

Jan. 14, 1936.

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2,027,735

PRESS

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Fig. 1.

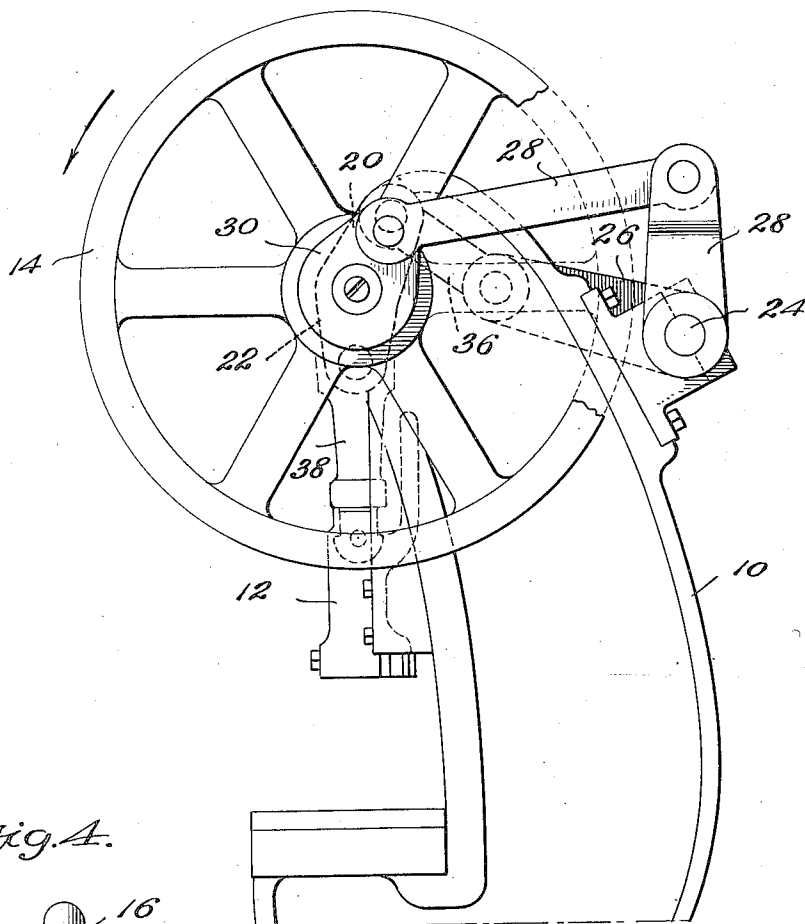
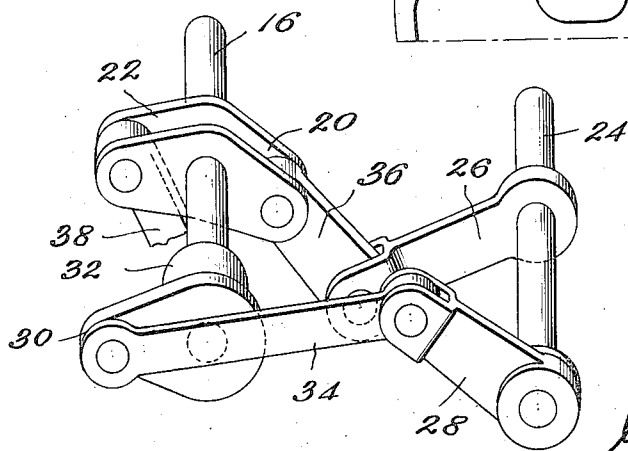


Fig. 4.



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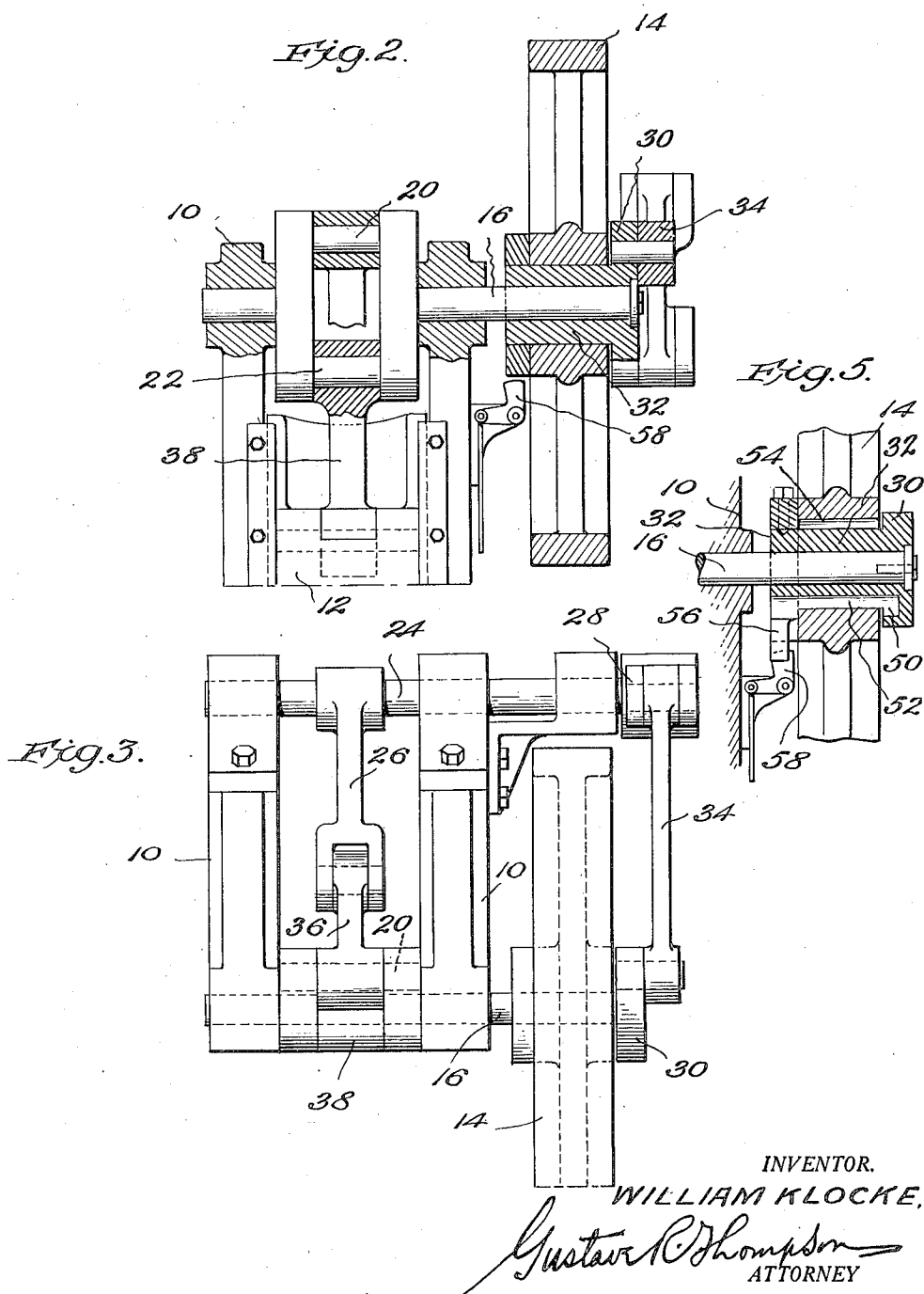
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Fig. 6.

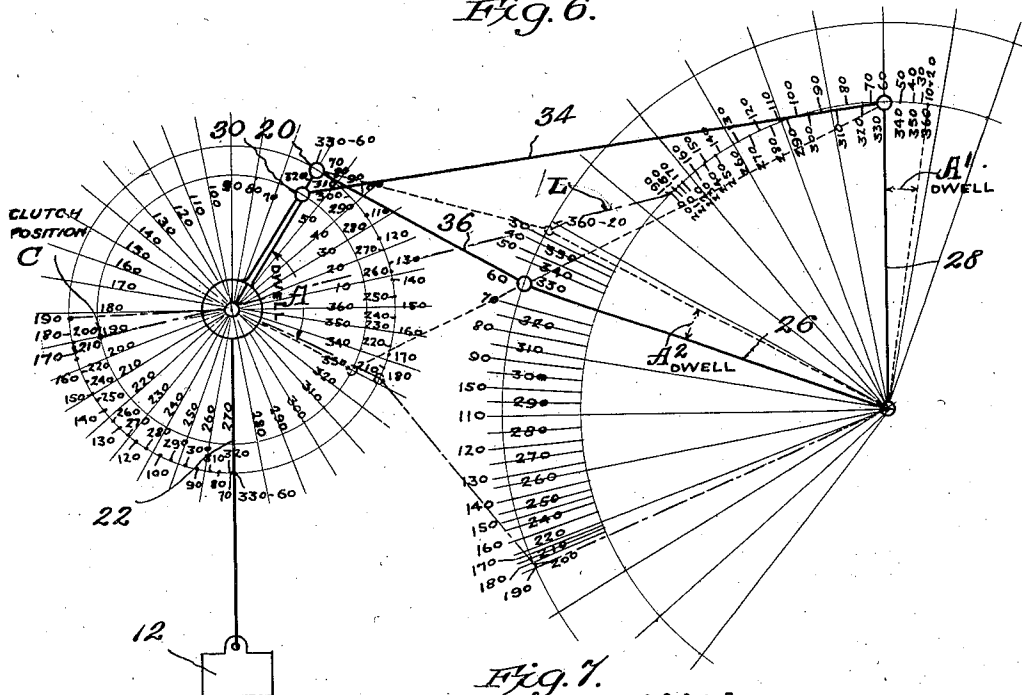
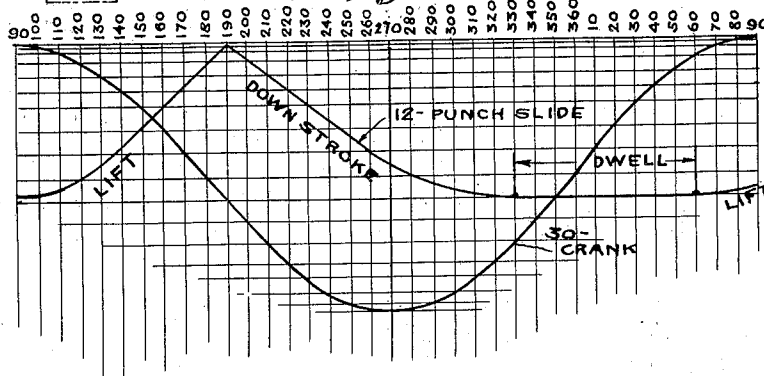


Fig. 7.



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PRESS

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12 Claims. (Cl. 74—40)

This invention relates to presses, and provides improvements therein.

In presses used for doing certain types of work it is required that the punch-slide be actuated in such manner that it "dwells" at the end of its working stroke. For example, in presses used for forming or molding under pressure articles from plastic or thermo-plastic compositions, (celluloid, bakelite, etc.) and pulp mixtures of various kinds, the punch-slide is so actuated, the purpose being to give time for the composition to "set" while under pressure. Presses heretofore used for the type of work referred to, have been provided with a clutch-mechanism operating to disengage the punch-slide actuating-mechanism from the driving means at the end-of-the-working-stroke position of the slide, the clutch-mechanism usually also operating to disengage the slide-actuating mechanism at the top of the stroke, so that a working cycle requires a double operation of the clutch-mechanism on the part of the press-operator, once to bring the clutch-parts into engagement at the top-position of the slide, (following which the punch-slide is driven on its working-stroke and the clutch then automatically disengaged), and a second time, to again bring the clutch parts into engagement at the bottom-position of the slide (following which the punch slide is raised to its top-position and the clutch again automatically disengaged). With a clutch, there are variations in the stopping-position of the punch-slide, due to the variable movement of the slide-actuating-mechanism following its disengagement by the clutch, and there are also variations in the time of engagement of the clutch-parts following the operation by the press-operator of the clutch-operating mechanism, which results in non-uniformity of the form, quality and physical structure of the articles formed in the press. Moreover, the engagement of the clutch-parts in the bottom-position of the punch-slide, and with the parts of the press under stress, is severe on the clutch, as the clutch must initiate the movement of the slide-actuating mechanism against the resistance of the stresses in the press and against the weight of the slide and its connected parts.

The present invention provides a press, with a punch-slide which dwells at the end of the working-stroke, in which the punch-slide is operated in uniform cycles; and by which uniform articles may be produced, less skill and effort is required of the press-operator, and more work may be done. It provides a press of the character described having a punch-slide actuating-mechanism

operating under easy conditions, without shocks or severe strains. The punch-slide actuating-mechanism is a series of rocking-parts connected by links, and a rotated or turning part which turns continuously and uniformly through each cycle, all so related and arranged that the links do not pull against the bearings of the rocking-parts so as to produce severe strains in the working parts or on the bearings. The angles between the working parts are good throughout the cycle and the pull and push of one part on another acts principally to produce turning-movements of the parts rather than pressure or force directed toward a bearing. Clutches working under unusually severe conditions are eliminated, and none is required which operates within a cycle of operation. In accordance with general practice the press would ordinarily be provided with a clutch which operates on the completion of each cycle, at which time the punch-slide is at the top of its stroke and the severity of clutch-action is least.

The invention also provides an arrangement of the parts of the punch-slide actuating-mechanism in which said parts, at the top-position of the slide, and in the disengaged position of the clutch-parts, locks the punch-slide against downward movement under its own weight.

AAn embodiment of the invention is illustrated in the accompanying drawings, in which

Fig. 1 is a side elevation of a press embodying my invention;

Fig. 2 is a front view thereof (with parts in section);

Fig. 3 is a top plan view; the punch-slide and its actuating-mechanism in this and the preceding views being shown in the positions which they occupy at the end of the working-stroke, the "dwell" being just about to end, and the lift of the slide to begin;

Fig. 4 is a perspective view of the parts of the punch-slide actuating-mechanism, detached from the frame, and in the positions which they occupy at the top-position of the stroke and in the disengaged-position of the clutch-parts;

Fig. 5 is a sectional view through the clutch and immediately associated parts in the disengaged-position of the clutch-parts, which is at the top of the stroke of the punch-slide;

Fig. 6 is a diagram of the parts of the punch-slide actuating-mechanism, the cranks and links being just about to leave the "dwell" producing positions thereof;

Fig. 7 is a diagram showing the movement of the punch-slide with relation to a crank-pin

turning through one revolution, or through one cycle.

Referring to said drawings, numeral 10 designates the press-frame, 12 the reciprocatory punch-slide, and 14 the part (here shown as a belt-driven fly-wheel) for driving the punch-slide actuating-mechanism.

The mechanism for actuating the reciprocatory punch-slide 12, comprises a rocking part 16 comprising a shaft turning in bearings in the press-frame 10 having thereon a pair of angularly spaced arms 20, 22. The arm 22 translates rocking-movements thereof into reciprocatory movements of the slide 12. The said mechanism further comprises a rocking part 24 having angularly spaced arms 26, 28 fixed thereon (and together constituting a bell-crank), a rotated (revolvable) part 30 (here shown as a crank on a sleeve 32 mounted free on rock-shaft 16), which may be driven so as to turn continuously and uniformly through each cycle, links 34, 36, the link 34 connecting crank 30 to one of the arms as the arm 28, to rocking-part 24, and the link 36 connecting the other arm (26) of rocking part 24 to arm 20 on rocking part 16, and a connecting-rod 38 connecting arm 22 to the punch-slide 12.

The relation and arrangements of the parts of the punch-slide actuating-mechanism is primarily to produce a "dwell" of the punch-slide 12, of considerable duration, at the end of its working-stroke. The arms 20, 22, 26, 28 of the rocking parts 16, 24 respectively are so set on their rock-shafts that when the revolving crank 30 is moving through an arc A having its chord at right-angles to a line connecting the end of arm 28 with the center around which crank 30 turns, where least lengthwise movement is imparted to link 34 and consequently least angular movement imparted to arm 28, the connecting rod 38 and arm 22, are in virtual alinement, and the link 36 and arm 26 move in a small arc A² across a line corresponding to their position of alinement (toggle-motion). Referring to Fig. 6 when the revolving arm 30 moves through an arc of 90° at A, the crank-arms 26 and 28 move through arc A¹, A² of about 9°, and the arms 20 and 22 are motionless or virtually motionless, and the punch-slide 12 "dwells" for a time measured by the movement through 90° of the crank 30.

The relation and arrangement of the parts of the punch-slide actuating mechanism is also such that when the revolving crank 30 is opposite the middle of arc A the ends of the crank 30 and arm 28 and the center around which crank 30 turns are again in alinement (virtually in the same line L), and the disengaging position of the clutch is arranged at this position, or slightly beyond in the direction of revolution of crank 30, as indicated at C. In this position the punch-slide 12 is in approximately its fully lifted position, and its weight tends to turn the parts running back to the clutch. However, in this position the pull of link 34 on crank 30, is directly against the center around which arm 30 turns, and thereby "locks" the parts of the punch-slide actuating-mechanism against movement under the force of the weight of slide 12. The clutch is shown in Fig. 5, and may consist of an oscillating key 50, journaled in the sleeve 32, having an eccentric portion 52, which, in the engaging position of the clutch-parts, projects into a notch 54 provided in the fly-wheel 14.

The key 50 also has a tail 56 which is in the path of a movable treadle-operated stop 58. The stop 58 normally stands in the path of tail 56, and upon contact therewith, at the end of a revolution of the fly-wheel 14 and sleeve 32 (engaged through the clutch), turns the key 50 to move the eccentric part 52 thereof out of the notch 54, and thereby disengages the sleeve 32 from the fly-wheel 14. The stop 58 is moved out of the path of the tail 56 by the treadle-mechanism, allowing the key 50 to turn and bring the eccentric part 52 into notch 54, thereby engaging the sleeve 32 and fly-wheel 14, and initiating a cycle of operation of the press. Such a clutch-mechanism is disclosed in patent to Klocke 710,199, Sept. 30, 1902, and in a number of other patents.

Throughout the revolution of crank 30, the pull and push of link 34 is at approximately right-angles to the arm 28, and the pull and push of link 36 connected to arm 26 is at approximately right-angles to crank 30, so that the pressure against the bearings of the rocking-parts resulting from the pull or push of revolving crank 30 is small and there is no "binding" against the bearings in the punch-slide actuating-mechanism during the driving of the punch-slide 12. It will be seen that the angles between the working parts are good through the cycle and the pull and push of links 34 and 36 act principally to produce turning-movements of the arms 28 and 20 rather than pressure or force directed toward the bearings of the rocking parts 16, 24. Severe strains are avoided and an easy action obtained.

As the revolving crank 30, when the clutch is engaged, turns uniformly, as the parts of the punch-slide actuating mechanism are always connected, and as the clutch (which is usually employed) is engaged throughout a working-stroke and the lift of the punch-slide (one cycle), the cycles of movement of the punch-slide are uniform; in particular, the "dwells" of the punch-slide in every cycle are uniform. The punch-action is uniform, and the quality and form of the article formed by the press is uniform. The clutch is engaged and disengaged at the top of the stroke of the punch-slide, where the parts are not under working stresses or strains, and the shock of engagement is relatively light.

The related movements of the punch-slide 12 and of the revolving crank 30 are shown in the timing diagram Fig. 7, the line 30 designating the movement of the crank 30, and the line 12 designating the related movement of the punch-slide 12.

The invention may receive other embodiments than that herein specifically illustrated and described.

The reference numerals in the claims are used primarily for clarity, and such use does not imply any greater restriction than is required by the prior state of the art.

What is claimed is:

1. A press of the character described, comprising a reciprocatory slide, and actuating mechanism for said slide comprising a crank turning through a full revolution in each cycle, a rocking part having a pair of angularly spaced arms thereon (24, 26, 28) and a second rocking part having an arm thereon (16, 20), a link connecting an arm on said first named rocking part with the arm on said second rocking part, a link connecting said crank (30) with the other arm of

said first-named rocking part, and means on said second rocking part for translating rocking movements thereof into reciprocatory movement of said slide, said parts being interconnected and arranged to produce a "dwell" in the movement of said slide at the bottom of its working stroke.

2. A press of the character described, comprising a reciprocatory slide, and actuating mechanism for said slide comprising a crank turning through a full revolution in each cycle, a rocking part having a pair of angularly spaced arms thereon (24, 26, 28) and a second rocking part having an arm thereon (16, 20), a link connecting an arm on said first named rocking part with the arm on said second rocking part, a link connecting said crank (30) with the other arm of said first-named rocking part, and means on said second rocking-part for translating rocking movements thereof into reciprocatory movement of said slide, said parts being interconnected and arranged to produce a "dwell" in the movement of said slide at the bottom of its working stroke, the arrangement of the arms of said rocking parts and of the links being such that in the bottom position of said slide, an arm of said first named rocking-part and the link connecting it with the arm on said second rocking part move in a small arc in which they remain in virtual alinement.

3. A press of the character described, comprising a reciprocatory slide, and actuating mechanism for said slide comprising a crank turning through a full revolution in each cycle, a rocking part having a pair of angularly spaced arms thereon (24, 26, 28) and a second rocking part having an arm thereon (16, 20), a link connecting an arm on said first named rocking part with the arm on said second rocking part, a link connecting said crank (30) with the other arm of said first-named rocking part, and means on said second rocking-part for translating rocking movements thereof into reciprocatory movement of said slide, said parts being interconnected and arranged to produce a "dwell" in the movement of said slide at the bottom of its working stroke, the arrangement of the arms of said rocking-parts and of the links being such that in the bottom position of said slide, an arm of said first named rocking-part and the link connecting it with the arm on said second rocking part move in a small arc in which they remain in virtual alinement, said crank at the same time moving through an arc having a chord at approximately right angles to a line joining the axis on which the crank turns with the end of the arm of said first-named rocking part with which it is linked.

4. A press of the character described, comprising a reciprocatory slide, and actuating mechanism for said slide comprising a crank turning through a full revolution in each cycle, a rocking part having a pair of angularly spaced arms thereon (24, 26, 28) and a second rocking part having an arm thereon (16, 20), a link connecting an arm on said first named rocking part with the arm on said second rocking part, a link connecting said crank (30) with the other arm of said first-named rocking part, and means on said second rocking-part for translating rocking movements thereof into reciprocatory movement of said slide, said parts being interconnected and arranged to produce a "dwell" in the movement of said slide at the bottom of its working stroke, the arrangement of said crank in the lifted position of the slide being such that the link connected thereto is alined with a line passing

through the point of connection of said link to said crank and the axis on which said crank turns.

5. A press of the character described comprising a reciprocatory slide, and actuating mechanism for said slide comprising a crank turning through a full revolution in each cycle, a rocking part having a pair of angularly spaced arms thereon (24, 26, 28) and a second rocking part having an arm thereon (16, 20), a link connecting an arm on said first named rocking part with the arm on said second rocking part, a link connecting said crank (30) with the other arm of said first-named rocking part, and means on said second rocking-part for translating rocking movements thereof into reciprocatory movement of said slide, said parts being interconnected and arranged to produce a "dwell" in the movement of said slide at the bottom of its working stroke, the arrangement of said crank in the lifted position of the slide being such that the link connected thereto is alined with a line passing through the point of connection of said link to said crank and the axis on which said crank turns, and a clutch having an engaging and disengaging position corresponding to the aforesaid position of said crank and its connected link in said lifted position of said slide.

6. A press of the character described, comprising a reciprocatory slide, and actuating mechanism for said slide comprising a crank turning through a full revolution in each cycle, a rocking part having a pair of angularly spaced arms thereon (24, 26, 28) and a second rocking part having an arm thereon (16, 20), a link connecting an arm on said first named rocking part with the arm on said second rocking part, a link connecting said crank (30) with the other arm of said first-named rocking part, and means on said second rocking-part for translating rocking movements thereof into reciprocatory movement of said slide, said parts being interconnected and arranged to produce a "dwell" in the movement of said slide at the bottom of its working stroke, the arrangement of the arms of said rocking-parts and of the links being such that in the bottom position of said slide, an arm of said first named rocking-part and the link connecting it with the arm on said second rocking part move in a small arc in which they remain in virtual alinement, said crank at the same time moving through an arc of approximately 90° having a chord at approximately right angles to a line joining the axis on which the crank turns with the end of the arm of said first-named rocking part with which it is linked.

7. Slide reciprocating mechanism of the character described, comprising a crank (30) and means for rotating it, a reciprocatory slide (12), a rocking part having a pair of angularly spaced arms thereon (24, 26, 28), a second rocking part having an arm thereon (16, 20), a link connecting an arm on said first-named rocking part with the arm on said second rocking part, a link connecting said crank with the other arm of said first named rocking part, and means on said second rocking part for translating rocking movements thereof into reciprocatory movement of said slide, said parts being interconnected and arranged to produce a "dwell" in the movement of said slide at the bottom of its working stroke.

8. Slide reciprocating mechanism of the character described, comprising a crank (30) and means for rotating it, a reciprocatory slide (12), a rocking part having a pair of angularly spaced

arms thereon (24, 26, 28), a second rocking part having an arm thereon (16, 20), a link connecting an arm on said first-named rocking part with the arm on said second rocking part, a link
 5 connecting said crank with the other arm of said first named rocking part, and means on said second rocking part for translating rocking movements thereof into reciprocatory movement of said slide, said parts being interconnected and arranged to produce a "dwell" in the
 10 movement of said slide at the bottom of its working stroke, an arm of said first-named rocking part and the link connecting it with the arm on said second named rocking part being arranged
 15 to move, in the hereinbefore mentioned bottom-position of said slide, in a small arc in which they remain in virtual alinement.

9. Slide reciprocating mechanism of the character described, comprising a crank (30) and
 20 means for rotating it, a reciprocatory slide (12), a rocking part having a pair of angularly spaced arms thereon (24, 26, 28), a second rocking part having an arm thereon (16, 20), a link connecting
 25 an arm on said first-named rocking part with the arm on said second rocking part, a link connecting said crank with the other arm of said first named rocking part, and means on said second rocking part for translating rocking
 30 movements thereof into reciprocatory movement of said slide, said parts being interconnected and arranged to produce a "dwell" in the movement of said slide at the bottom of its working stroke, an arm of said first-named rocking
 35 part and the link connecting it with the arm on said second named rocking part being arranged to move, in the hereinbefore mentioned bottom position of said slide, in a small arc in which they remain in virtual alinement, said
 40 rotary crank at the same time moving through an arc having a chord at approximately right angles to a line joining the axis on which the crank turns with the end of the arm of the first-named rocking part with which it is linked.

10. Slide reciprocating mechanism of the character described, comprising a crank (30) and
 45 means for rotating it, a reciprocatory slide (12), a rocking part having a pair of angularly spaced arms thereon (24, 26, 28), a second rocking part having an arm thereon (16, 20), a link connecting
 50 an arm on said first-named rocking part with the arm on said second rocking part, a link connecting said crank with the other arm of said first-named rocking part, and means on said second rocking part for translating rocking move-
 55 ments thereof into reciprocatory movement of said slide, said parts being interconnected and arranged to produce a "dwell" in the movement of said slide at the bottom of its working stroke, and the arrangement of said rotary crank, at

the end of the reciprocatory movement of said slide corresponding to its lifted position being such that the link connected thereto is alined with a line passing through the point of connection of said link to said rotary crank and the
 5 axis on which said crank turns.

11. Slide reciprocating mechanism of the character described, comprising a crank (30) and means for rotating it, a reciprocatory slide (12),
 10 a rocking part having a pair of angularly spaced arms thereon (24, 26, 28), a second rocking part having an arm thereon (16, 20), a link connecting an arm on said first-named rocking part with the arm on said second rocking part, a link connecting
 15 said crank with the other arm of said first named rocking part, and means on said second rocking part for translating rocking movements thereof into reciprocatory movement of said slide, said parts being interconnected and
 20 arranged to produce a "dwell" in the movement of said slide at the bottom of its working stroke, and the arrangement of said rotary crank, at the end of the reciprocatory movement of said slide corresponding to its lifted position being such
 25 that the link connected thereto is alined with a line passing through the point of connection of said link to said rotary crank and the axis on which said crank turns, and a clutch having an engaging and disengaging position corresponding
 30 to the aforesaid position of said rotary crank and its connected link in said lifted position of the slide.

12. Slide reciprocating mechanism of the character described, comprising a crank (30) and means for rotating it, a reciprocatory slide (12),
 35 a rocking part having a pair of angularly spaced arms thereon (24, 26, 28), a second rocking part having an arm thereon (16, 20), a link connecting an arm on said first-named rocking part with the arm on said second rocking part, a link
 40 connecting said crank with the other arm of said first named rocking part, and means on said second rocking part for translating rocking movements thereof into reciprocatory movement of said slide, said parts being interconnected and
 45 arranged to produce a "dwell" in the movement of said slide at the bottom of its working stroke, an arm of said first-named rocking part and the link connecting it with the arm on said second named rocking part being arranged to move,
 50 in the hereinbefore mentioned bottom-position of said slide, in a small arc in which they remain in virtual alinement, and said rotary crank at the same time moving through an arc of approximately 90° having a chord at approximately right
 55 angles to a line joining the axis on which said crank turns with the end of the arm of the first-named rocking part with which it is linked.

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