3 Sheets—Sheet 1.

W. MÜNZER.

Machine for Pressing and Molding Substances into Blocks.

No. 203,362. Patented May 7, 1878.

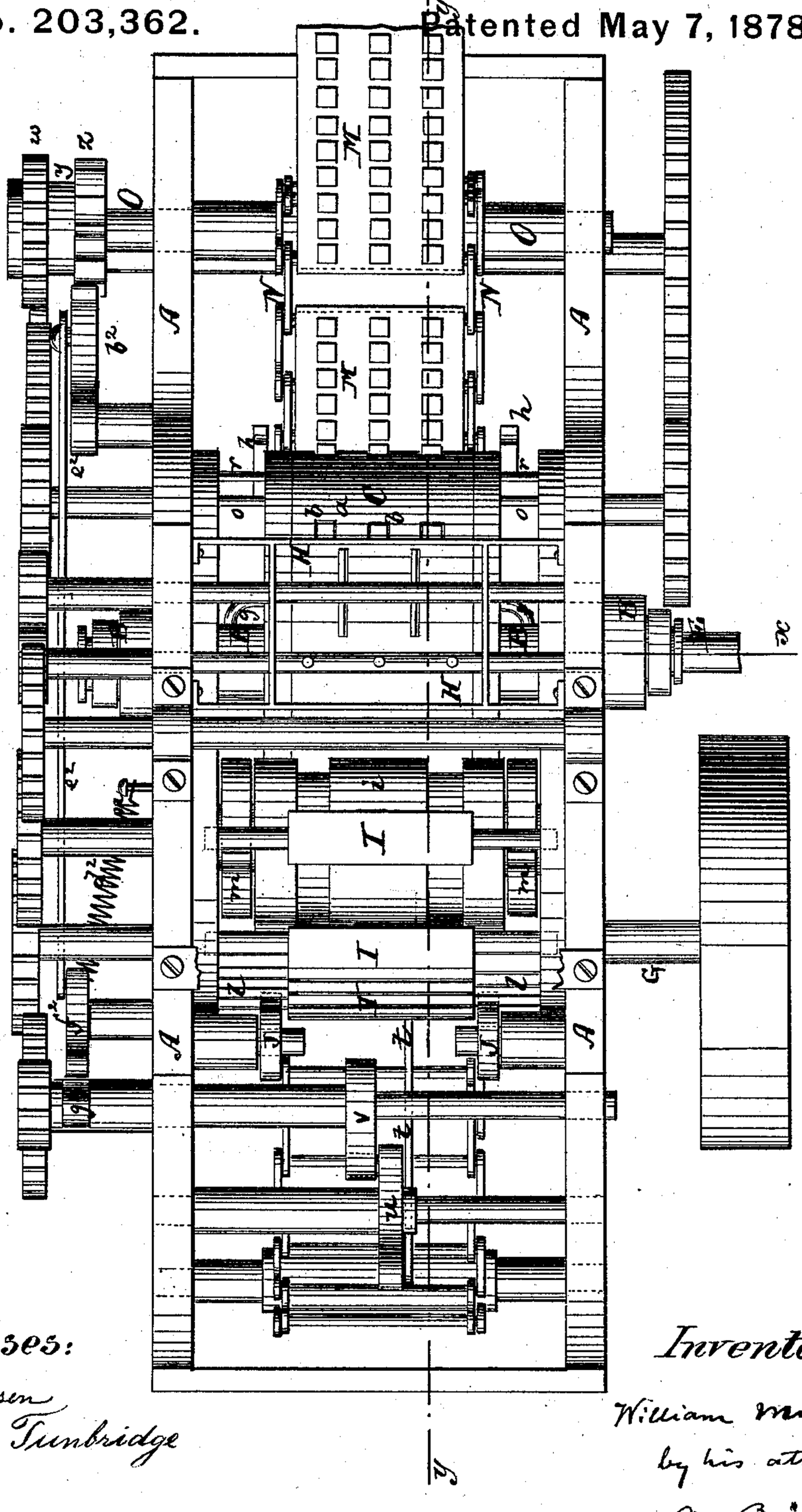

Fig: 1.

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3 Sheets—Sheet 2.

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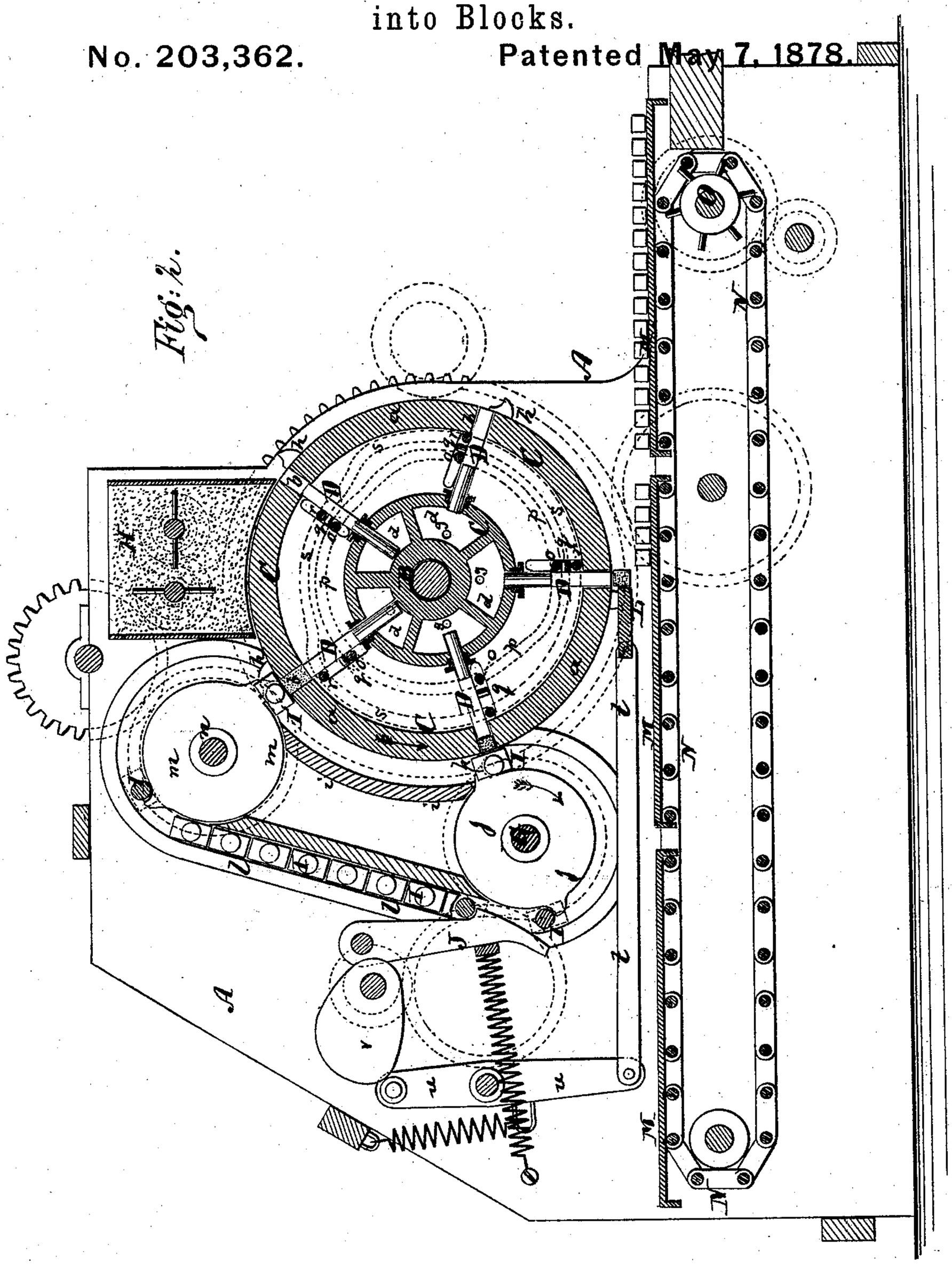

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3 Sheets—Sheet 3.

W. MÜNZER.

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Fig: 5.

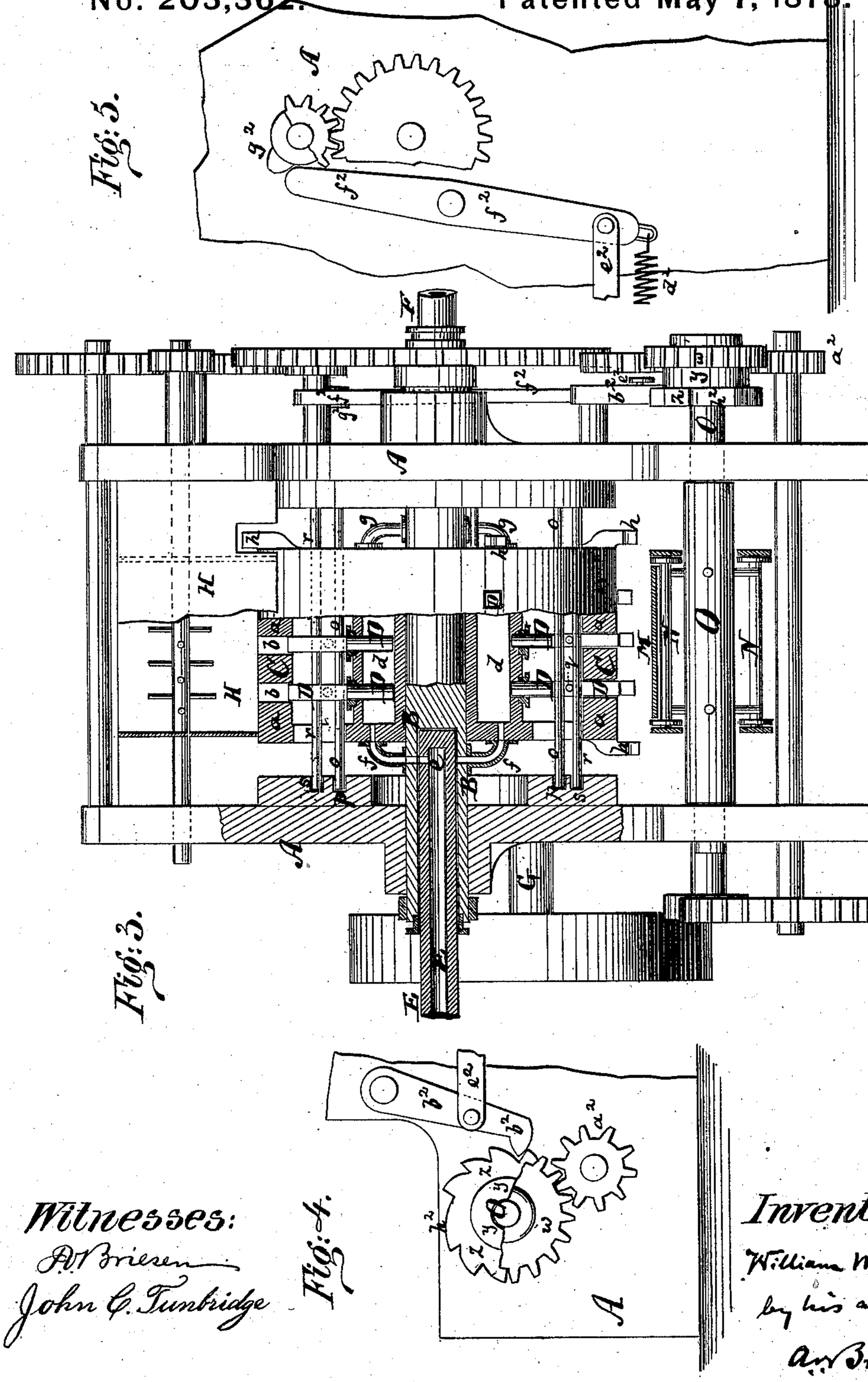

Fig: 3.

Fig: 4.

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UNITED STATES PATENT OFFICE.

WILLIAM MÜNZER, OF NEW YORK, N. Y.

IMPROVEMENT IN MACHINES FOR PRESSING AND MOLDING SUBSTANCES INTO BLOCKS.

Specification forming part of Letters Patent No. **203,362,** dated May 7, 1878; application filed February 28, 1878.

To all whom it may concern:

Be it known that I, WILLIAM MÜNZER, of the city of New York, county of New York, and State of New York, have invented an Improved Machine for Pressing and Molding Substances into Blocks, of which the following is a specification:

This invention relates to a new machine for pressing pliable or plastic substances—such as sugar, clay, and other matters—into blocks or forms of any desired consistency.

The principal object of the invention is to make the pressure self-regulating with reference to the amount of matter contained in the mold.

Heretofore presses—such as brick-presses, sugar-presses, &c.—were always constructed with plungers moved by mechanical power, between certain predescribed limits of motion, toward and away from the molds which contain the matter to be pressed, and if, as often occurred, the molds were not completely filled, the pressure would necessarily be incomplete, whereas, if, on the other side, as also frequently happened, the molds were overcharged, the blocks would be compressed beyond the desired degree, or the machine itself injured. In other words, there being no means of insuring the filling of the molds to a certain and absolute degree of equality, the pressure, being always equal, resulted in producing blocks of unequal consistency. The present invention seeks to avoid this difficulty by using hydraulic power for moving the plungers, the power being such that when the plunger enters into an imperfectly-filled mold it will advance farther than if it enters a mold which has been overfilled, or properly filled. In other words, the degree of power will always be the same. The compression will always be alike, no matter whether the mold is partly, wholly, or over filled, and consequently the blocks produced, whether they be blocks of sugar, bricks, or other matter, will be of absolutely equal consistency, although they may vary slightly in size.

To this end the invention consists in placing a series of reciprocating plungers into a rotary drum, the plungers being placed radially into the drum, so that they may move in the direction of the radii of the drum. The drum is arranged to communicate at or near its center with water-passages, which supply its central part with water (or other liquid, if desired) for forcing the plungers into the molds, when required. The rotation of the drum is utilized to open and shut the water-supply, and to consequently establish and discontinue the hydraulic pressure at proper intervals.

The motion imparted by hydraulic pressure to the plungers for compressing the substances is simply outward. For drawing them inward again after the pressure has taken place, the plungers are provided with mechanical means in the form of projecting pins, that are brought in proper contact with rods or rollers moving in cam-grooves, so that, after the molds have been emptied, the plungers will be withdrawn toward the center of the drum to enable the molds to be refilled. By the like mechanical means the plungers are also pushed out beyond the limits of the compression movement, for the purpose of discharging from the molds the blocks therein contained.

The abutting devices, against which the plungers press the matter contained in the molds, are movable bars or plates, which, by a very peculiar system of feed mechanism, are properly supplied, so that they are in line with the molds during the time that the plungers are moved outward for compressing the contents of the molds; but after the pressure has taken place, said abutments are withdrawn from the molds, leaving the latter free to discharge their contents upon an endless apron or other receptacle.

The mechanism for moving the abutments constitutes an essential feature of my invention.

The blocks of sugar or other matter compressed in the machine are deposited, preferably, upon trays that are placed upon an endless apron. Intermittent motion is imparted to said apron by a peculiar gear-action, which will be more specifically described hereinafter. The intermittent motion is such as to make room for the deposit of the new block or row of blocks upon the trays in the same ratio in which said blocks or series of blocks are discharged from the drum, and the motion of the chain, moreover, is so regulated that it will prevent the deposition of blocks

between any two trays held on the endless apron. For this purpose the apron is moved somewhat faster as soon as one tray has been entirely filled, so that the next tray on the apron may properly arrive under the discharge-mold to receive the next deposit of compressed blocks.

Another feature of the invention has reference to the use of a gently-acting finger or pusher, which detaches the blocks that are being discharged from the molds from the ends of the plungers, to which they are apt to adhere if not mechanically separated.

It is evident that the details of the invention may be materially varied; that some of the features of the invention may be used without some of the other features; and it is expressly to be understood that the invention is not necessarily confined to a combined use of all the features of the machine, but does embrace each and every feature hereinafter specified and claimed as part of the invention, whether used alone or in conjunction with one or more of the other features.

In the accompanying drawing, Figure 1 represents a plan or top view of the improved machine for pressing and molding substances into blocks. Fig. 2 is a vertical longitudinal section of the same, taken on the plane of the line *y y*, Fig. 1. Fig. 3 is an end elevation, partly in section, of the same, the line *x x*, Fig. 1, indicating the plane of section. Fig. 4 is a detail side view, partly in section, of the mechanism for moving the endless apron; and Fig. 5 is a detail side view, showing the mechanism for actuating the pawl which arrests the motion of the said endless apron.

Similar letters of reference indicate corresponding parts in all the figures.

The letter A in the drawing represents the frame of the machine, said frame being made of metal, wood, or of both combined, of such size and shape as to enable it to properly support the mechanism constituting the machine, and of sufficient strength to enable such mechanism to operate in the manner intended. In this frame A are the bearings of a shaft, B, upon which is mounted a drum, C. The drum C is hollow, as shown in Fig. 2, having an outer rim, *a*, of sufficient thickness and strength to admit the molds *b* for compressing the matter to be formed into blocks within said rim. These molds *b b* are preferably apertures cut through the rim *a*, and are spaced circumferentially at equal distances apart. Fig. 2 shows the drum to be divided into five equal parts, circumferentially, for five molds or rows of molds, *b*. Each mold is of prismatic or other suitable form, according to the shape of the block which it is intended to produce. Longitudinally the drum is also divided, so as to receive rows of molds *b*, as indicated in Fig. 3, which figure shows three molds *b* in line with each other lengthwise on the drum; but more or less molds may be used, both circumferentially and longitudinally. In line with every mold *b* is placed into the hollow drum C a plunger, D, whose outer part is shaped to closely fit the mold, and whose inner part enters, through a suitable stuffing-box, a chamber, *d*, which is formed in the central portion of the drum. This central part of the drum is divided into as many chambers *d* as there are series of molds circumferentially, which, in the drawing, appear to be five. The axle of the drum C is made hollow at the ends, as shown in Fig. 3, and embraces or connects otherwise with an inlet-pipe, E, at one end, and with an outlet-pipe, F, at the other end, as indicated in Fig. 3. The inlet-pipe E communicates with a suitable reservoir of water or other liquid, and has one or more openings, *e*, for communication with the chambers *d* of the drum C.

As the drum revolves, branches *f*, which extend from the chambers *d d*, arrive alternately in line with the opening or openings *e*, and said branches, being tubular, establish communication between the inlet-pipe E and the chambers *d*, so as to allow the liquid to enter the chambers *d*, and to force out the plungers D, which enter such chambers *d*. At the proper time other tubular branches, *g*, connect the chambers *d* with the outlet-pipe F, and allow water to be discharged from the chambers *d*, or at least the pressure on the plungers to be relieved.

It is be understood that the respective chambers *d* are brought in communication with the inlet-pipe only at certain positions during the revolutions of the drum—to wit, when certain of the plungers are in position to compress the contents of a row of molds against an abutment—and that at the proper time the pressure is relieved by the closing of the branches *f* and the opening of the branches *g* to the outlet-pipe. As to the outlet-pipe, it is intended to permit it to communicate with an elevated reservoir, so that it will not fully discharge the liquid from the chambers *d d*, but will rather serve to release the pressure on the plungers, which pressure is exerted when the inlet-pipe communicates with the chambers *d*, said inlet-pipe being also in communication with a still more elevated reservoir, or with means for otherwise increasing the pressure of the water on the plungers, such as a pump or accumulator.

G is the driving-shaft, hung in the frame A parallel to the drum C. Rotary motion in the direction of the arrow, which is shown around this shaft in Fig. 2, is imparted to it by suitable mechanism and by suitable gearing, which is indicated by dotted lines in Fig. 2. The motion is transmitted from the shaft G to the drum C, which is revolved in the direction indicated by the arrow shown on such drum in Fig. 2.

The matter to be compressed into blocks is placed into a suitable hopper, H, which is above the drum C, as shown in Fig. 2, and is provided with suitable stirring devices for agitating the contents of the hopper, and for conveying them into molds as said molds

pass beneath the hopper, the lower part of the hopper being open to the drum, as shown, so that there will be no obstruction to the proper filling of the molds. The row of molds which approaches the hopper during the rotation of the drum is empty, the plungers being withdrawn from such molds, as shown in Fig. 2, and as such mold or row of molds passes under the hopper, it is filled with the matter to be compressed, and, being thus filled, arrives under an abutting plate or abutment, I, as also shown in Fig. 2, at the left-hand side of the hopper. When the mold or row of molds arrives into this last-mentioned position, the chamber *d*, which receives the lower ends of the plungers pertaining to such mold or molds, is brought into communication with the inlet-pipe E, and the hydraulic pressure begins to be exerted upon such plungers to compress the matter contained in the mold or molds against the abutment I. This abutment I now follows the drum during its continued rotation, to permit the pressure to be continuous for a certain length of time, said abutment being taken along by a tooth or teeth, *h*, projecting from the circumference of the drum, and taking the abutment, which is a loose plate, along with the drum as the same rotates. While the abutment is thus carried by the drum, or rather by the teeth *h* on the drum, its outer face bears against or moves along a concave guide-block, *i*, which is clearly indicated in Fig. 2, and which takes up part of the pressure that is exerted by the plungers and the substance in the mold against the abutment. After the substance has been properly compressed in the mold, and as the lower end of the curtain or guide-block *i* is reached by the abutment, a disk or disks, *j*, mounted upon the shaft G, and provided with projecting teeth, engage the abutment with their teeth, and withdraw it from the drum C, allowing the latter to move farther on without said abutment. The abutment is now carried around by the teeth of the disks *j*, being supported by its ends entering suitable grooves, or otherwise, and delivered into the lower part of a channel, *l*, which extends from the disk *j* to another toothed disk or pair of disks, *m*, mounted upon a shaft, *n*, above the upper portion of the guide-block *i*, as shown in Fig. 2. The abutment I, which is raised by the toothed disk *j* into the channel *l*, is caught under a spring or snap hook, J, which holds it in place and prevents it from dropping after the disk *j* has ceased to affect such abutment, and as the disk *j*, during its rotation, takes one abutment after another from off the surface of the drum C, it delivers them one after another into the channel *l*, the lowermost one always being caught and supported on the snap-hook J, as indicated, and thus one after another of the abutments is gradually raised and pushed up into the channel *l* until the upper one comes within reach of the teeth of the disk *m*, which disk *m*, taking the upper abutment, delivers it to the drum C into proper position for receiving the pressure of the plungers, and for being taken along by the teeth *h* of the drum, in manner already stated. Thus, by means of the toothed disks *j* and *m* and the snap-hook J, a continuous feed-motion of the abutments is produced, which will permit one abutment to be always in proper position on the mold for taking the pressure of the plungers, while the others are moving gradually into position for further use, as stated.

Now, to return to the drum C, it will be found that, after the abutment has been taken away from it by the disk *j*, the mold or row of molds thus uncovered is free to discharge its contents, and this discharge is effected by a further outward motion of the plungers D, mechanically produced. In fact, the communication between the chamber *d* and the inlet-pipe is cut off, shortly before the abutment is taken away from the drum, by the disk *j*, and the hydraulic pressure therefore ceases to act from that moment. The discharge of the molds is effected by a rod, *o*, which passes through the disk C lengthwise—that is to say, parallel to the axis of the same—and the ends of which enter a stationary cam-groove, *p*, formed in the sides of the frame A, and indicated by dotted lines in Fig. 2. The rod *o* bears against a projecting pin, *q*, of each plunger in a row of plungers, and as the drum continues to revolve the rod is gradually moved outward by the cam-groove *p* toward the periphery of the drum, and, being so moved outward, it also pushes the plungers outward, because it bears against the projecting pins *q q* thereof. When, therefore, the plungers in question have reached a position vertically below the axis of the drum, they are pushed out to their fullest extent, as shown in Fig. 2, so as to discharge the contents of the molds. After this it is necessary to draw the plungers in again, so as to leave the mold open for a new charge, and also bring the plungers back into position for receiving the hydraulic pressure. To this end, an outer rod, *r*, moving in a stationary cam-groove, *s*, which is also formed in the sides of the frame A, is arranged across the drum similar and parallel to the rod *o*, and bears against the outer side of the pin *q* of the plunger; and this rod *r*, at the proper time, is gradually moved inward toward the center of the drum, as shown by the dotted lines in Fig. 2, to draw the plunger back and out of the mold proper, and expose the plunger to the hydraulic action, as already stated.

It need not be specially mentioned that there is necessarily a rod, *o* and *r*, for each row of plungers, this being clearly indicated in Fig. 2.

From the foregoing description the actual compressing process must be clearly apparent. It depends entirely upon the hydraulic action, which finds opposed to it the rigid abutment, the movable plunger, and, between the abutment and the plunger, the plastic or pliable substance to be compressed. The hydraulic

pressure being equal, it follows that the compression will always be equal, and that the blocks produced by the press will all be of equal consistency, even though the molds be unequally filled, because, if a mold is filled less than to its full capacity, the plunger will be further advanced by the hydraulic pressure, and if the mold is filled to its full capacity, or overflowing, the degree of motion of the plunger will be less, but the degree of pressure will always be the same. Therefore the machine is calculated to produce blocks of equal consistency, and is for this purpose invaluable. The hydraulic pressure may, of course, be adjusted to any desired degree.

In Fig. 2 is also shown a detaching slide or pusher, L, which connects, by a rod, *t*, and lever *u*, with a suitable rotary cam, *v*, and which, as the row of blocks of sugar or other matter pressed in the molds is being pushed out from the molds, is caused gently to tap or strike said blocks and to detach them from the surfaces of the plungers, to which they might otherwise be apt to adhere. The stroke of this pusher L is very slight so far as regards its contact with the blocks, being just sufficient to detach said blocks from the plungers, and insufficient to otherwise interfere with the downward motion of the blocks as they drop from the drum. The blocks detached from the drum are deposited upon trays M, that are placed upon an endless chain or apron, N. This chain is represented in the drawing to be as long as the frame A; but in a full-sized machine it is intended to make it much longer, so as to obtain a longer feed and more time for replacing empty trays. The several trays M M are to be moved by and with the endless chain by intermittent motion, so as to make room for a new row of blocks as said rows are being discharged from the drum. Fig. 2 clearly shows how the rows of blocks are to be deposited on the trays; but it also shows that a larger space must be left by the motion of the chain for preventing blocks of sugar or other matter compressed from dropping between two trays. To effect this, the mechanism for moving the endless chain illustrated in Figs. 3, 4, and 5 is used. This mechanism is as follows: The driving-shaft O of the chain N has hung upon it a toothed wheel, *w*, which is loose on the shaft O, but which, by means of an elastic cushion, *y*, (shown in Fig. 3,) is pressed against a ratchet-wheel, *z*, that is rigidly mounted upon the shaft O. A pinion, a^2, which imparts rotary motion to the wheel *w*, meshes into said wheel, as shown in Fig. 4, and by revolving it also revolves the shaft O and moves the chain N, because, although the wheel *w* is loose on the shaft O, yet it is, by the cushion *y*, so firmly pressed against the fast wheel *z* as to impart its motion by friction to the shaft. But from time to time the motion of the shaft O is interrupted by a pawl, b^2, which engages into the teeth of the ratchet-wheel *z*, and which is thrust against the ratchet-wheel by a spring, d^2. The pawl connects by a rod, e^2, with a lever, f^2, which is actuated from time to time by a rotary cam, g^2. Whenever this cam g^2 bears against the lever f^2 it withdraws the pawl b^2 from the ratchet-wheel *z*, and allows the shaft O to be turned and the chain N to be moved.

For properly understanding this mechanism now being described, Figs. 4 and 5 of the drawing should be regarded together, as they virtually show the two ends of the rod e^2 and both connections of said rod. When the cam g^2 ceases to act upon the lever f^2 the spring d^2 at once throws the pawl against the ratchet-wheel, and locks the latter so as to prevent it from turning, and thereupon the pinion *w* must slip on the shaft O without imparting motion thereto. Thus there is intermittent rotary motion imparted to the shaft O, and also to the chain; but, although the pawl may be thrown against the ratchet-wheel, it does not stop the motion thereof until the end of a tooth of the ratchet-wheel reaches such pawl, and therefore the longer the tooth the longer will also be the degrees of motion of the shaft O and chain N. This principle is utilized for increasing the motion whenever the ends of two adjoining trays pass beneath the axis of the drum C, for at this point there is a longer tooth, h^2, on the ratchet-wheel, which tooth, when moving along the pawl, increases, by its length, the length of the motion of the chain in manner desired. The wheel *z* may have one or more longer teeth, h^2, for the purpose stated.

I claim as my invention—

1. The machine for pressing substances into blocks, the plungers whereof are moved within a rotary drum, by hydraulic pressure, into molds carried by the same rotary drum, substantially as herein shown and described.

2. In a machine for pressing substances into blocks, the combination of the plunger or plungers D with a rotary drum, C, and with a hydraulic chamber or chambers, *d*, into which said plungers extend, substantially as herein shown and described.

3. In a machine for pressing substances into blocks, the combination of the hydraulic plunger or plungers D, whose motion is regulated by the amount of charge in the mold, with a rotary drum, C, and with a traveling abutment, I, substantially as herein shown and described.

4. In a machine for pressing substances into blocks, the drum C, containing the hydraulic chamber or chambers *d* in its central part and the mold or molds *b* in its outer part, substantially as herein shown and described.

5. The combination of the drum C, containing the mold or molds *b* and the hydraulic chamber or chambers *d*, with the plunger or plungers D, each plunger extending into a chamber, *d*, and into a mold, *b*, substantially as herein shown and described.

6. In a machine for pressing substances into blocks, the combination of the hydraulic chamber or chambers *d*, which receive the plunger

or plungers, with the inlet-pipe E and outlet-pipe F, for alternately applying and releasing hydraulic pressure, substantially as herein shown and described.

7. The method of pressing substances into blocks by means of a plunger or plungers alternately exposed to hydraulic and to mechanical action, whereby the plungers are moved in the same direction outwardly for first compressing and next discharging the blocks, substantially as herein shown and described.

8. The combination of the drum C, which has the hydraulic chamber or chambers *d* and the plunger or plungers D, with the branch pipes *f g* and inlet and outlet pipes E and F, substantially as herein shown and described.

9. The drum C, carrying the rotary plunger or plungers D, in combination with a series of separated traveling abutments, I, and with the teeth *h*, which are formed on the drum, for moving each abutment separate from all the others, substantially as herein shown and described.

10. In a machine for pressing substances into blocks, the combination of the series of separated traveling abutments I I with the molding-drum C, and with the feed-disks *j* and *m*, said drum and said disks having teeth for alternately and separately moving the single abutments, substantially as herein shown and described.

11. The combination of the traveling abutments I with the feed-disks *j* and *m*, guide-channel *l*, and snap-hook J, substantially as and for the purpose herein specified.

12. In combination with the drum C, which has the hydraulic plungers D D and means for moving them by hydraulic pressure, the rod *o*, moving in the stationary guide-groove *p*, for the purpose of actuating the plungers after the hydraulic action has ceased to affect them, substantially as specified.

13. The combination of the rod *r*, moving in the guide-groove *s*, with the rod *o*, moving in the guide-groove *p*, with the hydraulic chamber *d*, and with the rotary drum C and its plungers D, substantially as and for the purpose herein shown and described.

14. The plunger D, placed radially into the rotary drum C, and extended into the hydraulic chamber *d*, said plunger being provided with a projecting pin, *q*, for mechanical contact with devices for moving it in and outward distinct from the hydraulic action, by which it is partly moved outward, substantially as specified.

15. The pusher or slide L, combined with the rod *t*, lever *u*, and cam *v*, and with a rotary drum, C, having plungers D and molds *b*, substantially as and for the purpose shown and described.

16. The combination of the endless chain or apron N with its shaft O, ratchet-wheel *z*, pawl b^2, and loose toothed wheel *w*, substantially as and for the purpose herein shown and described.

17. The ratchet-wheel *z*, made with one or more teeth, h^2, longer than the remaining teeth, and combined with the pawl b^2, shaft O, chain or apron N, and trays M M, substantially as herein shown and described.

18. The machine for pressing substances into blocks, having separate and distinct rows of plungers, all the plungers of one row being moved simultaneously by hydraulic pressure, but independent of all the other rows of plungers, substantially as herein shown and described.

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Witnesses:
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T. B. MOSHER.