

(No Model.)

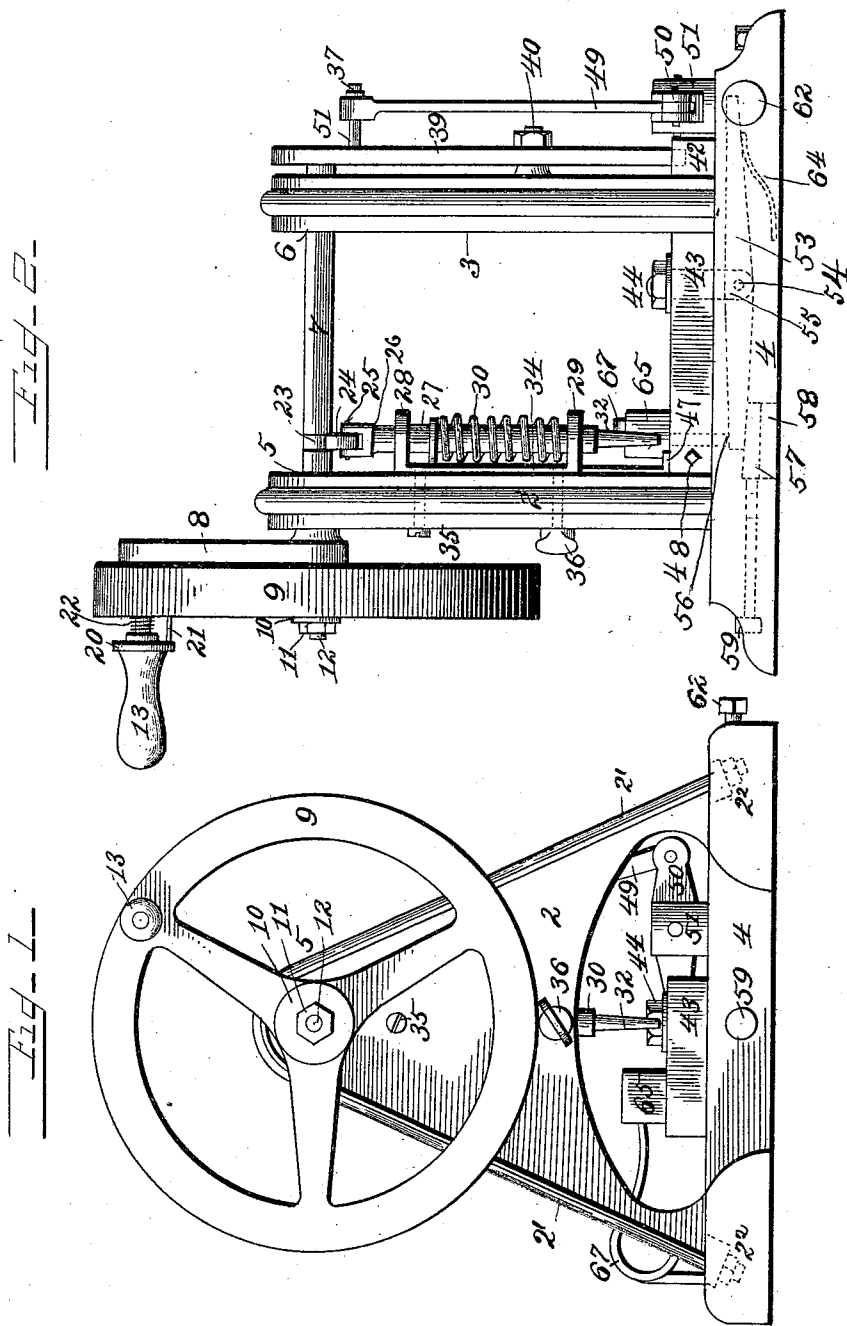
2 Sheets—Sheet 1.

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MACHINE FOR COMPRESSING TABLETS FROM POWDERS.

No. 461,683.

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Witnesses.

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MACHINE FOR COMPRESSING TABLETS FROM POWDERS.

SPECIFICATION forming part of Letters Patent No. 461,683, dated October 20, 1891.

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To all whom it may concern:

Be it known that I, JOHN P. MACLEARN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Compressing Tablets from Powders; and I do hereby declare the following to be a sufficiently full, clear, and exact description thereof as to enable others skilled in the art to make and use the said invention.

This invention relates to the manufacture of compressed tablets from powders for dispensing as medicines, and has for its object the more convenient adjustment of the machine to different sizes of tablets, greater simplicity of construction, and facility of working.

To attain these ends this invention consists in a machine embracing a special construction of driving mechanism, an easily-removable set of dies, and a construction of impressing mechanism within the frame of the machine, and therefore not so liable to deviation from right-lined motion when under pressure as in machines in which the impressing mechanism overhangs the frame of the machine.

The construction of the machine is herein after fully described, and shown in the accompanying drawings, in which—

Figure 1 shows a front view of the machine; Fig. 2, a side view; Fig. 3, a partial rear sectional view; Fig. 4, a vertical section looking to the front on the plane indicated by the line *x x* in Fig. 2. Fig. 5 is a section of part of the fly-wheel, the driving-handle, and clutch for communicating motion to the shaft from the fly-wheel.

The frame of the machine is preferably made of a single casting and embraces a front upright 2, a rear upright 3, and a bed-plate 4. The front upright 2 is braced by a double metal rod 2', drawn tightly in a groove over the bearing 5 by nuts 2³ in the bed 4. In the upper part of the uprights 2 and 3 is formed a bearing, respectively marked 5 and 6, in which bearings is fitted a horizontal shaft or arbor 7. The front end of the shaft 7 projects through the bearing 5 and is fitted with a lever-arm 8, securely keyed or other-

wise permanently fastened thereto. In front of the lever-arm 8 is a fly-wheel 9, fitted to turn freely on the shaft 7, and is held upon the shaft by a washer 10 and nut 11, fitted on the screw 12, formed on the end of the shaft 7. The wheel 9 receives rotary motion through a handle 13, fitted so as to turn freely upon a spindle 14, inserted and firmly fastened in the wheel 9. In addition to the rotative motion upon the spindle 14, the handle 13 has also a restricted lengthwise motion upon the spindle, the outward motion being restricted by a head or collar 15 on said spindle meeting the shoulder 16, formed in the bottom of the chamber 17, the other end of the chamber 17 being preferably closed by a plug 18, so as to exclude dirt and avoid soiling of the hands by lubricants. Upon the inner end of the handle 13 is a groove 19, in which a collar 20 is fitted, so that the handle may turn in it freely. Fastened in the collar 20 is a rod 21, extending through the wheel 9, so as to be flush with the inner face of the wheel when the handle 13 and collar 20 are pressed away from the wheel 9; but when pressed toward the wheel 9 the rod 21 engages the lever 8 and imparts rotary motion to the lever 8 and shaft 7. A spring 22, placed around the spindle 14 between the handle 13 and wheel 9, causes the rod 21 to clear the lever 8 when not pressed inwardly by the operator. The utility of this arrangement for clutching and unclutching the fly-wheel from the shaft arises from the fact that a considerable momentum is requisite to overcome the resistance of the materials to compact them into tablets, and such momentum can scarcely be developed in the first revolution, and in the event of any accident or disarrangement of the charging or compressing mechanism it is important to be able at will to suspend the rotation of the shaft 7 more promptly than the fly-wheel 9 can be brought to rest. A cam 23 is formed in the shaft 7. Beneath the cam 23 is a roller 24, fitted upon a pivot 25 in a clevis 26 in the upper end of a vertically-sliding gate 27, supported by and reciprocated in guides 28 and 29. The gate 27 is forced upwardly by a helical spring 30, secured at the upper end to the gate 27 and resting at the lower end upon the guide 29.

In the lower end of the gate 27 there is formed a conical socket, into which is fitted the upper die 32, which is held in position by a set-screw 33. The guides 28 and 29 are formed integrally with a plate 34, which is pivotally attached by a screw 35 near its upper end to the standard 2 and at its lower end by a detachable screw 36, so that it may by detaching the screw 36 be swung into the position indicated by the dotted lines Fig. 4, thus affording easy access to the lower end of the gate to introduce and remove the die 32. The lower portions of the standard 2 and 3 have arched openings in them to admit the parts for operating the mold and to facilitate the inspection of that portion of the apparatus when in motion.

Upon the rear end of the shaft 7 is formed an eccentric or crank-pin 37, which passes through a curved slot 38 in the upper end of a lever 39, pivoted at 40 to the upright 3 and having its lower extremity 41 engaged in a cleft 42 in a lever 43, pivoted at 44 in the base 4 of the machine, and containing at the opposite end 45 the body or sides 46 of the mold. The mold-body 46 is fitted removably in the lever 43 and is held down by a projection 47 from the plate 34, but may be otherwise secured, as by a set-screw 48. The form of the slot 38 in the lever 39 is such that it coincides with the motion of the crank-pin 37 during a considerable part of its revolution, and during this part of the rotation of the shaft and crank-pin no motion is imparted to the lever 39 and the parts connected thereunto and consequently the mold 46 is at rest, and while at rest the die 32 enters and compresses the material in it. The crank-pin 37 extends beyond the lever 39 and has pivotally fitted upon it the upper end of a connecting-rod 49, which rod 49 is pivotally attached at its lower end to one end of a lever 50, having its fulcrum 51 in the center and at the opposite end a finger 52, which extends downwardly through the bed-plate 4 and depresses the rear end of a lever 53, located in a cavity in the under side of the bed-plate 4 and having a fulcrum 54 at about the center of its length formed in a clevis 55, which is formed integrally with the pivot 44 and reciprocates with the lever 43. The front end of the lever 53 passes under the lower die 56 and raises it when the upper die 32 rises and expels the compressed tablet from the mold 46. Beneath the lever 53 is a wedge 57, which rests upon a shelf or flange 58 in the bed-plate 4, and is adjusted in position by a set-screw 59 and affords a support to the lower die 56 during the compressing operation. A wedge 60, resting upon a flange 61 in the bed-plate 4, susceptible of horizontal adjustment by a screw 62, serves to limit the extent to which the lever 53 may be depressed during the charging operation, and thus adjusts the volume of charge measured into the mold 46. A spring 63 in the cavity of the bed-plate 4 presses upwardly on the wedge 60 and holds

it in position as adjusted by the screw 62. Another spring 64 in the cavity of the bed-plate 4 presses upwardly on the lever 53 in the rear of the fulcrum, serves to depress the front end of the lever 53, and actuates the lower die 56, and by the downward motion of the crank 37, connecting-rod 49, and lever 50 the finger 52 is raised. A hopper 65 is placed upon the upper side of the lever 43, having a cavity 66 so located that the die 46 passes under it as the lever vibrates and receives a charge of the powder to be compressed. The hopper 65 is held in position on the lever 43 by a spring 67, the end of which bears in a cavity 68, and the lower face of the hopper 65 and the upper face of the lever 43 are finished with smooth plane surfaces, so as to prevent any powder from passing between them, and so that the outside of the hopper 65 sweeps the compressed tablets off from the mold 46 after they have been expelled by the lower die 56. By bracing the front standard 2 by the bolt 2' and nuts 2² great strength is secured without much weight or bulk of material and less force is absorbed in the spring of the powder in making the impression.

The operation of this machine is as follows: The powder to be compressed into tablets is placed in the hopper 65, a mold 46 of suitable diameter is placed in the lever 43, and upper and lower dies 32 and 56 are respectively placed in the gate 27 and mold 46. The fly-wheel 9 is then rotated by the handle 13 until it acquires a velocity of fifty or more turns per minute. The handle 13 is then pressed toward the fly-wheel 9 and the arm 8 engaged by the rod 21, all of which turns shaft 7, cam 23, and crank 37. The lever 39 moves the lever 43 and mold 46 with a charge of powder under the die 32 and the levers 39 and 43 with the mold 46 rest, during which rest the cam 23 forces the gate 27 and upper die 32 down into the mold 46, and at the same time the lower die 56 rests on the lever 53 and the charge of powder is compressed between the dies 32 and 56 into a tablet. The continued rotation of the shaft permits the reaction of the spring 30 to lift the gate 27. The crank 37 moves the levers 39 and 43 at the same time. The crank 37, connecting-rod 49, and levers 50 and 53 force the lower die 56 upward and expel the tablet. The lever 43 and mold 46 move under the hopper 65 and a new charge is introduced and the operation repeated. When it is found that the tablets are not sufficiently compacted, the wedge 57 is forced inward by the screw 59 until the desired pressure is secured. When it is found that too much powder enters the mold 46 from the hopper 65 and the tablets are too heavy, then the wedge 60 is forced inward by the screw 62 until the proper weight of tablet results from the decrease in the descent of the lower die 56 at the time of receiving the charge from the hopper 65. Should any accident occur in the working of any of the parts of the machine, or should the operator's attention

be called from it, the spring 22, retracting the rod 21 from the lever 8, suspends further action of the machine and the fly-wheel 9 simply turns independently of the shaft 7 and connected parts.

Having described my invention and the operation thereof, what I claim is—

1. In a machine for making tablets by compression of powders, the combination of the fly-wheel 9, shaft 7, cam 23, gate 27, mold 46, dies 32 and 56, with the levers 8, 43, and 39 and crank-pin 37, arranged to operate substantially as set forth.

2. In a machine for making tablets from powders, the combination of the sliding gate 27, the guides 28 and 29, and plate 34, with the upright 2, the plate 34 being pivotally secured at the upper end to said upright and detachably secured at the lower end thereto, as and for the purpose set forth.

3. The combination of the horizontally-reciprocating lever 43, mold 46, and vertically-reciprocating lever 53, participating in the horizontal movements of the lever 43, with the wedge 57 and lower die 56 for graduating and adjusting pressure, substantially as set forth.

4. The combination of the mold 46 and lever 43, the hopper 65, and the spring 67, arranged to maintain contact between the mold and hopper to supply powder to the molds and sweep off the tablets as discharged, substantially as set forth.

5. The combination, in a tablet-compressing machine, of the fly-wheel 9, grooved and sliding crank-handle 13, collar 20, rod 21, spring 22, and lever 8, secured to the shaft, with an impressing device and automatically feeding and discharging mechanism, substantially as described, the whole arranged to intermit action of the machine, as and for the purpose set forth.

6. In a tablet-compressing machine, the combination of the uprights 2 and 3 and bed 4, the said parts being integrally formed, rod 2', and nuts 2', with the cam 23, shaft 7, gate 27, lever 53, wedge 57, dies 32 and 56, and mold 43, all constructed to operate substantially as set forth.

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Witnesses:

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