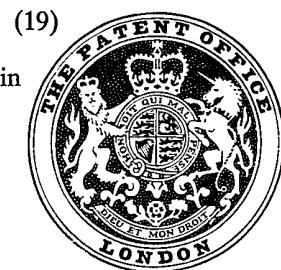


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(54) IMPROVEMENTS IN OR RELATING TO APPARATUS FOR STAMPING ADVANCING STOCK

(71) I, HELMUT HAEGERMANN, OF 4030 Ratingen 6/Hosel, Am Alternhof 21, Federal Republic of Germany, a Citizen of the Federal Republic of Germany, do hereby declare the invention for which I pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:-

5 This invention relates to an apparatus for the continuous stamping of identifying marks on advancing stock, such as slabs, billets, finished sections or the like, advancing on a roll table in a rolling mill or continuous casting plant.

10 It has been proposed to provide a stamping apparatus having a stamping head which is suspended on a swing or rocking arm which can pivot in the direction of movement of stock which is to be stamped and which projects into the path of movement of stock to be stamped. In such a prior proposed apparatus when the swing or rocking arm is struck by the stock which is to be stamped the arm is subsequently moved out of the path of movement of the stock by swinging with the assistance of a pneumatic arrangement which is triggered by a triggering element in dependence upon the movement of the swing arm as a result of the swing arm engaging the moving stock. The swing arm is thus moved upwardly out of the path of movement of the stock, moving the stamping head to an elevated position. The stamping head is maintained in this elevated position until the arm is released to pivot back into the path of the stock. The arm is released by a triggering element when the stock, moving at a predetermined speed, is a predetermined distance from the pivoting arm so that the stamping head firmly strikes the stock to stamp the desired mark thereon.

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German Offenlegungsschrift 2,320,796 describes and illustrates an apparatus of this

kind wherein rubbing of the stamping head over the stock as the stock moves past the stamping head after the stamping operation is avoided since the swing arm with the head on it is pivoted out of the path of the stock by the movement thereof subsequently to the moving stock striking the stamping head.

It has been found that apparatus of this kind has the disadvantage that, as the swing arm and stamping head pivot out of the path of stock, the markings of the head shift, on the stock end face, radially of the swing-arm suspension, an event which is detrimental to the markings and may wear and damage them. It is probably almost impossible to use this apparatus for high-speed working. The apparatus disclosed by German Offenlegungsschrift 2,320,796 does not specifically suffer from these disadvantages since the stock only moves relatively slowly. Thus, in this case, the stock and the stamping head do not move to damage the marking on the stock during the pivoting movement of the head out of the path of the advancing stock after the stock has struck the head for stamping. Provided that the speed of stock advance is not too high, the impetus of the stock can be used to advance the stock and to stamp the stock.

Unfortunately, increasing operating speeds, - high rates of stock advance, for instance, of up to something like 4.00 m/sec-lead to very high accelerations in the pneumatic cylinder providing the extra force required for the pivoting movement; the result is considerable impacting and jerking and therefore severe stressing of parts, with the possibility of breakages and of the complete apparatus vibrating. Noise too becomes excessive.

The apparatus cannot be used at relatively high rates of advance on a non-positive drive basis - i.e. for operation with a continuous non-positive drive - because the

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time available from the instant when the stock strikes the stamping head until the instant when the impressed indicia thereon have to be disengaged from the stock is at 5 most 10  $\mu$  seconds if the head with the markings is not to rub on the stock. This shortage of time also explains why stamping wheels rub briefly on the stock at high stamping speeds and therefore experience 10 heavy wear.

A further serious disadvantage of the known apparatus disclosed by German Offenlegungsschrift 2,320,796 is that it is unsuitable for low-speed operations, for 15 instance, stock advance rates below 1.5 m/sec, and it therefore cannot be used for continuous casting plants, since the stock is moving with insufficient impetus for stamping when it strikes the marking head.

It is an object of the invention to reduce 20 or obviate the above described disadvantages of the known apparatus and to provide an apparatus which can operate at low rates of stock of advance at 1.5 m/sec or less, such 25 as are found in continuous casting, at medium speeds of up to 2.5 m/sec and at high speeds of up to 4.00 m/sec.

According to one aspect of this invention, 30 there is provided an apparatus for the repeated stamping of advancing stock, the apparatus having a stamping head which is mounted on a swing or rocking arm for pivoting in the direction of stock movement and which may project into the path of the 35 stock, piston and cylinder means responsive to the stamping head being struck by the stock for the stamping thereof, for moving the stamping head out of the path of movement of the stock by pivoting the swing 40 arm, the piston and cylinder means being adapted to maintain the stamping head in the pivoted-out position, and a triggering element for releasing the swing or rocking arm to enable said arm to pivot back into 45 the said path of the stock, said piston and cylinder means comprising a pair of cylinders each having a closed end and an end through which a piston rod protrudes, said 50 closed ends being near one another and the piston-rod ends facing in opposite directions to one another each cylinder having a double-acting piston each associated with a respective one of said piston rods, the piston rod of one cylinder being connected to a 55 fixed connecting point and the piston rod of the other cylinder being connected to a connecting point on the swing arm.

It has been found that in using such an 60 apparatus there is no risk of harmful jerks and impacts in high-speed operation and the apparatus is not too noisy, for the swing arm pivots in both directions solely in a closed non-positive circuit. Preferably a pneumatic force is utilised which has an internal resilience which does not disadvantage such

circuit.

According to another aspect of the invention there is provided a method of operating an apparatus according to said one aspect for stamping rolled stock moving faster than 70 1.5 m/sec wherein the piston connected by its piston rod to the swing arm is subjected to a first relatively low pressure on the face towards the closed end of the cylinder and to a second relatively high pressure on the face towards the piston rod end of the cylinder, pivoting of the swing arm in the direction of stock advance is initiated in response to abutment of the stamping head by the advancing stock the resulting movement of the piston rod and piston in the cylinder associated with the swing arm moving the boss out of the intermediate collar element to open a passage to permit said higher pressure to act on the entire piston surface on the rod side of the piston to cause the piston and its rod to move abruptly inwards and overcome the low pressure on the other side of the piston, while in the cylinder associated with the fixed connecting point the piston is subjected to the higher pressure on its surface facing piston rod end and pressure on its surface facing the closed end having been discharged driving the piston into the respective cylinder causing a resultant movement of the cylinder associated with the swing arm so that the stamping head pivots out of the path of the advancing stock, and wherein subsequently the pressure on the rod side of the piston associated with the swing arm is lowered from the said second relatively high pressure value and the piston associated with the swing arm moves as a result of its face near the closed cylinder end experiencing the said first relatively low pressure, the pressure-experiencing surface area of the piston face on the piston-rod side being reduced to an annular surface around the piston rod as a result of the boss engaging sealingly in the intermediate collar element; and wherein that face of the piston associated with the fixed connecting point which is near the closed cylinder end experiences the said second higher pressure while the pressure acting on the rod-side of the piston face is vented, so that the piston rod moves out of the cylinder.

It is also possible to use the apparatus to stamp stock moving at low speeds of 1.5 m/sec or less by one cylinder moving out with an impetus increasing the impetus of the stamping head as the latter pivots back into the path of the advancing stock with the result that the impact between the head and the stock is strengthened and the reduced impetus of the slow-moving stock is increased - i.e., the lower speed is compensated for. Thus, according to yet another aspect of this invention there is provided a 120 125 130

method of operating an apparatus according to said one aspect for stamping rolled stock moving at a speed of 1.5 m/sec or less, wherein the piston connected by its piston rod to the swing arm is subjected to a first relatively low pressure on the face towards the closed end of the cylinder and to a second relatively high pressure on the face towards the piston rod end of the cylinder, pivoting of the swing arm in the direction of stock advance is initiated in response to abutment of the stamping head by the advancing stock, the resulting movement of the piston rod and piston in the cylinder associated with the swing arm moving the boss out of the intermediate collar element to open a passage to permit said higher pressure to act on the entire piston surface on the rod side of the piston to cause the piston and its rod to move abruptly inwards and overcome the lower pressure on the other side of the piston, while in the cylinder associated with the fixed connecting point the piston is subjected to the higher pressure on its surface facing piston rod end and pressure on its surface facing the closed end having been discharged driving the piston into the respective cylinder causing a resultant movement of the cylinder associated with the swing arm, so that the stamping head pivots out of the path of the advancing stock, and wherein subsequently the pressure on the rod side of the piston associated with the swing arm is lowered from the said second relatively high pressure value and the piston associated with the swing arm moves as a result of its face near the closed cylinder end experiencing the said first relatively low pressure, the pressure-experiencing surface area of the piston face on the piston-rod side being reduced to an annular surface around the piston rod as a result of the boss engaging sealingly in the intermediate collar element and wherein in response to a triggering element detecting stock at a predetermined point on the path of travel of the stock that face of the piston associated with the fixed connecting point which is near the closed cylinder end experience the said second higher pressure while the pressure acting on the rod-side of the piston face is vented, so that the piston rod moves out of the cylinder, thus causing the swing or rocking arm to move downwardly rapidly so that the stamping head strikes the stock firmly.

Conveniently, the two cylinders are joined together at their adjacent closed ends and are disposed along the same axis.

Preferably the said other cylinder whose piston rod is connected to the swing arm has, between the piston rod end and the piston a stationary intermediate inwardly directed collar element formed with a bore to accommodate the piston rod, the bore inner diameter being larger than the piston rod outer diameter; the piston within said other cylinder having on the side adjacent the intermediate collar element a boss which, when the piston moves out of the cylinder engages sealingly in the bore of the intermediate collar element.

Thanks to this feature, when the piston - i.e., the piston rod - is fully extended, a low pressure acting on the piston face facing the cylinder end adjacent the corresponding end of the other cylinder opposes a higher pressure acting on the other face of the latter piston to keep the rod thereof in the extended position; also, when the piston starts to move in as the result of a force applied by the swing arm to the piston rod end extending out of the cylinder, the boss moves out of the bore in the intermediate collar element and consequently, the entire piston-face area on the rod side of the piston experiences the higher pressure and the piston and its rod move abruptly into the cylinder, with the result that the stamping head pivots rapidly out of the path of the advancing stock substantially simultaneously with its being struck thereby or with only slight delay.

In order that the invention may be more readily understood, and so that further features thereof may be appreciated the invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view of one embodiment of an apparatus in accordance with this invention in a position ready to stamp rolled stock which is advancing on a roll table at a speed of more than 1.5 m/sec.

Figure 2 is a view similar to Figure 1 of the apparatus of Figure 1 after the rolled stock has abutted the stamping or marking head on the swing arm;

Figure 3 is a further view similar to Figure 1 illustrating how the marking head pivots out of the path of the advancing rolled stock, and

Figure 4 is yet a further view similar to Figure 1 illustrating how the apparatus returns to its normal (stand-by) position;

Only the elements essential for an understanding of the invention are shown in the drawings.

Referring to the drawings, the apparatus comprises a stamping or marking device 1 which comprises a suspended swing or rocking arm 2 and, disposed thereon, a stamping or marking head 3. The arm 2 is suspended on a rotatable pivot shaft 4 and can turn or pivot together with the shaft 4. When the arm 2 is in the vertical position shown in Figure 1, the head 3 is disposed in the path of rolled stock 7 which advances continuously on a roll table 9 constituted by

rolls 8. An arrow 6 indicates the direction of advance of the stock 7. The arm 2 can pivot, as indicated by double arrows 5, in the axis of movement of the stock (which axis is indicated by the arrow 6) the arm 2 thus moving from its vertical position illustrated in Figure 1 into an inclined position, as illustrated in Figure 3, permitting the advancing stock 7 to pass by, and back from the position illustrated in Figure 3 into the vertical position illustrated in Figure 1. 5

The apparatus has a pulse-generating apparatus, incorporating disc 11, which generates control pulses in dependence upon the rocking movement of the arm 2. The disc 11 has pulse initiating means M, O and P, which co-operate with further pulse initiating means located adjacent the disc 11 and illustrated as three circles in a row, a 10 pulse being transmitted whenever one of the means M, O or P is aligned with one of said further means. The means M, O and P, and the further means may take any convenient form, but since the precise nature of the pulse transmitting arrangement is not critical to the present invention the means will not be described in detail. In the embodiment shown the disc 11 is driven by the pivot shaft 4, e.g. by way of a chain and sprocket 15 drive arrangement which is illustrated schematically.

A pneumatic device 15 which produces in operation of the device the required movements of the arm 2 is connected between a fixed connecting pivot 12 on a machine frame 13 and a connecting pivot 14 on arm 2. The device 15 comprises a pair of pneumatic cylinders I, II whose closed ends 16 are mounted back-to-back so that the other ends of the cylinders, namely the ends having protruding piston rods, extend in opposite directions. In the embodiment shown the cylinders have a common longitudinal axis and are joined together by way of their adjacent closed ends 16. Each cylinder comprises a double-acting piston - there being a piston 17 in the cylinder I and a piston 18 in the cylinder II. Actuation of the cylinders is by compressed air. The piston 17 is connected to a piston rod 19 which is connected to the pivot 14 on arm 2. The piston 18 is connected to a piston rod 20 and that end of piston rod 20 which projects from cylinder II is connected to the pivot 12 on the machine frame 13. The cylinder I has a chamber A bounded by its closed end 16 and the piston 17 and a chamber B bounded by the end where the end of piston rod 19 issues from cylinder I, and intermediate 20 collar element 21. The collar element 21 is disposed on the rod side of piston 17 between the two chambers A and B and has the piston rod 19 extending through it. The inner diameter of the collar element 21 is 25 larger than the outer diameter of rod 19. 30

Piston 17 has on the piston-rod side a centering boss or the like 22 which engages in the bore of the intermediate collar element 21. The collar 21 has an annular seal 23 on the radially innermost surface thereof. When piston 17 moves towards the closed cylinder end 16, the boss 22 moves out of the bore of collar element 21 so that compressed air can flow from cylinder chamber B to the rod sides of piston 17. A cylinder chamber on this rod side of the piston 17 and on the side of collar element 21 remote from chamber B has the reference C. 35

The cylinder II has a chamber A' between the piston 18 and the closed cylinder end 16 and a chamber B' between the piston and the end of the cylinder where the piston rod 20 emerges from the cylinder. 40

Operation of the above described apparatus for the stamping or marking of rolled stock proceeds as follows:

When the apparatus is in the standby position shown in Figure 1, the piston rods 19, 20 have moved out of their cylinders I, II. Chamber A of cylinder I is at a low pressure  $p_1$  and chamber B of cylinder I is at a higher pressure  $p_2$ , such a higher pressure  $p_2$ , being, for example a pressure of from 4 to 6 atmospheres gauge, while the "low pressure"  $p_1$  is, for example, a much lower pressure of approximately 0.5 atmosphere gauge. 45

The boss 22 is in its initial position (as shown in Figure 1), that is to say the position in which it is in sealing-tight engagement with the intermediate collar element 21 by virtue of seal 23. The intermediate chamber C between piston 17 and the intermediate element 21 vents to atmosphere by way of a small bore (not shown). 50

The force which is produced by the pressure  $p_2$  in chamber B and which acts on the operative surface formed by the annular surface extending around the piston rod in the intermediate element 21 is much less than the opposing force acting on the other side of the piston 17 which opposing force results from the whole area thereof experiencing the low pressure. Also, when the apparatus is in the position illustrated in Figure 1, the pressure  $p_2$  acts on the piston 18 in chamber A' of cylinder II and keeps the piston rod 20 in its outwardly extended position. 55

The arm 1 is illustrated in an initial vertical position and the head 3 is located in the path of the advancing stock 7. The pulse initiating means M of disc 11 is in the position shown in Figure 1. 60

The stock 7 moves along the table 9 under its own weight at a speed of 2.5 m/sec or more in the direction of the arrow 6 and towards the head 3. The stock 7 abuts the head 3, and thus the stock is marked or 65

stamped with an identifying mark. Because of its impetus the stock 7 pivots the arm 2 from its normal vertical position, the arm 2 rotating the pivot shaft 4.

5 The pivoting of the arm 2 causes piston rod 19 of cylinder 1 to be retracted partially into the cylinder. The boss 22 disengages from the bore of the intermediate collar element 21 and after a predetermined distance of movement of the boss 22 compressed air at the higher pressure  $p_2$  is allowed to enter chamber C of cylinder I.

10 The rod-side surface of the piston 17 is therefore subjected over its entire surface area to the higher pressure  $p_2$ , the resulting force exceeding the opposing force on the other side of the piston towards the closed end 16 of the cylinder. As a result the piston 17 is accelerated abruptly against the opposing force - i.e., against the lower pressure  $p_1$ . Thus the piston and cylinder arrangement assists the initial pivoting movement of the arm 2.

15 As the arm 2 moves pivotally the disc 11 rotates and after the disc 11 has rotated through a predetermined angle, that is to say when the boss 22 is clear of the intermediate collar element 21, the pulse initiating means O on disc 11 are brought into a position adjacent the further pulse initiating means to provide a pulse for actuating a control valve arrangement. This is the position illustrated in Figure 2. When the control valve is actuated air discharges 20 from chamber A' of cylinder II and simultaneously the higher pressure  $p_2$  is supplied to chamber B' of cylinder II. Thus piston 18 is driven into cylinder II, but since the piston rod 20 is anchored the cylinder II moves, thus moving cylinder I as the two 25 cylinders are interconnected.

30 The piston 17 is still being forced into the cylinder I, and thus both the pistons are withdrawn into their respective cylinders as illustrated in Figure 3. This further assists the pivotal movement of the arm 2, and it will be noted that the head 3 has pivoted out of the way of the stock 7 into its highest position. The stock 7 can move past below 35 the head 3. It will also be noted that the disc 11 has rotated so that the pulse initiating means P are adjacent the further pulse initiating means. The pulse thus generated is utilised further to actuate the control valve 40 arrangement.

45 Air is then discharged from cylinder chamber B, and the piston 17 is moved by the low pressure  $p_1$ , in the chamber A into its initial position. The boss 22 therefore 50 engages sealingly in the intermediate collar element 21. The arm 2 pivots down in response to the movement of the cylinder. The condition of the apparatus is then as 55 shown in Figure 4. The chamber B' of cylinder II discharges and chamber A' is at

the normal pressure  $p_2$  so that piston rod 20 moves out of the cylinder. Finally the arm 2 reaches the vertical position corresponding to the standby position. Pulse initiating means M is thus brought adjacent the further pulse initiating means, and the resultant pulse again actuating the control valve arrangement.

70 Subsequently chamber A of cylinder 1 is still at the low pressure  $p_1$  and this pressure continues to be operative. Cylinder chamber B is charged at the higher pressure  $p_2$ . The pressure in chamber A' of cylinder II is the higher pressure  $p_2$ .

75 Thus the apparatus is ready for the next cycle of operations.

80 If it is required to use the apparatus for rolled stock moving slower than a predetermined speed, for example slower than 2.50 m/sec as is the case in continuous casting, where typical speeds 1.50 m/sec or less, the operation of the apparatus must be modified as described below to ensure that the head 3 and the stock 7 meet with sufficient impetus to ensure that the stock is marked.

85 In the modified operation, all the operational steps are as described above until in the closing stages of the cycle of operation, piston rod 19 is fully extended and chamber A of cylinder I is at the low pressure  $p_1$  while chamber B is vented. After boss 22 has moved into the bore of the intermediate collar element 21 and is in sealing-tight engagement therewith the chamber B is provided with the higher pressure  $p_2$ . The small chamber C between piston 17 and the intermediate element 21 vents to the atmosphere via a bore. The force which acts in the direction of the piston 17 as a result of the higher pressure  $p_2$  in chamber B acting on the annular surface hereinbefore referred to is a much lesser force than the opposing force determined by the low pressure  $p_1$  and the surface area of the piston 17 exposed to the low pressure  $p_1$  in chamber A.

90 The normal pressure  $p_2$  acts in chamber B' on piston 18 of cylinder II and keeps the piston rod 20 in its fully in position.

95 The stock 7 is moving at a predetermined speed on the table 9 and in the direction indicated by the arrow 6 towards the arm 2 - i.e., the head 3. At a place determined in accordance with the rate of advance of the stock 7, the stock 7 triggers a pulse to cause the control valve arrangement to apply the higher pressure  $p_2$  to the piston 18 in the chamber A' and also to vent chamber B'. Thus air at the higher pressure  $p_2$  enters the chamber A' and the piston rod 20 is driven out of the cylinder II, with the result that the consequent movement of the two interconnected cylinders I, II towards the connecting pivot 14 on the arm 2 boosts the pivoting movement of the head 3 relative to the stock 7 and increase the impetus of the head 3 as

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the arm 2 pivots.

At a predetermined instant of time (i.e., when the arm 2 takes up the vertical position and the stock strikes the head 3) the head 3, moving in free fall and boosted by the outwards movement of the piston rod 20, knocks firmly against the stock, thus ensuring that the stock is stamped even though the stock is moving slowly.

Upon completion of stamping, the stock pivots the arm back, from the vertical position. As occurs in the stamping of faster-moving stock, this pivoting movement moves piston rod 19 of piston 17 into cylinder I, due to the motion being transmitted positively from the arm 2. The cycle of operations previously described is repeated until the position shown in Figure 4 has been reached, whereafter the part cycle of operations as previously described in connection with the stamping of slow-moving stock is repeated.

WHAT WE CLAIM IS:

1. An apparatus for stamping advancing stock, the apparatus having a stamping head which is mounted on a swing or rocking arm for pivoting in the direction of stock movement and which may project into the path of the stock, piston and cylinder means, responsive to the stamping head being struck by the stock for the stamping thereof, for moving the stamping head out of the path of movement of the stock by pivoting the swing arm, the piston and cylinder means being adapted to maintain the stamping head in the pivoted-out position and a triggering element for releasing the swing or rocking arm to enable said arm to pivot back into the said path of the stock, said piston and cylinder means comprising a pair of cylinders each having a closed end and an end through which a piston rod protrudes, said closed ends being near one another the piston-rod ends facing in opposite directions to one another each cylinder having a double-acting piston each associated with a respective one of said piston rods, the piston rod of one cylinder being connected to a fixed connecting point and the piston rod of the other cylinder being connected to a connecting point on the swing arm.

2. An apparatus according to claim 1 wherein the piston and cylinder arrangement is pneumatically operated.

3. An apparatus according to claim 1 or claim 2 wherein a triggering device is provided which is actuated by initial pivoting movement of the swing arm and which controls operation of the piston and cylinder means.

4. An apparatus according to any one of the preceding claims wherein the two cylinders are joined together at their adjacent closed ends and are disposed along the same axis.

5. An apparatus according to any one of the preceding claims wherein the said other cylinder whose piston rod is connected to the swing arm has, between the piston rod end and the piston, a stationary intermediate inwardly directed collar element formed with a bore to accommodate the piston rod, the bore inner diameter being larger than the piston rod outer diameter; the piston within said other cylinder having on the side adjacent the intermediate collar element, a boss which, when the piston moves out of the cylinder, engages sealingly in the bore of the intermediate collar element.

6. An apparatus according to any one of the preceding claims for stamping rolled stock travelling at speeds of 1.5 m/sec or less, wherein a triggering element is provided at an appropriate place on the path of the stock, said triggering element being adapted to cause higher pressure to become operative in the cylinder associated with the fixed point on that side of its piston which is near the closed cylinder end associated with the closed end of the other cylinder after the stamping head has pivoted back some of the way into the path of the stock, so that the impetus of the swing arm for pivoting back is boosted and the stamping head strikes the stock with a strengthened and abrupt blow.

7. A method of operating an apparatus according to claim 5 for stamping rolled stock moving faster than 1.5 m/sec wherein the piston connected by its piston rod to the swing arm is subjected to a first relatively low pressure on the face towards the closed end of the cylinder and to a second relatively high pressure on the face towards the piston rod end of the cylinder, pivoting of the swing arm in the direction of stock advance is initiated in response to abutment of the stamping head by the advancing stock, the resulting movement of the piston rod and piston in the cylinder associated with the swing arm moving the boss out of the intermediate collar element to open a passage to permit said higher pressure to act on the entire piston surface on the rod side of the piston to cause the piston and its rod to move abruptly inwards and overcome the low pressure on the other side of the piston, while in the cylinder associated with the fixed connecting point the piston is subjected to the higher pressure on its surface facing piston rod end and pressure, on its surface facing the closed end having been discharged driving the piston into the respective cylinder causing a resultant movement of the cylinder associated with the swing arm so that the stamping head pivots out of the path of the advancing stock, and wherein subsequently the pressure on the rod side of the piston associated with the swing arm is lowered from the said second relatively high pressure value and the piston

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associated with the swing arm moves as a result of its face near the closed cylinder end experiencing the said first relatively low pressure, the pressure-experiencing surface area of the piston face on the piston-rod side being reduced to an annular surface around the piston rod as a result of the boss engaging sealingly in the intermediate collar element; and wherein that face of the piston associated with the fixed connecting point which is near the closed cylinder end experiences the said second higher pressure while the pressure acting on the rod-side of the piston face is vented, so that the piston rod moves out of the cylinder. 8. A method of operating an apparatus according to claim 6 for stamping rolled stock moving at a speed of 1.5 m/sec or less, wherein the piston connected by its piston rod to the swing arm is subjected to a first relatively low pressure on the face towards the closed end of the cylinder and to a second relatively high pressure on the face towards the piston rod end of the cylinder, pivoting of the swing arm in the direction of stock advance is initiated in response to abutment of the stamping head by the advancing stock, the resulting movement of the piston rod and piston in the cylinder associated with the swing arm moving the boss out of the intermediate collar element to open a passage to permit said higher pressure to act on the entire piston surface on the rod side of the piston to cause the piston and its rod to move abruptly inwards and overcome the low pressure on the other side of the piston, while in the cylinder associated with the fixed connecting point the piston is subjected to the higher pressure on its surface facing piston rod end and pressure on its surface facing the closed end having been discharged driving the piston into the respective cylinder causing a resultant movement of the cylinder associated with the swing arm so that the stamping head pivots out of the path of the advancing stock, and wherein subsequently the pressure on the rod side of the piston associated with the swing arm is lowered from the said second relatively high pressure value and the piston associated with the swing arm moves as a result of its face near the closed cylinder end experiencing the said first relatively low pressure, the pressure-experiencing surface area of the piston face on the piston-rod side being reduced to an annular surface around the piston rod as a result of the boss engaging sealingly in the intermediate collar element; and wherein in response to a triggering element detecting stock at a predetermined point on the path of travel of the stock that face of the piston associated with the fixed connecting point which is near the closed cylinder end experiences the said second higher pressure while the pressure acting on the rod-side of the piston face is vented, so that the piston rod moves out of the cylinder, thus causing the swing or rocking arm to move downwardly rapidly so that the stamping head strikes the stock firmly. 9. An apparatus for stamping advancing stock substantially as herein described with reference to and as shown in the accompanying drawings. 10. A method of operating apparatus for stamping advancing stock according to claim 8 and substantially as herein described with reference to the accompanying drawings.

the pressure acting on the rod-side of the piston face is vented, so that the piston rod moves out of the cylinder, thus causing the swing or rocking arm to move downwardly rapidly so that the stamping head strikes the stock firmly. 9. An apparatus for stamping advancing stock substantially as herein described with reference to and as shown in the accompanying drawings. 10. A method of operating apparatus for stamping advancing stock according to claim 8 and substantially as herein described with reference to the accompanying drawings.

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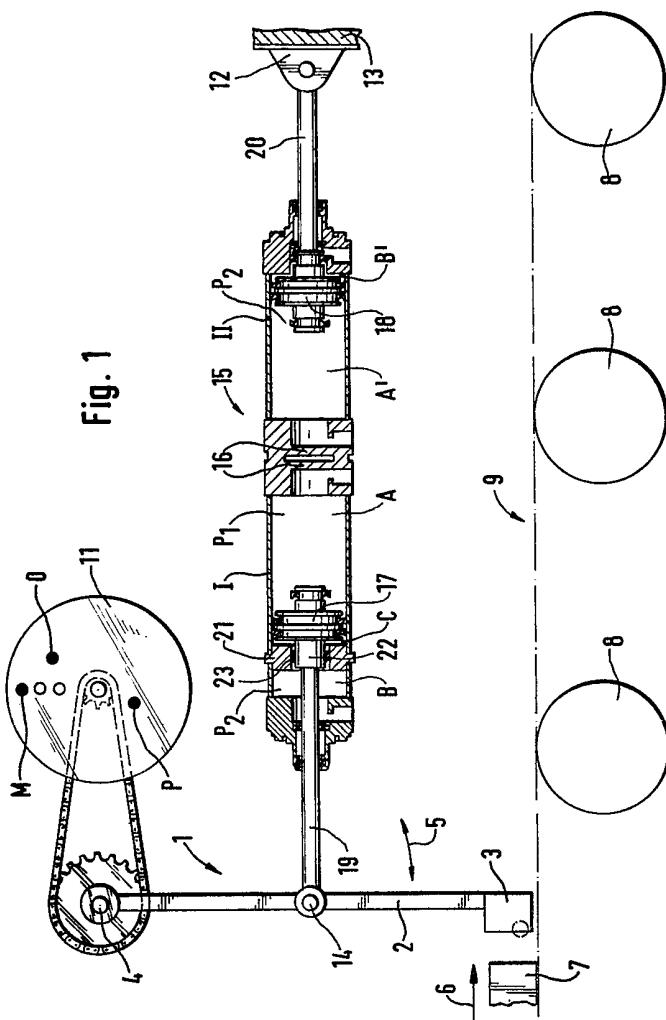


Fig. 2

