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SLUG CASTING MACHINE

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My present invention relates to improvements in slug casting machines and especially to automatically operating mechanism by means of which the pair of vise-jaws are actuated to clamp and retain the composed line or matrix, preparatory to the casting operation.

The invention is involved in an attachment which may readily be attached to and operate as part of typesetting machines now in use, without materially altering the construction of the standard machines, for the purpose of automatically moving and locking one or both of the jaws in the operation of quadding and in the centering operation respectively. By means of my improved jaw operating machine and a manually controlled device therefor, one vise jaw may be moved for quadding, and alternately, both vise jaws may be moved for centering the line, as will hereinafter be more fully set forth.

The operating mechanism is actuated, automatically, through the reciprocating movement of an appropriate or suitable moving part of the machine, as for instance the justification bar and its rods. Thus, in quadding, the upward movement of the justification bar is employed to actuate the operating mechanism for pulling the right hand vise jaw toward the left hand vise jaw, and in centering a line the operating mechanism is actuated by an up stroke of the justification bar to pull the right hand vise jaw toward the left hand vise jaw and simultaneously push the latter toward the former. The re-setting of the operating mechanism and the separation of the jaws are accomplished by movement of a down stroke of the justification bar. Means automatically operated by the jaw-closing lever are also employed for locking the right hand vise jaw during both the quadding and centering operations, and for releasing the lock device after these operations and during the centering operation, in addition to the lock device, both jaws are positively locked together through the instrumentality of the coupling member or gear that coacts with racks of the two jaws.

The invention consists in certain novel combinations and arrangements of parts as will hereinafter be more fully set forth and claimed.

In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention, and a modified form of jaw-moving parts, in which the parts are combined and arranged according to one mode I have thus far devised for the practical application of the principles of my invention.

Figure 1 is a top plan view of the vise jaw frame of a slug casting machine showing so much as is necessary to illustrate the adaptation of my invention, the jaws being shown as closed on a line or matrix.

Figure 2 is a view in elevation from the inner side of the machine, showing the jaws and a line between them, and the jaw operating mechanism of my invention supported from the hinged jaw frame.

Figure 3 is a view in elevation as seen from the right in Figure 2.

Figure 4 is a perspective view of the operating mechanism showing the jaws locked in centered position.

Figure 5 is a detail view showing the automatically operating actuating pawl in position to permit downward movement of the actuating tappet as the latter moves during the performance of the usual functions of the justification bar or rod.

Figure 6 is a perspective view of the friction-clutch of the locking device for the right hand vise jaw.

Figure 7 is a perspective view of the locking device and its actuating pawl.

Figure 8 is a conventional perspective view of a modified form of the jaw-moving members.

In order that the general arrangement and relation of parts may readily be understood I have shown the jaw frame 1 and its cap 2, hinged as usual at A on the shaft B in Figure 2. Inasmuch as the views are shown as seen from inside the machine, the right hand vise jaw 3 and the left hand vise jaw 4 become transposed in the drawings, but they slide horizontally in the cap 2 to clamp a line or matrix 5, with or without the space bands 6 which are indicated in Figure 2.

The justification bar or cross bar 7 is pivoted as usual at the upper ends of the spaced justification rods 8 and 9, which rods reciprocate as usual in bearings 10 of the jaw frame, for the performance of the customary functions of the justification bar. The justification bar is elevated in usual manner by the diagonally arranged strut or link 11, which at its upper end is loosely pivoted to the bar, and through the instrumentality of the lifting arms 12 and 13, the justification mechanism is operated.

As best seen in Figure 4 where parts are omitted for convenience of illustration, the right hand vise jaw 3 is provided with a rigid rack bar 14 that is free to travel in a groove 18 at the underside of the left hand vise jaw 4, and the latter jaw is also provided with a rigid rack bar 16 of 110
less than the bar 14, but located in the same horizontal plane, and parallel with the rock bar 14.

The rack teeth of the two rack bars are located on the inner pins. The pinions or free ends of these bars, and above the plane of the rack bars a coupling pinion or gear 17 is supported, which pinion is lowered into position to mesh with the racks when both jaws are to be adjusted as in centering, as in Figure 4, and when only the right hand vise jaw is to be adjusted with relation to the left hand vise jaw, this pinion or gear is lifted out of mesh from the rack bars, as shown by dotted lines in Figure 2.

The horizontally disposed pinion is mounted at the lower end of a vertical shaft 18, which shaft is non-rotary, but is vertically reciprocable. Near its upper end the shaft is provided with spaced collars 19 and 20, and between these collars and in frictional contact with their upper and lower faces respectively, a cam disk or eccentric 21 is positioned in a vertical plane. The cam disk is rotatable with a horizontal cam shaft 22 journaled in bearings of bracket 23, which bracket is rigidly supported on the cap 2 of the jaw frame. A boss 24 is fixed on the end of the cam shaft, opposite the cam, and a handle 25 is attached to this boss and adapted to be turned by hand to turn the cam disk for lowering or raising the pinion 17 into and out of mesh with the rack bars, as desired, by the operator.

In adapting my invention to slug casting machines now in use I utilize an auxiliary frame 26, having attaching lugs 27, that is secured by bolts or screws to the jaw frame in position to accommodate the jaw operating mechanism of my invention. I also attach a tappet arm 28, through its collar or bushing 29, in adjusted position on the justification rod 9, and it will be understood that the tappet is permanently affixed to the rod to vertically reciprocate therewith.

For initiating the movement which pulls the jaw 3 toward jaw 4, I employ an actuating pawl 30 in the path of the upward movement of the tappet arm 28, and as the latter rises and contacts with this pawl the jaw operating mechanism is actuated. The pawl is pivoted at 31 on the lower section 32 of an adjustable or extensible link that includes the section 34 and another section 35, that are joined by the turn buckle 36, the latter being employed to vary the length of this actuating link. At its lower end, the extensible actuating link is pivoted at 37 to a resetting lever 38, which is pivoted at 39 to the auxiliary frame. The resetting lever is also located in the path of movement of the tappet arm, and its free end is longer than the actuating pawl, and rounded, for contact by the tappet arm on its descent, or lowering movement of the justification rod.

The upper end of the actuating link is pivotally connected at 40 to the bifurcated end of the fulcrum arm 41, pivoted at 42 on the auxiliary frame, and a lever arm or pin 41 with a bifurcated end 41a is also pivoted at the upper end of the actuating link. The other end of this lever arm or pin 41 passes loosely through a slide bearing in the jaw operating lever or main lever 42, and a retaining head 43 is fixed on the pin to prevent its displacement and actuate the lever 42 when the latter is being reset. Between the main lever 42 and the bifurcated end of the lever arm or pin 41 a spring 44 is interposed, and coiled about the pin, which spring is compressed as the jaw 3 is pulled to the right in Figure 4, for quadding or centering the line, and the spring remains under compression only as long as the tappet arm is in direct lifting contact with the jaw of the protruding or free ends of these bars, and above the plane of the rack bars a coupling pinion or gear 17 is supported, which pinion is lowered into position to mesh with the racks when both jaws are to be adjusted as in centering, as in Figure 4, and when only the right hand vise jaw is to be adjusted with relation to the left hand vise jaw, this pinion or gear is lifted out of mesh from the rack bars, as shown by dotted lines in Figure 2.

When centering on a full line the movement of the jaws is less than when centering on a partial line or single word. When a full line is set up, the movement of the lever 42 may not be sufficient to cause the pawl 30 to be disengaged from the rack, in which event the pawl 30, under pressure of the tappet will cause lever 39 to swing against the tension of the spring 44, thus permitting the tappet to pass the pawl. The pawl is swung by engagement with the tappet 28 on its down movement, in order that the justification actions may take place. Should pawl 30 become again engaged with the tappet on the second justification, the movement will be absorbed in the spring 44 without transmission to the jaws.

As best seen in Figure 4, the free end of the main lever or jaw operating lever 42 is provided with a slot 45, and this slotted, free end of the lever is pivotally connected by means of the slot and a pin 46, to the free end of the rack bar 14 of the right hand vise jaw 3. This pin and slot connection permits a slight lost motion between the lever and the rack bar of the jaws mounted on the boss 24, which lost motion of this lost motion, the locking device for the rack bar 14 is released, in order that the lever 42 may transmit motion to the rack bar and to its right hand vise jaw 3 to open the latter.

The rack bar 14 is locked after each of its adjusting movements, through the instrumentality of a spring pressed locking pawl 47, which is located beneath the rack bar and provided on its upper face with rack teeth 48 that are designed to mesh with complementary teeth 49 on the under face of the rack bar 14. The rack teeth 49 on the pawl and bar are arranged to permit a sliding movement to the right, in Figure 4 as the jaw 3 is pulled to the right, and the spring pressed pawl is depressed to permit this sliding movement, but as indicated in Figure 7, the teeth 48 of the 120 spring press 47 and prevent sliding movement of the rack bar to the left in Figure 4. In other words, the teeth of the spring pressed pawl, when the pawl is in locking position, prevent separation of the jaws, and hold the jaws in locked position.

The locking device, including the locking pawl, is mounted to slide vertically in guides 50, shown in Figure 2 as attached to the upper part of the auxiliary frame or jaw frame of the machine, and a grooved slide head 51, which is located beneath the pawl, forms a part of the locking device. The pawl is also grooved to slide with the head in the support, and a cushion spring 52 is interposed between the slide head and the pawl to urge the pawl against the teeth 49 of the rack bar 14, and to permit depression of the pawl as the rack bar 14 slides over the pawl when the jaw 3 is being closed.

If necessary, a tie strap 53, which is fixed to the slide head 51 may be used, with its upper end slidable in a vertical slot 54 of the pawl, to join the slide head and pawl and insure proper relative movement of these parts.

The slide head and its locking pawl are reciprocated vertically in the guide 50 by the rocking movement of a cam 55, which is pivoted with a grooved cam face 56 in which the tongue 57 on the lower end of the slide head is fitted. The cam is mounted on a cam shaft 58 journaled in bearings 59 supported on the auxiliary frame.
and as the shaft is turned or rocked the rocking movement of the cam is translated into vertical movement of the slide head and its pawl for locking or unlocking the rack bar of the right hand vise jaw.

The cam is actuated from the main lever 42 through the instrumentality of a crank arm 60 on the cam shaft, and as best seen in Figures 4 and 6 a pin 61 engages in the free end of the crank arm and is fixed to a slide 62 which has a friction spring 63 attached at one end only to the upper face of the slide. The slide and its spring are confined within a rectangular yoke 64, which yoke is pivotally connected at 65 to the main lever or jaw closing lever 42, and the yoke "floats", or is supported on the slide block 62 through the frictional contact between the spring blade 63 and the inner face of the top or upper bar of the yoke.

Referring to Figure 2, the full line position of the tappet 29 and the pawl 30, show the latter in the path of the upward movement of the former, and the dotted lines show the range of movement of the parts. When the ascending tappet strikes the pawl 30, the actuating link is lifted and swings to the right, or laterally on the pivot 36 engaging lever 36 and the fulcrum arm 36. The fulcrum arm guides the upper end of the link, and the latter urges or pushes the pin 41 and spring 44 to the right, thus imposing a resilient pressure against the main lever to move it to the right, for imparting a pull on the vise jaw 3 when quadding, and for pulling the jaw 3 and pushing the jaw 4 when centering, as explained heretofore.

The initial movement of the lever 42 pulls on the yoke 64 and the frictional engagement of the yoke, spring 63 and slide block 62, in the nature of a friction clutch, by pulling on the slide block, swings the crank arm 60 to the right, and through the cam 55, slide head 51 and connections, the locking pawl 47 is elevated into position to lock the rack bar 14 and jaw 3 in their adjusted position. When centering the line by the movement of both jaws, both jaws are positively locked after each adjustment, as is also the single jaw 3 locked after each adjustment. The spring pressed pawl 47 permits sliding movement of the rack bar 14 when the jaw 3 is being closed, but the pawl prevents opening movement of the jaw by its engagement with the rack.

Preceding the downward movement or stroke of the tappet and as indicated in Figure 4, the pawl 30 is out of the path of movement of the tappet and the tappet therefore passes the pawl, and after the cast, the jaws, (or jaw) are opened and the jaw operating mechanism is reset or restored to normal position by contact of the tappet with the resetting lever or jaw opening lever 36 which is in the path of the descending tappet.

In Figure 4 it will be seen that the slot 45 permits of a slight delayed movement or actuation of the rack bar 14 until the pawl 47 can be withdrawn from the rack bar 14. During this slight delay the main lever 42 pushes the yoke to the left and the friction clutch within the yoke causes the crank arm 60 to turn to the left thereby rocking the cam with relation to the slide head 51, and the latter is thereby pulled downwardly to release the locking pawl from the rack bar 14.

When the tappet contacts with the jaw opening lever 36 the link 32-33 is pulled downwardly and swung to the left on the pivots 37 and 40, thereby pulling on the pin 41 to swing the main lever 42 for opening the jaw or jaws, and this movement of the actuating link brings the actuating pawl again into position in the upward path of movement of the tappet, as in Figure 2. In Figure 8 a modified form of the invention is shown where the two bars 66 and 67 are connected to the respective right hand vise jaw 3 and left hand vise jaw 4 in lieu of the rack bars, and a rotary arm 68 having the slots 70 co-acting with pins 71 on the ends of the arm, whereby a pull on the bar 66 causes a push on the bar 67 to produce the centering adjustment of the line.

Under some conditions the locking pawl 47 may fall away from gravity from the rack bar 14 when the slide head is positively lowered by the cam 55, but the connecting link 53 is provided in order to insure a positive unlocking of the jaw by withdrawal of the pawl from its rack bar. Since the jaw 3, or both jaws 3 and 4, must necessarily be locked in all positions when the machine is quadding or centering the line, and since the locking pawl must also be released before the jaws are opened or separated regardless of the position of the jaws, the friction clutch which is actuated by the lever 42 is an operative at all times, regardless of the position of the lever 42 and the consequent relative positions of the slide block 62 and yoke of the friction clutch.

The turn buckle 34, it will be understood is designed for use in varying the length of the actuating link and adjusting the tension of the spring 44 between the link and the jaw operating lever.

Having thus fully described my invention, what I claim as new and secure to be patented is—

1. In a slug casting machine, the combination of a pair of opposed relatively movable jaws between which the line is confined in casting relation to a mold, means for operatively coupling said jaws, operating mechanism connected to one of said jaws, a locking device for said jaw means actuated by said operating mechanism for actuating the locking device, means under control of a moving part of the machine for actuating said operating mechanism, and means for uncooperating said jaws.

2. In a slug casting machine, the combination of a pair of opposed relatively movable jaws between which the line is confined in casting relation to a mold, operating mechanism connected to one of said jaws, locking means for said jaw and means actuated by said operating mechanism for actuating said locking mechanism, and means under control of a moving part of the machine for actuating said operating mechanism.

3. In a slug casting machine, the combination of a pair of opposed relatively movable jaws, operating mechanism connected to one of said jaws, locking means for said jaw, a friction clutch interposed between said operating mechanism and the locking means for controlling the latter, and means under control of a moving part of the machine for actuating said operating mechanism.

4. In a slug casting machine, the combination of a pair of opposed relatively movable jaws, means operating mechanism connected to one of said jaws and means affording a lost motion between said mechanism and jaw, locking means for said jaw and means actuated by said operating mechanism for actuating the locking means.
means under control of a moving part of the machine for actuating said operating mechanism.

5. In a slug casting machine, the combination of a pair of opposed relatively movable jaws, operating mechanism connected with one of said jaws and means affording a lost motion between said mechanism and jaw, locking means for said jaw, a friction clutch interposed between said operating mechanism and locking means for controlling the latter, and means under control of a moving part of the machine for actuating said operating mechanism.

6. In a slug casting machine the combination with a movable jaw and operating mechanism therefor, of locking means for the jaw, and means under control of the operating mechanism for alternately locking and unlocking said locking means.

7. In a slug casting machine, the combination of a pair of opposed relatively movable jaws each having a rack bar rigid therewith and arranged in parallel spaced relation, a coupling pinion, operating mechanism for one of said bars, and means under control of a moving part of the machine for actuating said operating mechanism.

8. In a slug casting machine, the combination of a pair of opposed relatively movable jaws each having a rack bar rigid therewith and arranged in parallel spaced relation, a coupling pinion, manually operated means for alternately moving said pinion into active and inactive relation to said rack bars, means for locking one of said bars in adjusted position, means for operating one of said jaws, operative connections between said operating means and locking means for controlling the latter, and means under control of a moving part of the machine for actuating said operating means.

9. In a slug casting machine, the combination of a pair of opposed relatively movable jaws and means for coupling said jaws for simultaneous movement, operating means for said jaws, justification mechanism forming part of the machine, and means actuated by the justification mechanism for actuating said operating means.

10. In a line composing and type casting machine, a matrix line receiving vise comprising a pair of opposed jaws both movable toward and from one another, a rack bar connected to each jaw, and a pinion to mesh with said rack bars and equalize the movements of said jaws.

11. In a line composing and type casting machine, a matrix line receiving vise comprising a pair of opposed jaws both movable toward and from one another, a rack bar connected to each jaw, and a pinion movable into mesh with said rack bars to equalize the movements of said jaws and disengageable therefrom to permit movement of one jaw independently of the other.

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