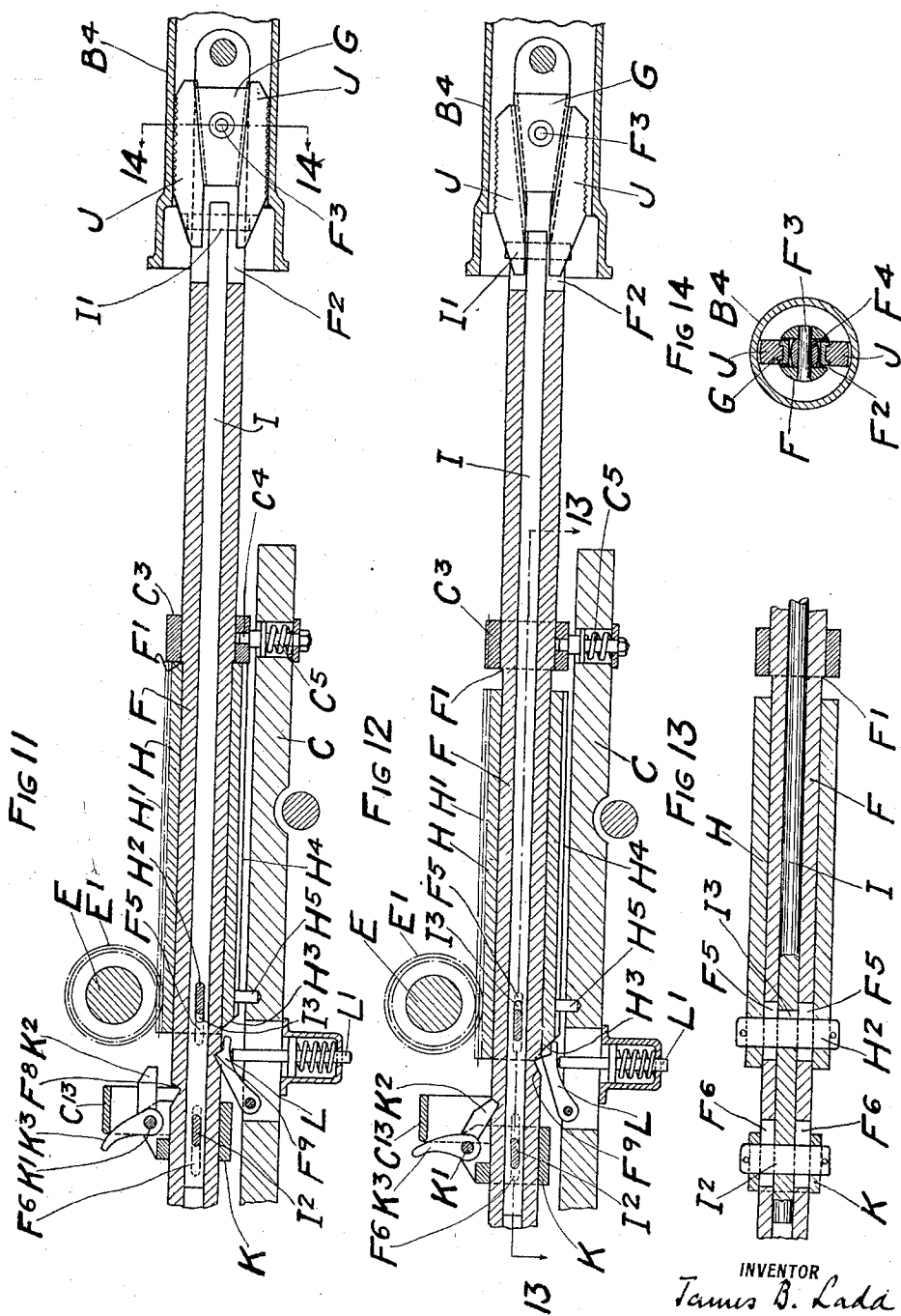
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MACHINE FOR DRAWING PIPES FROM MOLDS

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6 Sheets-Sheet 5



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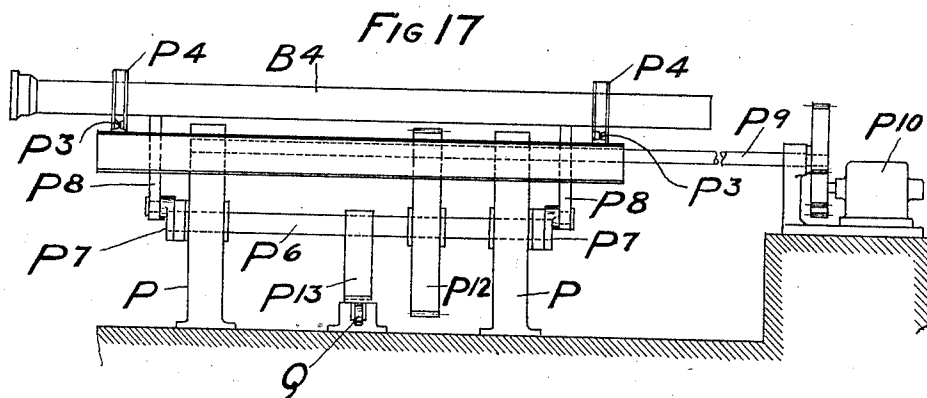
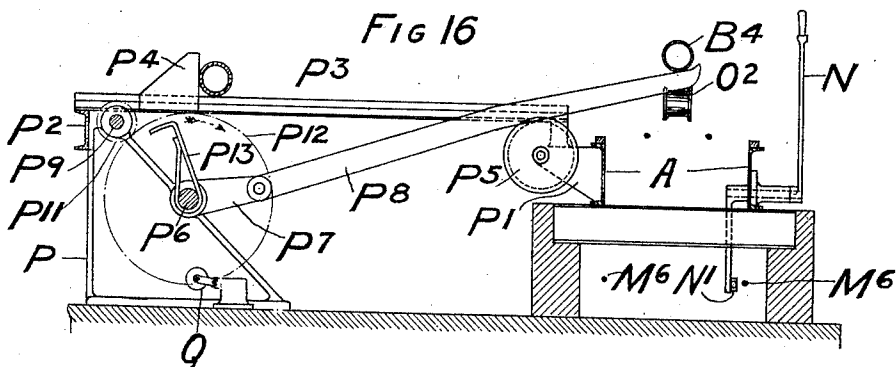
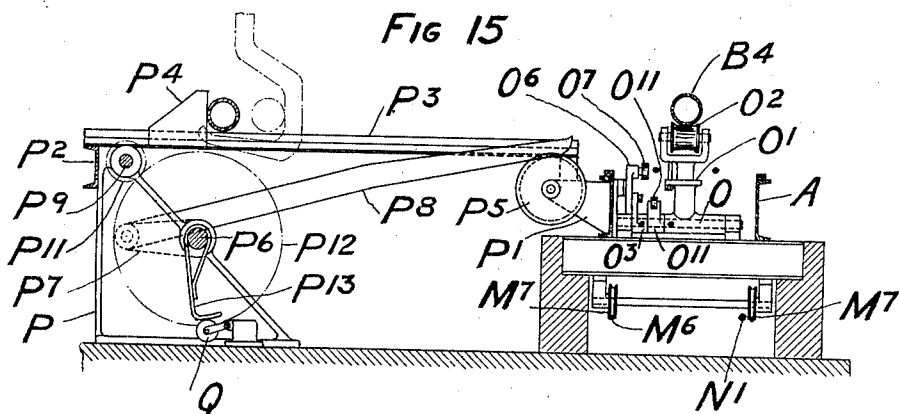
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MACHINE FOR DRAWING PIPES FROM MOLDS

Filed Jan. 19, 1928

6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE.

JAMES B. LADD, OF ARDMORE, PENNSYLVANIA, ASSIGNOR TO UNITED STATES CAST IRON PIPE & FOUNDRY COMPANY, OF BURLINGTON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR DRAWING PIPES FROM MOLDS.

Application filed January 19, 1923. Serial No. 247,782.

My invention relates to centrifugal pipe casting plants and has for its object to provide an improved mechanism for gripping a newly cast pipe in the mold and withdrawing it from the mold by which the operation of the gripper to seize the pipe and preferably also to release the pipe shall be made automatic. Another object which I have in view is to provide mechanism by which the gripper carrying car will be actuated at reduced speed and with increased power at the time when it begins to move the pipe out of the mold and still another object which I have in view is to provide improved means for removing the pipes from the supports upon which they are deposited as they are withdrawn from the mold.

The nature of my improvements will be best understood as described in connection with the drawings in which they are illustrated and in which

Figure 1 is a plan view of a centrifugal pipe casting plant embodying my improvements.

Figure 2 is a side elevation.

Figure 3 is a view similar to Fig. 1, but showing the gripper supporting carriage in pipe engaging position.

Figure 4 is a side elevation of the mechanism shown in Fig. 3.

Figure 5 is a plan view of the rope pulleys by which the gripper carrying car is actuated.

Figure 6 is a plan view of the gripper carrying car and its supported mechanism taken as on the horizontal section 6—6 of Fig. 7.

Figure 7 is an elevation of the rear end of the car.

Figure 8 is a cross section on the line 8—8 of Fig. 6.

Figure 9 is an elevation on the vertical section 9—9 of Fig. 6, showing also the mold and pipe end section.

Figure 10 is a view similar to Fig. 9, showing the position of the car and its supported parts at the time when the gripper actuating mechanism comes in contact with a fixed stop as the car approaches the mold.

Figure 11 is a sectional view on an enlarged scale showing parts of the mechanism as shown in Fig. 9.

Figure 12 is a similar view showing the position of the same parts immediately be-

fore or immediately after the grippers engage the pipe.

Figure 13 is a section on the line 13—13 of Fig. 12.

Figure 14, a cross section on the line 14—14 of Fig. 11.

Figure 15 is a side elevation of the device for removing the pipes from the supports on which they are first deposited.

Figure 16 is a similar view showing the socket arms in the position in which they engage and elevate the pipes from the supports, and

Figure 17 is a rear elevation of the mechanism shown in Figs. 15 and 16.

A, A, are the longitudinally extending beams which form or support a track-way for the mold and gripper carrying car. B indicates the mold casing, which is of the well known de Lavaud type supported on the tracks by the wheels B¹. C is the gripper carrying car, the frame of which is supported on wheels C¹. C² is a slide bearing for the gripper supporting member F which is also supported in a bearing C³ which bearing is flexibly supported on a pin C⁴ which in turn rests upon a spring C⁵ supported in the bottom of the car. C⁶ and C⁷ are slide bearings for the longitudinally moving rack bar D. C⁸, C⁸, are ears extending from the rear of the car to which are pivotally connected the beams C⁹, C⁹, which in turn are connected at their ends by the studs indicated at C¹⁰, C¹⁰. C¹¹, C¹¹, best shown in Figs. 6 and 8 are bearings for the shaft E. C¹² is a stop finger extending laterally from the car, as shown in Figs. 6 and 8. C¹³, best shown in Figs. 9 and 10, is an arm secured to the car, the function of which is to operate on the locking pawl K², K³. C¹⁴, C¹⁴, are arms depending from the rear end of the car to which the rope for moving the car is attached.

Longitudinally movable in the slide bearings C⁶, C⁷, is the bar D, having formed on or attached to its lower side the rack engaged at D¹ and having at its ends the spring cushioned abutting studs indicated at D² and D³. E is a transversely extending shaft supported in the bearings C¹¹ and having attached to it a gear wheel E¹ which is in engagement with the rack D¹. E² is a hand wheel attached to the shaft E.

F is a longitudinally movable gripper

supporting member which is, as shown, tubular and which is supported by and movable in the bearings C² and C³. This tubular member is formed as shown with a shoulder at F¹ and is slotted at its forward end as indicated at F², see Figures 11, 12, and 14. The pin F³ extending between the slots which open through a curved sided washer F⁴, supports the wedge member G of the gripping device. The tubular member F is slotted as indicated at F⁵ and again slotted as indicated at F⁶, see Figures 11, 12, and 13. On the top of the member F is formed a locking notch indicated at F⁸ and on the bottom of the member another locking notch indicated at F⁹.

H is a sleeve surrounding the member F having at its top a rack H¹ which is in engagement with the gear wheel E¹. H² is a pin secured to the rack H and extending through the slots F⁵ in the member F.

I is a second member of the gripper supporting members having the form of a rod extending through tubular member F. I¹ is a pin secured to the forward ends of the member I to which are connected the gripper members indicated at J, J. I² is a pin secured to the rear end of the member I, extending through the slots F⁶ of the member F and secured at its ends to the sleeve K which, through a threaded pin K¹, supports the locking pawl K² and the pawl actuating finger K³. I³ is a slot formed through the member I through which extends the pin H² which, as shown best in Figure 13, is permitted a certain amount of longitudinal movement in this slot. L, best shown in Figures 11 and 12, is a locking pawl pressed upward by a spring actuated pin, as shown at L¹, the function of which is to engage in the notch F⁹ at a proper time and which is withdrawn from the notch by the action of the wedge end H³ of the sleeve H, as shown in Figure 12.

M is a motor for actuating the gripper carrying car which is connected through suitable gears with a shaft M¹ to which are attached the rope pulleys M², M³ of small and large diameter, connected by volutes, as indicated at M⁴ in Fig. 4. M⁵, M⁶, are the ropes which are connected to the rear of the car C through studs C¹⁰, see Figures 6 and 7, and also through the downwardly extending arms C¹⁴, C¹⁴, the rope passing under the guide pulleys M⁷ and the pulley M⁸.

N, N, are levers extending upward into the path of the stop finger C¹², the lower ends of the levers connecting with a rod N¹ which, in turn, is connected to and actuates a switch construction indicated at N², by means of which the motor M is started and stopped.

O, O, etc., are a series of rock shafts to which are attached supports O¹ having

curved rollers O² supported at their ends. O³, O³, etc., are lever arms also attached to the shafts O, each connecting through a rod O⁴ with the pivoted lever O⁵, O⁶, having cam engaging rolls O⁷ secured on the ends of the arms O⁶. Pivoted on the rock shafts O are the levers O⁸, O⁹, having at the ends of the arms O⁸, hooks O¹⁰, which engage ears projecting from the lever arms O⁵, as shown in Fig. 2, when the parts are in the position shown in that figure and having at the ends of the arms O⁹ the cam engaging rolls O¹¹.

Referring to Figures 1, 3, 15, 16, and 17, P, P, indicate standards and P¹ positively placed brackets secured to one of the beams A, between which extend the skid-ways indicated at P³, P³, to which are attached stops indicated at P⁴. P² is a beam connecting the standards P. P⁵, P⁵, curved pulleys journaled on the brackets P¹. P⁶ is a shaft having bearings in the standards P and having attached to it crank arms P⁷, to which are pivotally attached skid arms, indicated at P⁸ which rest on the curved pulleys P⁵. P⁹ is a shaft supported in the standards P and rotated by a motor indicated at P¹⁰. P¹¹ is a gear wheel secured on the shaft P⁹ and engaged with a gear wheel P¹² which in turn is secured to the shaft P⁶. P¹³ is a switch actuating arm secured on the shaft P⁶ and actuating a switch device indicated at Q, by means of which the motor P¹⁰ can be stopped.

In operation, the car C being in retracted position, as shown, for instance, in Figures 1 and 2, a pipe is cast in the mold B², the casting being indicated at B⁴. The motor M is then set in operation to draw the car C toward the mold and as the car moves toward the mold the cam face C¹⁶ acting on the cam rolls O¹¹, depresses the lever arm O⁹ and elevates the lever arm O⁸ so as to disengage the hooks O¹⁰ from the levers O⁵. Shortly after this disengagement the cam C¹⁵ engages successively the cam rollers O⁷, depressing the lever arms O⁶ and shifting the pipe supporting devices from the position shown in Fig. 2 to that shown in Fig. 4, so that the pipe supporting devices are retracted out of the path of the car and its supported mechanism. When the car begins this movement toward the mold, the supported mechanisms are in the position shown in Figure 10, and they remain in this position until the contact head D² of the rack bar D comes in contact with the stop which, as shown, is the end of the mold casing B. Continued movement of the car toward the mold then leaves the rack bar D stationary and the rack D¹ acting on the gear wheel E¹ in turn acts upon the rack H¹ so as to give the sleeve H a forward movement on the car, as a result of which the sleeve first moves forward on the grip supported mem-

ber F until the pin H^2 comes in contact with the end of the slot I^3 , see Figures 11, 12, and 13, whereupon the gripper supporting member I is carried forward with the sleeve H and through the pin I^2 and the engaged sleeve K and the locking pawl K^2 and engagement with the notch F^8 carries forward with it the gripper supporting member F, with the result that the grippers are projected forward into the pipes, as shown in Figures 9 and 12. Just before the completion of the forward movement of the car, the finger K^3 coming in contact with the stop C^{13} , leaves the pawl K^2 out of the notch F^8 and promptly at the same time the notch F^9 comes into registry with the locking pawl L which is forced up into the notch by the action of the spring actuated pins L^1 . A further movement of the sleeve H acting through its connecting pin H^2 then forces the member I forward in the tubular member F, this motion being permitted by the slots F^7 , through which the pin H^2 passes and as the rod member I moves forward in the tubular member F the gripper members J, J, are thrust forward on the wedging member G, see Figures 11 to 14, with the result that the pipe is gripped as shown in Figure 11. The car then begins its backward movement to draw the pipe from the mold and it will be observed that owing to the differential rope pulley construction shown in Figure 5, the motions imparted to the car and connected parts while the gripper is entering and leaving the mold is slower and more powerful than during the remainder of the driving of the car and this, of course, is a feature of value in loosening the pipe from the mold at the beginning of the drawing operation.

The carriage moves backward, drawing the car with it and through the cams C^{15} and C^{16} and the mechanism upon which these cams act, as already described, the different supporting devices are successively returned to pipe supported position, as shown in Figure 2, so that at the completion of the backward movement of the car the pipe drawn from the mold is supported as shown in this figure.

During the latter part of the backward movement of the car the abutment D^3 on the end of the rack bar D comes in contact with the fixed stop with the result that the rack bar is again held stationary while the car completes its backward movement and, acting through the gear connection described, the sleeve H is moved backward on the gear and through its wedge end H^3 , see Figures 11 and 12, engages the lock pawl L and lifts it out of the notch F^9 , as shown in Figure 12. This action, owing to the stop located in the slot I^3 , see Figure 13, takes place before the pin H^2 comes in op-

erative contact with the rod I and immediately on this contact occurring the rod I is shifted backward, as shown in Figures 11 to 13, the immediate result being the engagement of the pawl K^2 with the notch F^8 , as shown in Figure 12, and the drawing backward of the clutch members J, J, on the wedge G, so that the clutch or gripper releases the pipe, as shown in Figure 12. The further backward movement of the car effects the complete withdrawal of the gripper mechanism from the pipe, as is shown in Figures 1 and 2.

It is, of course, important that the pipes deposited on the retractable support should be promptly removed so as to be out of the way of the operative parts of the machine and this operation I preferably accomplish by the mechanism best shown in Figures 1, 3, 15, 16, and 17. The motor P^{10} is set in operation immediately on the withdrawal of the grippers from the pipe and starting from a base of rest such as is shown in Figure 15, the skid arms P^8 are thrust forward under the pipe supported on the rollers Q^2 and then upward, as shown in Figure 16, with the effect of lifting the pipe from the rollers and supporting them on the inclined skid arms P^8 down which they roll on to the fixed skids P^9 . A complete revolution of the shaft P^6 returns the skid arms to the position shown in Fig. 15, at which point the arm P^{13} contacting with the switch member Q effects the stoppage of the motor, the parts remaining in retracted position until the motor is again started.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A machine for drawing pipes from molds comprising in combination a car movable on a guideway towards and away from a pipe mold, an expandible pipe gripper supported on the car, means for expanding and contracting the gripper also supported on the car and including an actuating device arranged to contact with stops and a stop arranged to contact with said device as the car moves forward and shift it to expand the pipe gripper.

2. A machine for drawing pipes from molds comprising in combination a car movable on a guideway towards and away from a pipe mold, an expandible pipe gripper supported on the car, means for expanding and contracting the gripper also supported on the car and including an actuating device arranged to contact with stops and stops arranged to contact with said device as the car moves backward and forward and shift it to expand and contract the pipe gripper.

3. A machine for drawing pipes from molds comprising in combination a car movable on a guideway towards and away from

a pipe mold, a longitudinally movable gripper support carried by said car, an expandible pipe gripper carried by said support, means for advancing and retracting the gripper support including an actuating device arranged to contact with stops, stops arranged to contact with the actuating device as the car moves backward and forward, a gripper operating device and automatic means for actuating said device operative as the car approaches its extreme positions.

4. In a machine having the constructive features of claim 3, the special construction including a gripper support comprising two relatively movable members each attached to separate gripper members, means for locking the support members together as the car moves towards the mold, means for disconnecting said locking means operative as the support approaches its extreme forward position and means operating to move one support member with relation to the other operating on the release of the lock and so as to effect the expansion of the gripper.

5. In a machine having the constructive features of claim 3, the special construction including a gripper support comprising two relatively movable members each attached to separate gripper members, means for locking the support members together as the car moves towards the mold, means for disconnecting said locking means operative as the support approaches its extreme forward position, means operating to move one support member with relation to the other operating on the release of the lock and so as to

effect the expansion of the gripper and means operative at the end of the backward movement of the car for returning the support members to normal locked position and releasing the gripper.

6. In a machine having the characteristic features of claim 3, the additional feature consisting of car actuating means operating at reduced speed and greater power at the beginning of the rearward movement of the car.

7. In a machine having the constructive features of claim 3, the special construction including a gripper support comprising two relatively movable members each attached to separate gripper members, means for locking the support members together as the car moves towards the mold, means for disconnecting said locking means operative as the support approaches its extreme forward position, means operating to move one support member with relation to the other operating on the release of the lock and so as to effect the expansion of the gripper, means operative at the end of the backward movement of the car for returning the support members to normal locked position and releasing the gripper, a longitudinally movable rack connected to one of the support members, a second longitudinally movable rack gear connected to the first rack and having extensions arranged to contact with fixed stops as the car moves forward and backward so as to shift the rack and operate the gripper supporting members.

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