

3 Sheets—Sheet 1.

Patented Mar. 29, 1898.

No. 601,398.

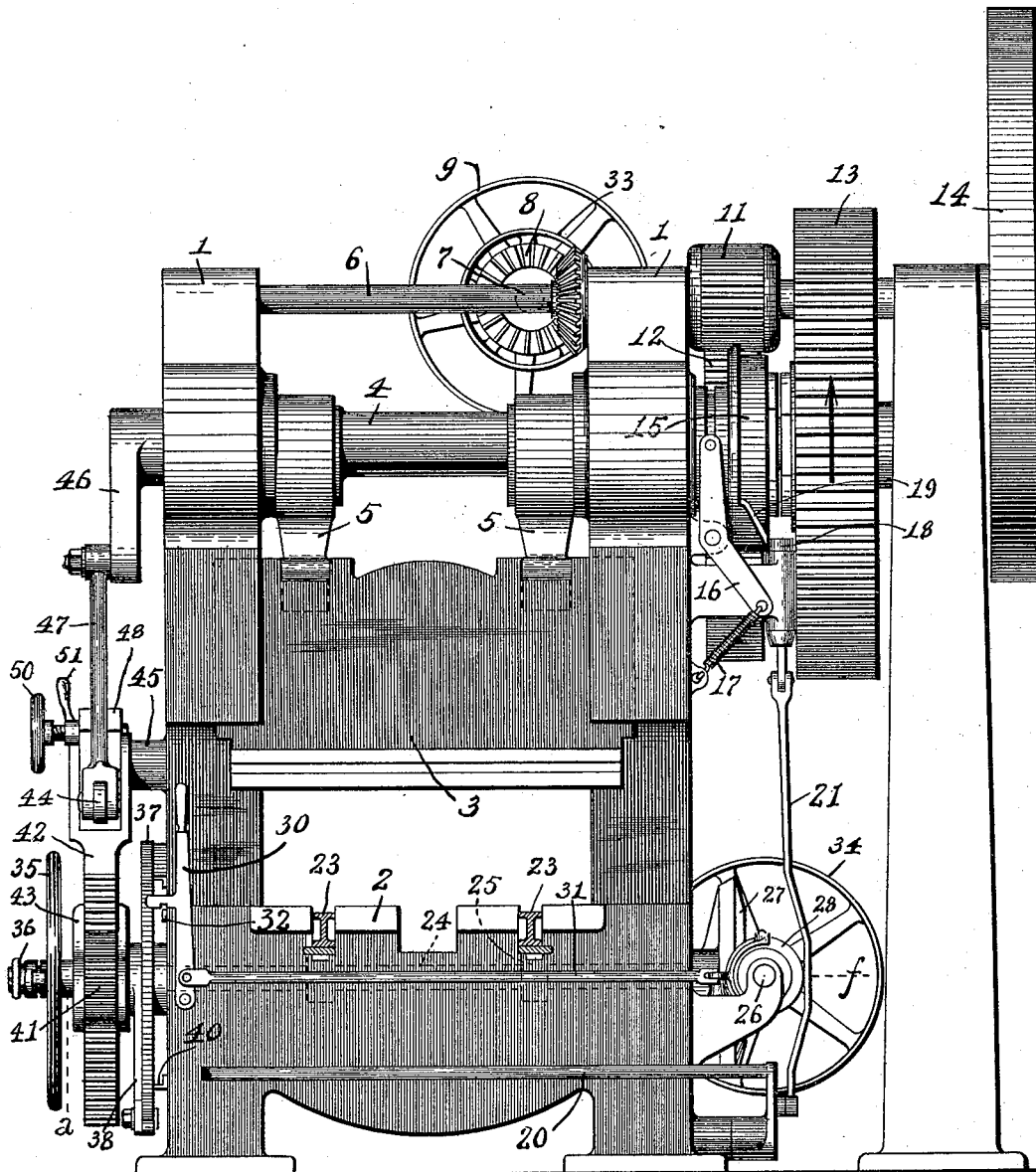


Fig. 1.

Inventors

by James W. See
Attorney

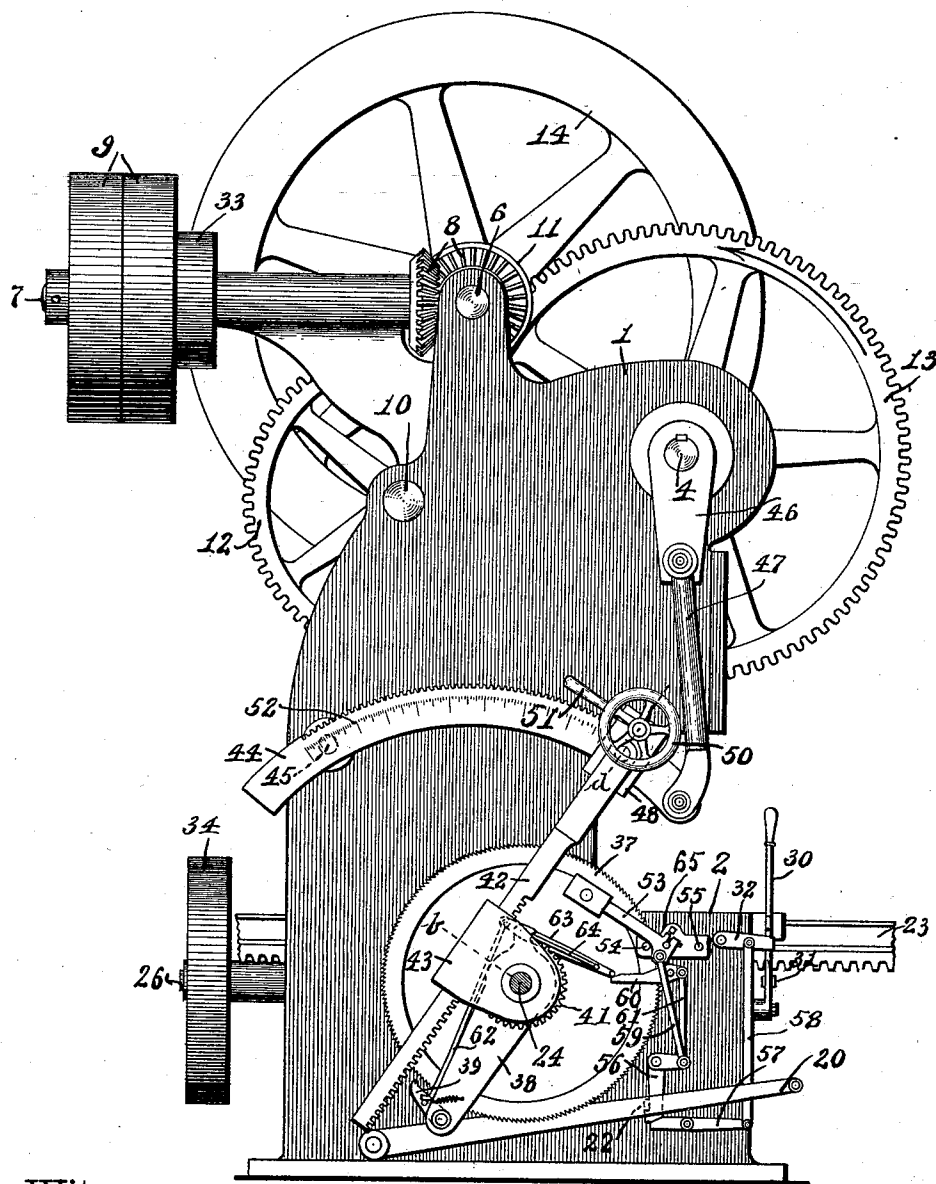
(No Model.)

3 Sheets—Sheet 2.

J. M. & J. M. W. LONG.
SPACING PUNCH.

No. 601,398.

Patented Mar. 29, 1898.



Witnesses:
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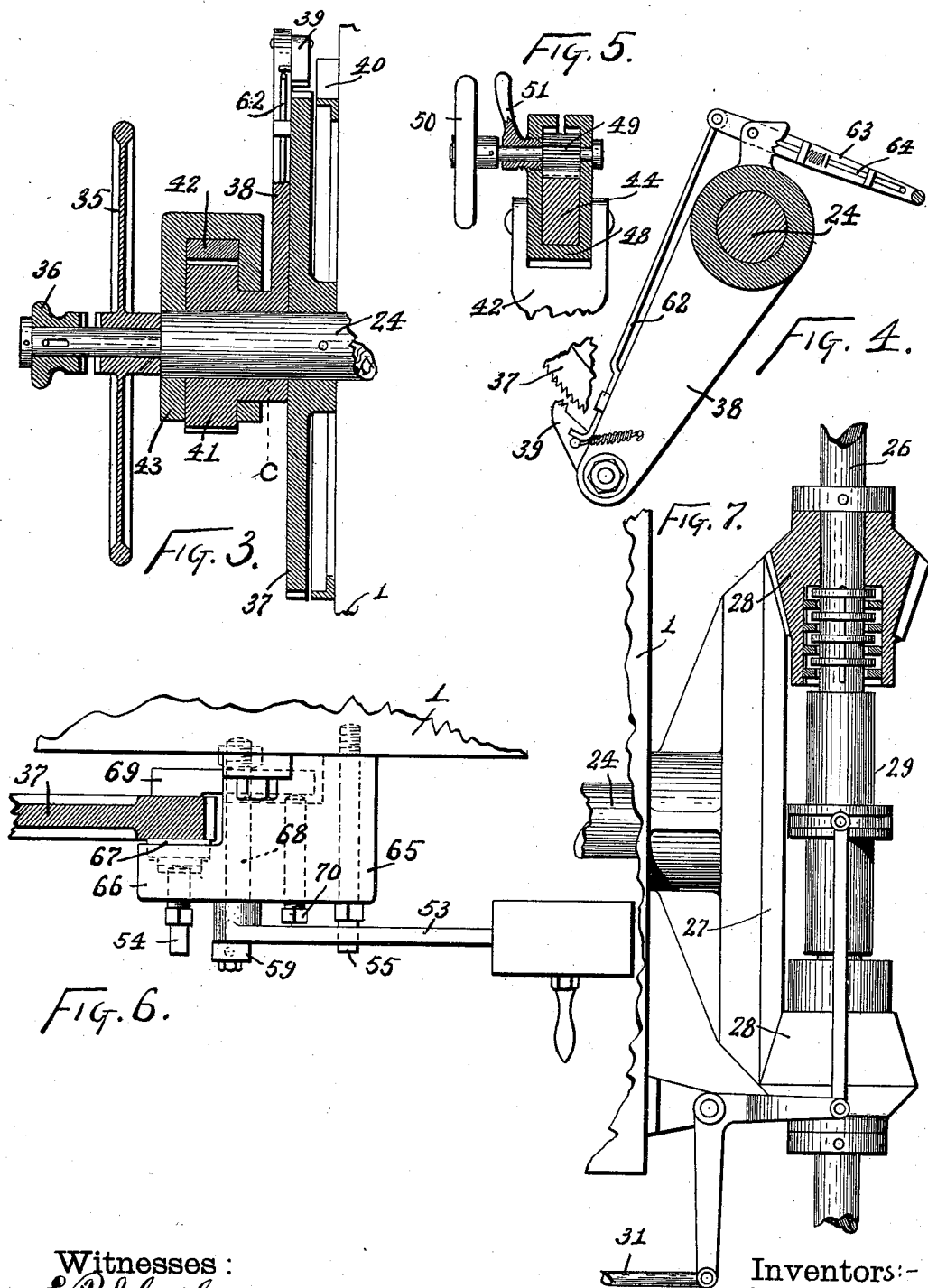
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3 Sheets—Sheet 3.

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SPACING PUNCH.

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M. S. Belden.

Inventors:-
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UNITED STATES PATENT OFFICE.

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THE LONG & ALLSTATTER COMPANY, OF SAME PLACE.

SPACING-PUNCH.

SPECIFICATION forming part of Letters Patent No. 601,398, dated March 29, 1898.

Application filed October 25, 1897. Serial No. 656,311. (No model.)

To all whom it may concern:

Be it known that we, JOHN M. LONG and JOHN M. W. LONG, of Hamilton, Butler county, Ohio, have invented certain new and useful
5 Improvements in Spacing-Punches, of which the following is a specification.

This invention relates to improvements in punching-machines designed for the automatic spacing and punching of holes in series,
10 and our improvements will be readily understood from the following description, taken in connection with the accompanying drawings, exemplifying our invention in a punching-machine of the gate type, in which draw-
15 ings—

Figure 1 is a front elevation of the machine; Fig. 2, a side elevation of the same, the feed-shaft appearing in vertical section in the plane of line *a* of Fig. 1; Fig. 3, a horizontal section of the feed ratchet-wheel and its immediate accessories in the plane of line *b* of Fig. 2; Fig. 4, a side elevation of the pawl-arm, its hub and the feed-shaft appearing in vertical section in the plane of line *c* of Fig. 3; Fig. 5,
20 a vertical section of the rock-bar and its shoe in the plane of line *d* of Fig. 2; Fig. 6, a plan of the ratchet-wheel gripper, a portion of the ratchet-wheel appearing in horizontal section; and Fig. 7, a plan of the fleeting-gears and their clutch, one of the pinions appearing in
30 horizontal section in the plane of line *f* of Fig. 1.

In the drawings, and giving attention to Figs. 1 and 2 except as otherwise directed, 1
35 indicates the housings of the punching-machine; 2, the table adapted to receive and support the lower punching-tools; 3, the gate sliding vertically in the housings and adapted to carry the upper punching-tools; 4, the cam-shaft; 5, the pitmen connecting the cam-shaft
40 with the gate; 6, a counter-shaft parallel with cam-shaft 4; 7, a driving-shaft at right angles to counter-shaft 6; 8, bevel-gears connecting driving-shaft 7 with counter-shaft 6; 9, tight
45 and loose pulleys on driving-shaft 7, through the medium of which the machine may be operated by belt; 10, a second counter-shaft, parallel with the cam-shaft; 11, a pinion on counter-shaft 6; 12, a gear on counter-shaft
50 10 and engaged by pinion 11; 13, a master-gear loose on the cam-shaft and engaged by a

proper pinion on counter-shaft 10, the hub of master-gear 13 being provided with clutch-jaws; 14, a fly-wheel on counter-shaft 6; 15, a sliding clutch splined to cam-shaft 4 and
55 having jaws adapted to engage with those of master-gear 13; 16, a lever engaging a groove in sliding clutch 15; 17, a spring acting on lever 16 and tending at all times to urge sliding clutch 15 into engagement with the clutch
60 of master-gear 13; 18, a spring-plunger with its upper end engaging the front face of sliding clutch 15 and holding that clutch in disengaged position; 19, a cam formed on the front face of sliding clutch 15 and adapted
65 during the turning of the sliding clutch, when the clutch is engaged with the master-gear, to act on plunger 18 and cause the sliding clutch to retreat to position of disengagement; 20, a
70 treadle; 21, a rod connecting the treadle with plunger 18, and 22 a lug projecting from one of the arms of treadle 20.

Thus far there has been described a gate punching-machine of ordinary construction and provided with the ordinary automatic
75 stop-motion. Shaft 7, being driven continuously by belt, causes the continuous turning of master-gear 13 in the direction indicated by its arrow, the master-gear, turning loosely on the cam-shaft and sliding clutch 15, being
80 held out of engagement by plunger 18. If now treadle 20 be depressed, the plunger will descend, and spring 17, acting on lever 16, will move sliding clutch 15 to the right and lock
85 master-gear 13 to the cam-shaft, whereupon the cam-shaft will turn and produce vertical reciprocations of gate 3, which reciprocations will continue so long as the treadle is de-
90 pressed. If at any time after thus starting the gate into action the treadle be released, plunger 18 will rise and stand in front of the depressed portion of the face of sliding clutch 15, and as that clutch rotates cam portion 19
95 will engage plunger 18, and the clutch will be moved to the left and held out of engaging position, thus allowing the cam-shaft and gate to come to rest, the position of cam 19 being such with angular relation to the main
100 cams of the cam-shaft that the gate will be in its upward position when thus brought to rest. Thus the gate may be caused to reciprocate continuously so long as the treadle is

in depressed position, or the treadle may be depressed and immediately released after starting the machine, in which case the gate will make one excursion and come to rest in its upper position. All of this, both as to function and construction, is without novelty. If while treadle 20 is in its upward position, corresponding with the stationary condition of the machine, an obstruction be engaged under lug 22, then it is obvious that the treadle cannot be depressed so as to start the machine until such obstruction is removed.

Referring, further, to the drawings, and still giving attention to Figs. 1 and 2, 23 indicates a pair of bars sliding horizontally in suitable guideways in the base of the machine in a direction at right angles to the vertical plane of the gate, these bars being provided with rack-teeth on their lower surfaces and forming the skeleton feed-table of the machine, to which table there may be attached the usual or suitable holding devices to grip the plate or bar which is to be punched, the length of this skeleton table being such as is called for by the maximum length of work the machine is to deal with, the usual floor-stands to be provided in front of and to the rear of the machine to furnish additional guiding-support for the skeleton table; 24, a feed-shaft journaled in the base of the machine below table-bars 23 and at right angles to them; 25, pinions fast on feed-shaft 24 and engaging the toothed racks of table-bars 23; 26, a shaft disposed at right angles to and across one end of feed-shaft 24; 27, a bevel-gear fast on feed-shaft 24; 28, a pair of bevel-pinions loose on shaft 26 and engaging gear 27; 29, Fig. 7, a clutch of well-known construction adapted to serve in locking either of pinions 28 alternatively to shaft 26; 30, a hand-lever for throwing clutch 29 and locking either pinion 28 alternatively to shaft 26; 31, connections of an obvious character between lever 30 and clutch 29; 32, a latch pivoted to the framing of the machine and adapted when in its upper position to engage a notch in lever 30 and prevent that lever from being shifted out of neutral position, in which neutral position neither of pinions 28 is locked to shaft 26; 33, a pulley fast on driving-shaft 7; 34, a pulley fast on shaft 26; 35, a hand-wheel loose on feed-shaft 24, and 36, Fig. 3, a clutch on shaft 24, adapted to serve in temporarily locking hand-wheel 35 to its shaft.

Shaft 24 is the feed-shaft, which, being turned, will obviously give traveling motion to the skeleton table formed by bars 23. If by means of clutch 36 hand-wheel 35 be locked to the feed-shaft, then the feed-shaft may be turned by hand and traveling motion be given to the skeleton table, so as to bring any desired portion of its length under the gate. This constitutes the hand feeding motion for the table. Shaft 26 is in continuous motion by belt on pulleys 33 and 34, pinions 28 being loose on the shaft. By properly operating hand-lever 30 either of pinions 28 may be

locked to shaft 26, thus causing the rotation of feed-shaft 24 in one direction or the other, according to which way lever 30 is shifted. Thus the skeleton table may be caused to travel in either direction by power. This constitutes the fleeting motion of the machine and is useful where long traverses of the table are to be effected. Hand-wheel 35, being normally loose on feed-shaft 24, permits of the feed-shaft having its motion initiated and arrested with greater accuracy than would be the case were the inertia of the hand-wheel involved by having it fixed upon its shaft.

As thus far described the skeleton table of the machine is susceptible of having a traveling motion imparted to it by hand or by power; but no automatic spacing capacities have yet been referred to.

Referring, further, to the drawings, 37 indicates the feed ratchet-wheel fast upon feed-shaft 24 and having accurately-spaced teeth, each one of which corresponds with one unit of feed distance for the skeleton table, such feed-unit being, say, one-sixteenth of an inch; 38, a pawl-carrying arm loose on the feed-shaft alongside ratchet-wheel 37; 39, a pawl carried by the pawl-arm and adapted to engage the teeth of the ratchet-wheel and urged into engaging position by a suitable spring; 40, a fixed circular track adapted to be engaged by a shoe on the pawl and hold the pawl out of engagement with the ratchet-wheel while the pawl is making its idle stroke, this arrangement being the same as set forth in Long's patent, No. 454,440, of June 16, 1891; 41, a pinion fast with pawl-arm 38 and loose on the feed-shaft; 42, an oscillating and reciprocating rack engaging pinion 41; 43, a yoke journaled on the feed-shaft and straddling pinion 41 and furnishing an oscillating bearing and guide for rack 42 and serving to keep the rack in gear with its pinion; 44, a curved rock-bar disposed some distance above pinion 41; 45, a fixed pivot supported by the framing of the machine near one end of rock-bar 44, this being the pivot on which the rock-bar rocks; 46, a crank on cam-shaft 4; 47, a link connecting this crank with the free end of rock-bar 44, whereby each excursion of gate 3 is accompanied by an oscillating excursion on the part of rock-bar 44; 48, Fig. 5, a shoe neatly fitting on rock-bar 44 and adapted for sliding adjustment thereon, this shoe having pivotal engagement with the bifurcated upper end of rack 42, the shoe being slitted at its top; 49, a pinion mounted in shoe 48 and engaging teeth on the upper surface of rock-bar 44; 50, a hand-wheel on the shaft of this pinion to serve in turning it; 51, a handled binder surrounding the shaft of pinion 45 and having its hub screwed into the wall of shoe 48 and serving to draw on the pinion-shaft and clamp the shoe upon the rock-bar and pinion, and 52 graduations on the face of rock-bar 44 to serve in measuring the adjustment for degree of spacing.

Giving attention to Fig. 2, it will be obvious

that when rock-bar 44 rises rack 42 will be drawn upward, thus causing a partial rotation of pinion 41 and a feeding movement of the pawl, the ratchet-wheel being thus advanced a distance corresponding with the upward movement of the rack. As seen in Fig. 2, shoe 48 is near the free end of the rock-bar, and consequently the pawl will impose upon the ratchet-wheel nearly the maximum feeding capacity of the device. If now shoe 48 be shifted and secured to the rock-bar in such position that the pivot at the upper end of rack 42 coincides with pivot 45, on which the rock-bar rocks, then it is obvious that the oscillations of the rock-bar would impose no reciprocating motion upon rack 42 and give no feeding motion to the ratchet-wheel or to the table of the machine. By fixing shoe 48 at intermediate positions on the rock-bar the stroke of rack 42 may be adjusted and any desired degree of spacing feed gotten between zero and the maximum capacity of the device. Graduations 52 on the rock-bar are preferably such that the number of units of feed can be read directly from them. Thus the first mark at the left corresponds with zero of rack motion, the second mark with one unit of spacing feed, and so on. Shoe 48 is adjusted along the rock-bar by turning hand-wheel 50, and after adjustment the shoe is locked to the bar by turning the binder 51, Fig. 5, which clamps the pinion-shoe to the bar. It is to be observed that crank 46 gives to the rock-bar a motion invariable in extent. The rock-bar is so curved that shoe 48 may traverse it without causing any turning of pinion 41. The rock-bar has not a circular curve, its curvature being such as would be produced if a string were employed as the radius, with a marker at its upper end, the lower portion of the string being wrapped upon a cylinder corresponding with the pitch diameter of pinion 41, the string leading upwardly from the left of the pinion or its representative cylinder. Or, to express it otherwise, assume shoe 48 to be absent and a pencil or other marker to take the place of the pivot uniting the upper end of rack 42 to the shoe, and assume the pawl arm and pinion 41 to be locked against rotation. Now the marker or pencil will sweep the proper curve for rock-bar 44. This forms an extremely meritorious variable spacing device, susceptible of great accuracy and susceptible of extremely easy and accurate adjustment.

If in an automatic spacing punching machine the work be interrupted and it be desired to actuate the punches without feeding, as in testing, it is highly important that the work be not inadvertently shifted, else abnormal spacing of holes might occur. Again, in such machines if it be desired to traverse the work by hand or by power it is important that such movements be not interfered with by the automatic spacing devices, else the accurate spacing mechanism may become subjected to damaging strains.

Referring, further, to the drawings, 53 indicates a weighted hand-lever pivoted near one edge of the ratchet-wheel; 54, a stop to support this lever in position at one side of the neutral; 55, a stop to support the lever in position at the opposite side of the neutral; 56, a bell-crank pivoted to the framing, its lower arm having a hook adapted to engage under lug 22 on the treadle and prevent the treadle being depressed; 57, a lever pivoted to the framing and having one end beveled and engaged by an appropriate bevel on the lower arm of bell-crank 56, so that as that arm of the bell-crank moves to the right it will raise the outer end of lever 57; 58, a link connecting the outer end of lever 57 with latch 32 of hand-lever 30, and 59 a link connecting weighted lever 53 with the horizontal arm of bell-crank 56, so that leftward position of weighted arm 53 corresponds with hooked condition at lug 22 and freedom at latch 32.

As shown in Figs. 1 and 2, latch 32 is down to idle position. Hand-lever 30 may now be shifted in either direction to throw into action the fleeting motion of the feed-table; but while the machine is in this condition its gate cannot be started into action by intention or accidental pressure on treadle 20 for the reason that the hook of arm 56 is engaged under lug 22, thus locking the treadle. The feed-table may thus be shifted at will by the fleeting mechanism without danger of the work being ruined by the accidental starting up of the punching part of the machine. If it be desired to start up the punching part of the machine, then the operator will need to throw weighted lever 53 over to the right, where it will be supported on stop 55. The effect of this shifting of the weighted lever is to release lug 22 and permit the punching part of the machine to be put into motion by operating the treadle; but the release of lug 22 has been accompanied by a rising motion of latch 32, which engages the notch in lever 30, and thus locks the fleeting mechanism against action. It will thus be seen that the fleeting mechanism cannot be set into action while the punching part of the machine is in action and that the punching part of the machine cannot be thrown into motion while the fleeting devices are in use or unlocked.

Proceeding with the drawings, 60 indicates a lever pivoted to the framing below weighted lever 53 and lying alongside the ratchet-wheel; 61, a link connecting lever 60 with the lower pivot of link 59, so that the shifting of weighted lever 53 from its leftward to its rightward position will produce an elevation and depression of the inner end of lever 60; 62, a trip-rod carried by pawl-arm 38, its outer end adapted to engage pawl 39 and push the pawl to idle position; 63, Fig. 4, a lever carried by the pawl-arm and having one end connected with trip-rod 62, its outer end being in position to rest over lever 60 and be somewhat elevated thereby as lever 60 moves upwardly,

Fig. 2 showing lever 60 in upper position, and 64 a spring-detent carried by lever 63 and engaging detent-notches carried by the pawl-arm 38 and adapted to hold lever 63 in positions corresponding with idle or working condition of pawl 39, Figs. 2 and 4 showing lever 63 in position corresponding with non-acting condition of pawl 39.

When weighted lever 53 is in its leftward position, as indicated in Fig. 2, the treadle is locked, and fleeting-lever 30 is unlocked, as heretofore explained, and the feed-table may be fledted by power or may be traversed by hand by employing hand-wheel 35. At the same time lever 60 has pressed lever 63 upward and forced pawl 39 to inactive position. Under these conditions the work-table may be shifted by hand or may be fledted by power without interference from pawl 39. After desired adjustments of the feed-table have been effected and when it is desired to continue the punching operation weighted lever 53 being thrown to the right latches fleeting-lever 30 and unlocks the treadle, as before explained, and at the same time lowers lever 60, thus permitting lever 64 to be depressed, thus lifting trip-rod 62 and freeing the pawl from its influence and permitting the pawl to properly engage the ratchet-wheel.

Continuing with the drawings, 65, Fig. 6, indicates a block secured to the framing at the rim of the ratchet-wheel; 66, a jaw projecting inwardly from this block alongside the rim of the ratchet-wheel; 67, a brake-pad, preferably of wood, seated in a recess in the inner face of jaw 66 and taking a fair bearing against the outer face of the rim of the ratchet-wheel, stop 54 being formed into a screw threaded into jaw 66 and bearing against pad 67 to serve in nicely adjusting the pad to the ratchet-wheel; 68, the pivot of weighted lever 53, the same being journaled in block 65 and having a nut on its inner end, lever 53 being clamped on the outer end of pivot 68, as seen in Fig. 2, so as to be angularly adjustable thereon; 69, a pad-lever with the face of its inner end engaging the inner face of the rim of the ratchet-wheel, the intermediate portion of this pad-lever being on the inner end of pivot 68 and held inwardly by the nut on that pivot, and 70 a set-screw threaded into block 65, with its inner end impinging on pad-lever 69, this set-screw serving in nicely adjusting the grip of pad-lever 69 to the rim of the ratchet-wheel.

In swinging weighted lever 53 from the left to the right from stop 54 to stop 55 it effects the turning of pivot 68, screwing the pivot farther into its nut, and thus effecting a proper frictional clamping of the rim of the ratchet-wheel. When the weighted lever is in the position indicated in Fig. 2, then pads 67 and 69 are practically free on the rim of the ratchet-wheel, thus permitting of the proper hand adjustment or fledting of the feed-table; but when the spacing device is to be set into

action and weighted lever 53 is thrown over to the right then the turning of its pivot brings the pads to bear upon the rim of the ratchet-wheel, and a friction-brake is thereby formed to prevent overthrow or back motion of the ratchet-wheel. By angularly adjusting weighted lever 53 on its pivot 68 the desired degree of braking action may be secured when the weighted lever rests on stop 55.

We claim as our invention—

1. In a spacing-punch, the combination, substantially as set forth, of a gate, a cam-shaft for actuating the gate, a feed-rack arranged to travel at right angles to the gate, a feed-shaft parallel with the cam-shaft, a pawl-and-ratchet mechanism for intermittently turning said feed-shaft, a pinion on the feed-shaft engaging said rack, a shaft at right angles to said feed-shaft, reversing-gears connecting the last-mentioned shaft with the feed-shaft, a driving-shaft parallel with said last-mentioned shaft, gearing and a clutch connecting the driving-shaft with the cam-shaft, and pulleys on the driving-shaft for receiving motion and for transmitting motion to the shaft geared to said feed-shaft.

2. In a spacing-punch, the combination, substantially as set forth, of a feed-table having a rack, a feed-shaft, a pinion on the feed-shaft engaging said rack, a hand-wheel loose on said feed-shaft, a clutch connecting the hand-wheel and feed-shaft, a bevel-gear on said feed-shaft, a cross-shaft at the end of said feed-shaft, two bevel-pinions loose on said cross-shaft and engaging said bevel-gear, and a clutch adapted to lock said bevel-pinions alternatively to said cross-shaft.

3. In a spacing-punch, the combination, substantially as set forth, of a feed-table, a feed-shaft geared thereto, a shaft for imparting motion to said feed-shaft when the table is to be fledted by power, a clutch arranged to control the connection between said last-mentioned shaft and the feed-shaft, a lever for actuating said clutch, a latch for said lever, a treadle to serve in starting the punching machinery into motion, a latch to prevent the movement of the treadle, and connections between said two latches adapted to move said latches in unison so that one of the latches will be in active position when the other latch is in idle position.

4. In a spacing-punch, the combination, substantially as set forth, of a feed-table, a power-driven mechanism for giving fleeting motion to the table, a clutch-lever for controlling the action of said power-driven mechanism, a pawl-and-ratchet device for giving intermittent feeding motion to the table, a latch for said clutch-lever, and connections between the pawl and said latch whereby said pawl is thrown to idle position when said latch is moved to idle position.

5. In a spacing-punch, the combination, substantially as set forth, of a feed-table, a pawl-and-ratchet device for giving feeding motion

to said table, a treadle to serve in starting the punching machinery, a latch for said treadle, and connections between the pawl and said latch to serve in simultaneously engaging
5 said latch and throwing said pawl to idle position.

6. In a spacing-punch, the combination, substantially as set forth, of a feed-table, power-driven mechanism for giving fleeting motion
10 to the table, a clutch-lever for controlling the action of said power-driven mechanism, a latch for said clutch-lever, a treadle to serve in starting the punching machinery, a latch
15 for said treadle, a pawl-and-ratchet mechanism for giving feeding motion to the table, and connections between the pawl and said latches whereby when said clutch-lever is unlatched the treadle is latched and the pawl
20 thrown to idle position.

7. In a spacing-punch, the combination, substantially as set forth, of a feed-table, a pawl-and-ratchet mechanism for giving feeding motion
25 to said table, a friction-brake arranged to normally resist the motion of said table, a hand-lever serving to apply and release said brake, and connections between said lever
30 and the pawl whereby the pawl may be thrown to idle position by hand and the brake simultaneously released.

8. In a spacing-punch, the combination, substantially as set forth, of a feed-table, a feed-shaft for giving motion to the feed-table, a
35 ratchet-wheel fast on said shaft, a pawl-arm loose on the shaft and carrying a pawl, a pinion loose on the shaft and fast with the pawl-arm, a rock-bar pivoted to the framing of the machine, a crank linked to the free end of the
40 rock-bar for oscillating the rock-bar in unison with the reciprocations of the punch, a rack having pivotal connection with a mid portion of said rock-bar and engaging said pinion, and a yoke loose on said feed-shaft and engaging
45 said rack.

9. In a spacing-punch, the combination, substantially as set forth, of a feed-table, a feed-shaft for giving motion to the feed-table, a
50 ratchet-wheel fast on said shaft, a pawl-arm loose on the shaft and carrying a pawl, a pinion loose on the shaft and fast with the pawl-arm, a rock-bar pivoted to the framing of the machine, mechanism for oscillating the rock-bar
55 in unison with the reciprocations of the punch, a shoe arranged for adjustment along said rock-bar, a rack engaging said pinion and having pivotal connection with said shoe, and a yoke coupling said rack to said feed-shaft.

10. In a spacing-punch, the combination, substantially as set forth, of a feed-table, a
60 feed-shaft for traversing the table, a ratchet-wheel fast on the feed-shaft, a pawl-arm loose on the feed-shaft, a pawl carried thereby, a pinion loose on the feed-shaft and fast to the pawl-arm, a curved rock-bar pivoted to the
65 framing, mechanism for oscillating the rock-bar in unison with the reciprocations of the

punch, a shoe arranged for adjustment along the rock-bar, a rack engaging said pinion and having pivotal connection with said shoe, and
70 a yoke coupling the feed-shaft and rack.

11. In a spacing-punch, the combination, substantially as set forth, of a feed-table, a
75 feed-shaft for traversing the table, a ratchet-wheel fast on the feed-shaft, a pawl-arm loose on the feed-shaft, a pawl carried thereby, a pinion loose on the feed-shaft and fast to the pawl-arm, a curved rock-bar pivoted to the
80 framing, mechanism for oscillating the rock-bar in unison with the reciprocations of the punch, a shoe arranged for adjustment along the rock-bar, a rack engaging said pinion and having pivotal connection with said shoe, a
85 yoke coupling the feed-shaft and rack, a series of teeth on said rock-bar, a pinion carried by the shoe and engaging said teeth, a handle for turning the pinion, and a binder for locking the shoe.

12. In a spacing-punch, the combination, substantially as set forth, of a feed-table, a
90 feed-shaft for traversing the table, a ratchet-wheel fast on the feed-shaft, a pawl-arm loose on the feed-shaft, a pawl carried thereby, a pinion loose on the feed-shaft and fast to the pawl-arm, a curved rock-bar pivoted to the
95 framing, mechanism for oscillating the rock-bar in unison with the reciprocations of the punch, a shoe arranged for adjustment along the rock-bar, a rack engaging said pinion and having pivotal connection with said shoe, a
100 yoke coupling the feed-shaft and rack, a lever pivoted to said pawl-arm, a connection from said lever to the pawl, and a detent to serve in holding said lever in position corresponding with the idle position of the pawl.

13. In a spacing-punch, the combination, substantially as set forth, of a feed-table, a
105 feed-shaft for traversing the table, a ratchet-wheel fast on the feed-shaft, a pawl-arm loose on the feed-shaft, a pawl carried thereby, a pinion loose on the feed-shaft and fast to the pawl-arm, a curved rock-bar pivoted to the
110 framing, mechanism for oscillating the rock-bar in unison with the reciprocations of the punch, a shoe arranged for adjustment along the rock-bar, a rack engaging said pinion and having pivotal connection with said shoe, a
115 yoke coupling the feed-shaft and rack, a pawl-throwing lever pivoted to the pawl-arm, a connection from said lever to the pawl, a detent for said lever, a treadle to serve in starting the punching-machine, power-driven
120 mechanism for giving fleeting motion to the table, a clutch-lever for controlling the action of said power-driven mechanism, a latch for said clutch-lever, a latch for said treadle, a tripping-lever adapted to engage said clutch-
125 throwing lever, and connections between said tripping-lever and one or both of said latches whereby said pawl is thrown to idle position when the latch of the clutch-lever is released
130 or the latch of the treadle engaged.

14. In a spacing-punch, the combination,

substantially as set forth, of a feed-table,
power-driven mechanism for giving fleeting
motion to the table, a clutch-lever for con-
trolling the motion of said power-driven mech-
5 anism, a latch for the clutch-lever, a treadle
to serve in starting the punching machinery,
a latch for the treadle, a pawl-and-ratchet
wheel for giving feeding motion to the table,
a friction-brake for the ratchet-wheel, a

weighted lever, and connections between the 10
weighted lever and the pawl and the latches
to cause the lever to move them simulta-
neously.

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Witnesses:

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