No. 864,675. PATENTED AUG. 27, 1907.

J. McTAMMANY & M. S. WRIGHT.

COUNTING MACHINE.

APPLICATION FILED JAN. 4, 1898. RENEWED JAN. 26, 1907.

8 SHEETS—SHEET 1.

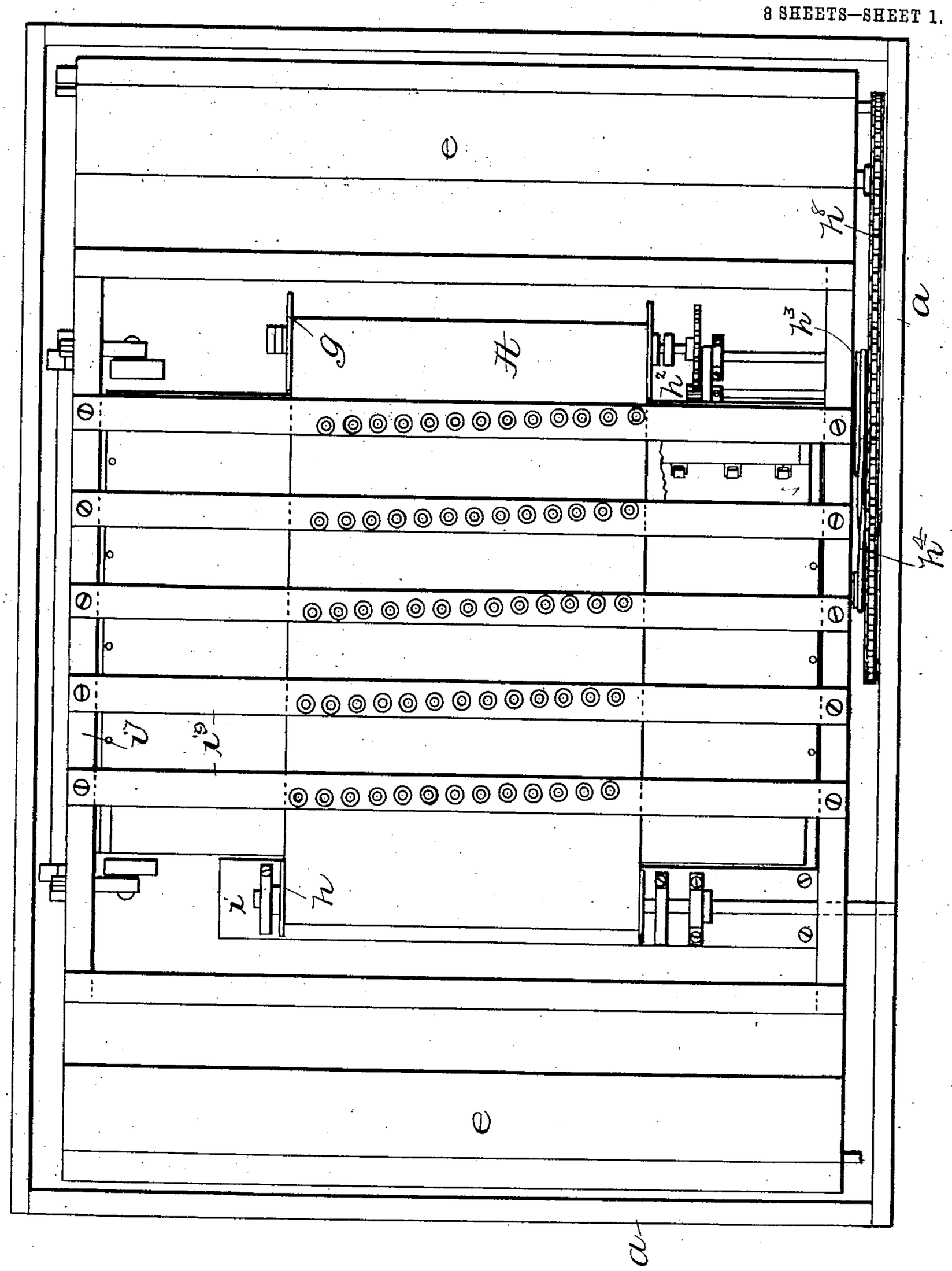

FIG. 1.

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8 SHEETS—SHEET 2.

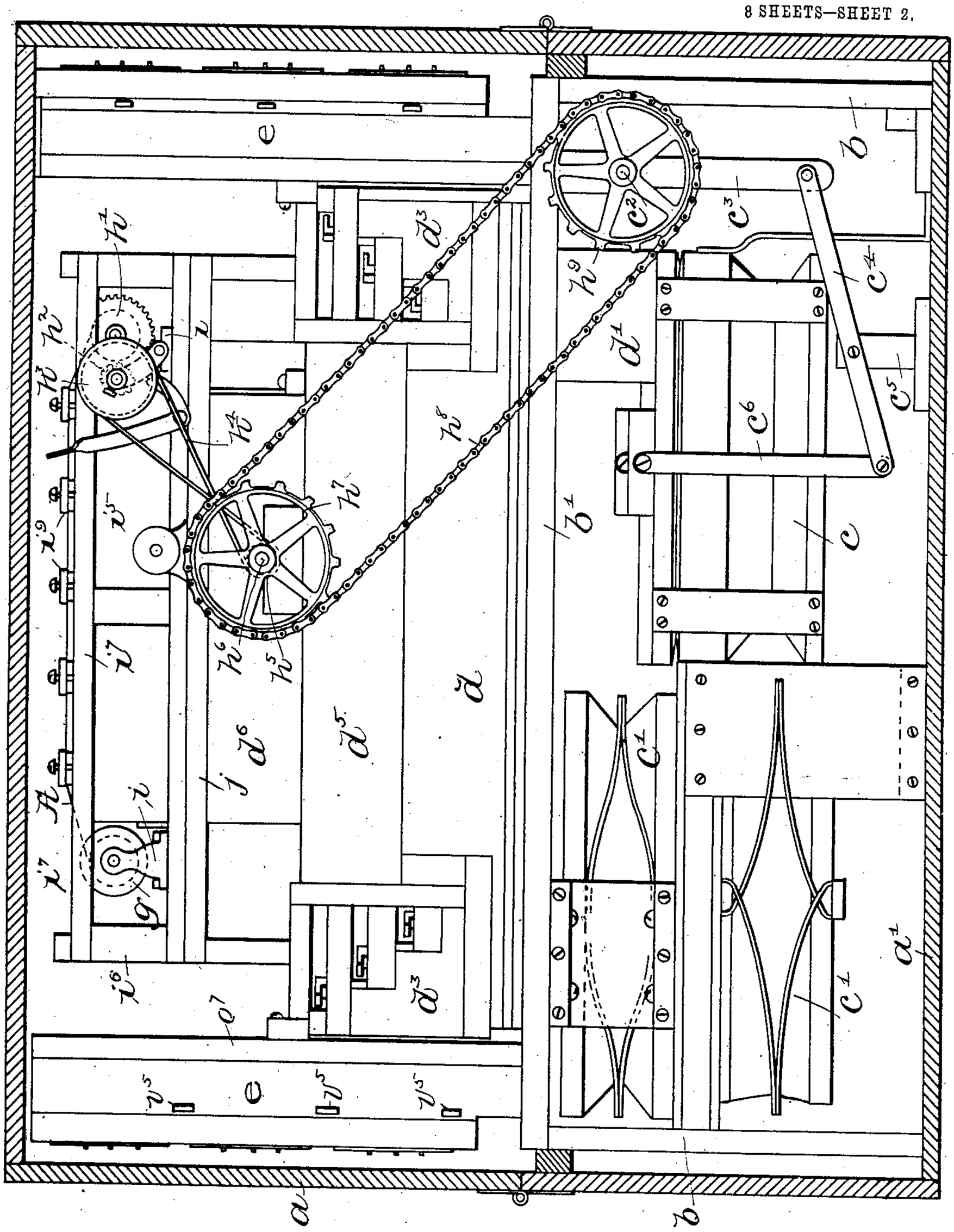

FIG. 2.

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8 SHEETS—SHEET 3.

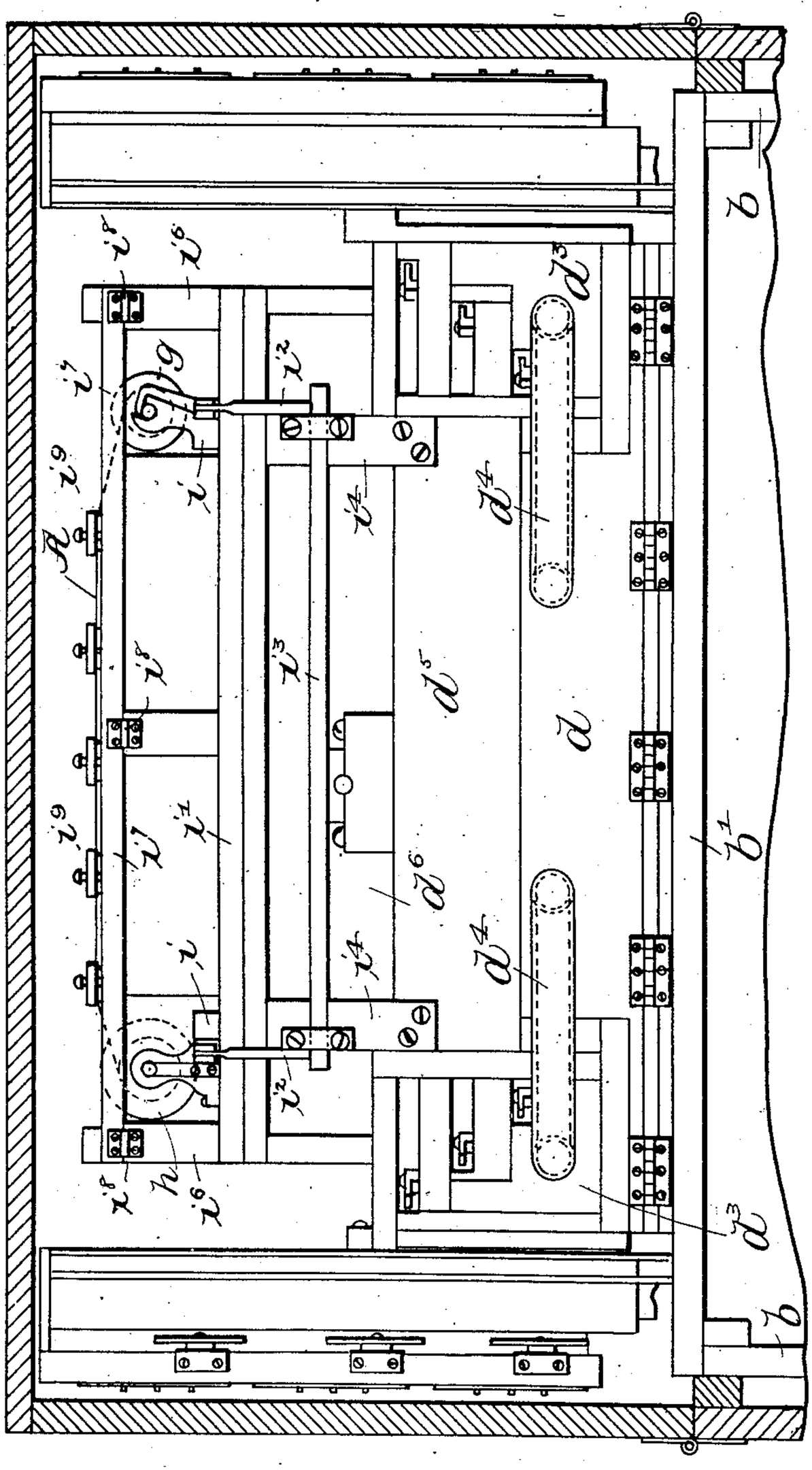

FIG. 3.

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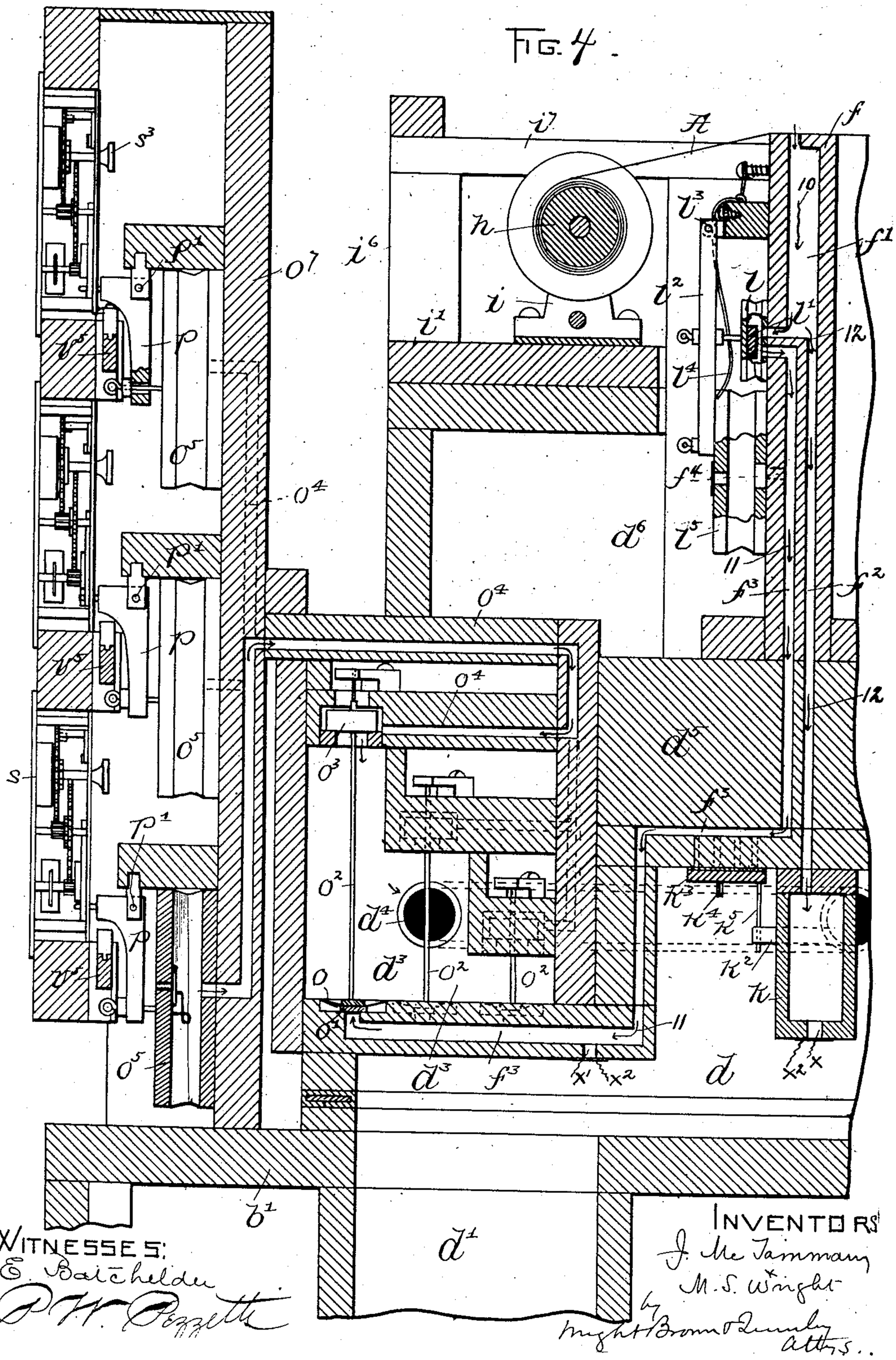
8 SHEETS—SHEET 4.

FIG. 4.



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8 SHEETS—SHEET 5.

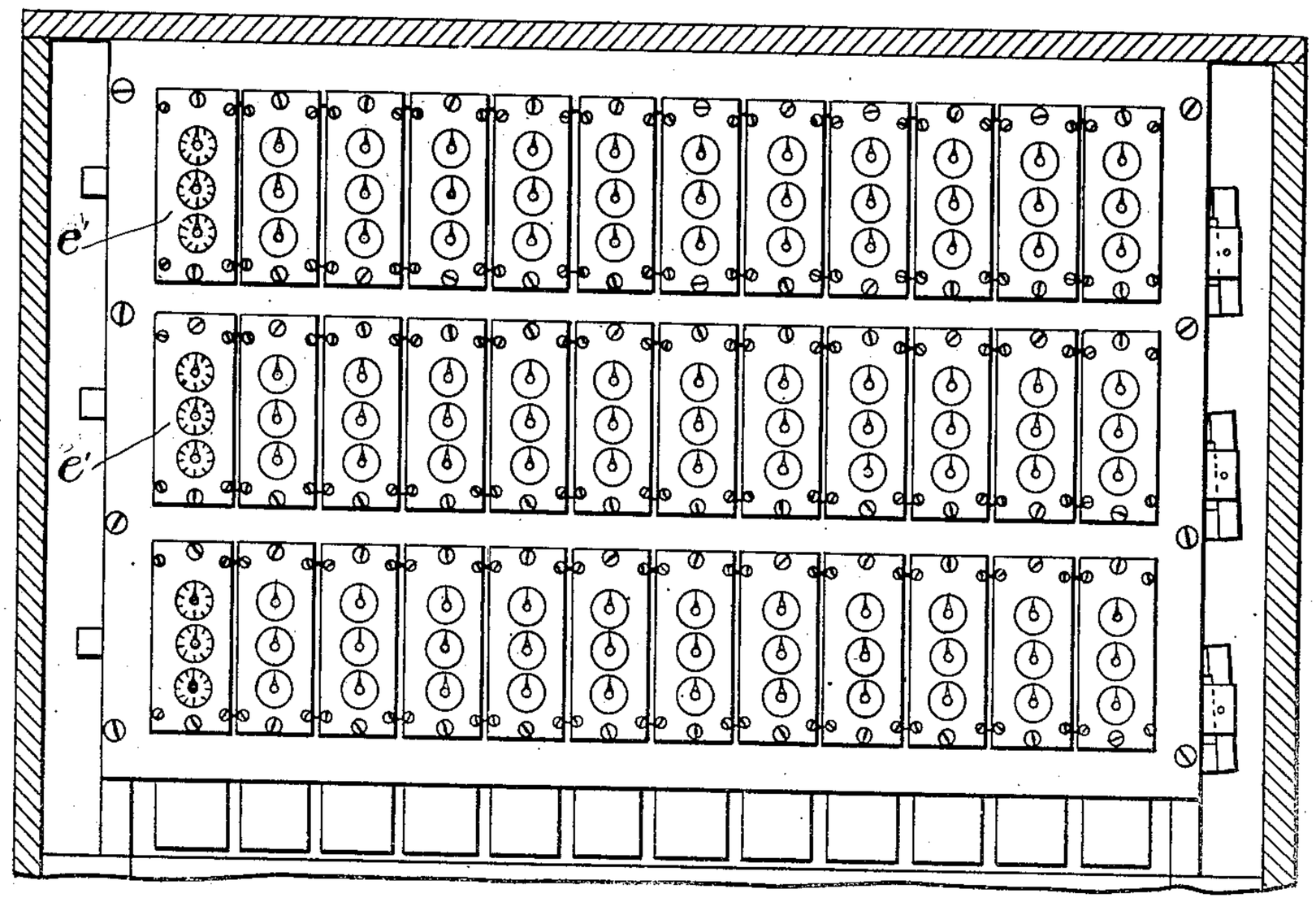

FIG. 5

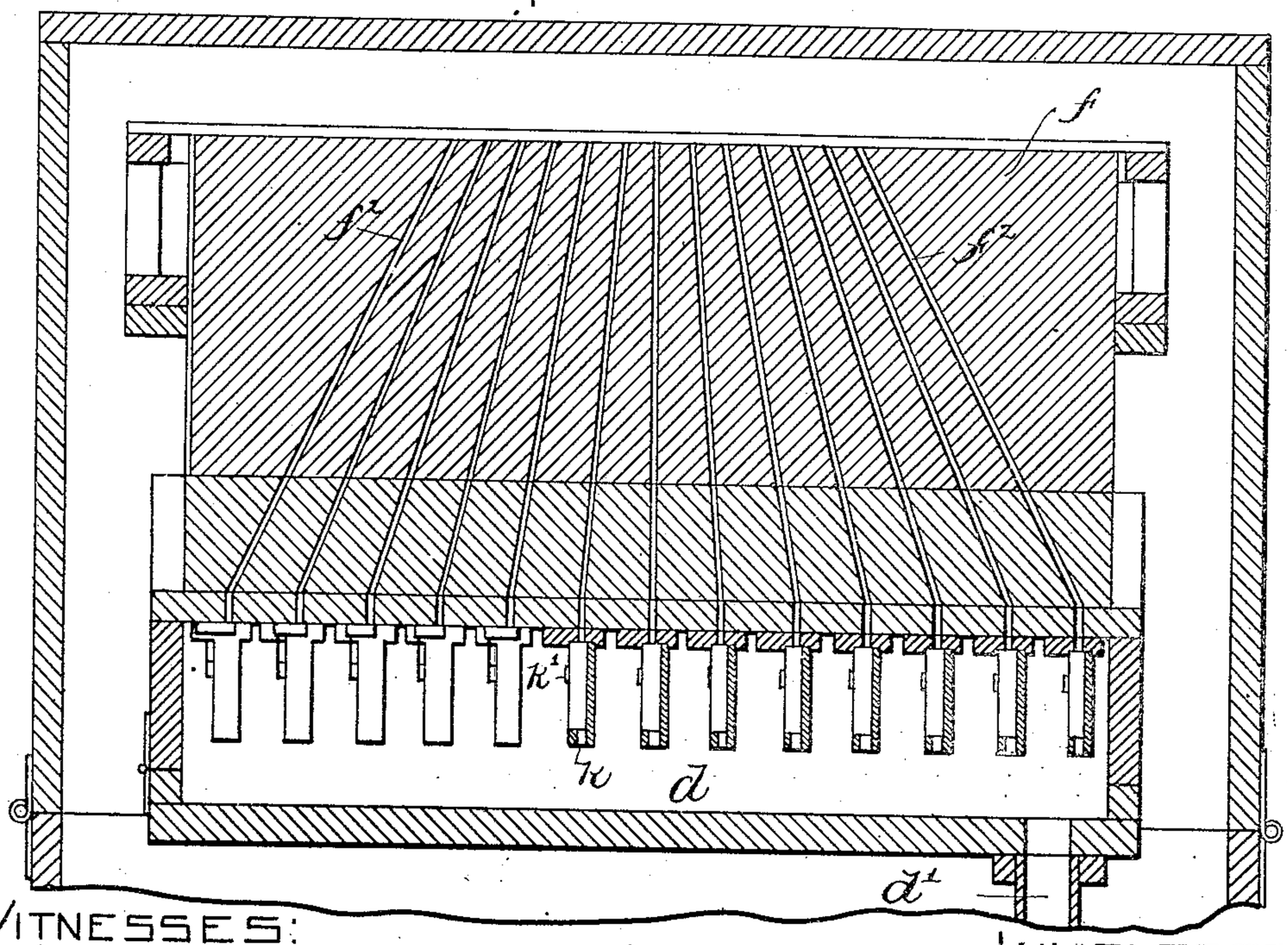

FIG. 6

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8 SHEETS—SHEET 6.

FIG. 7.

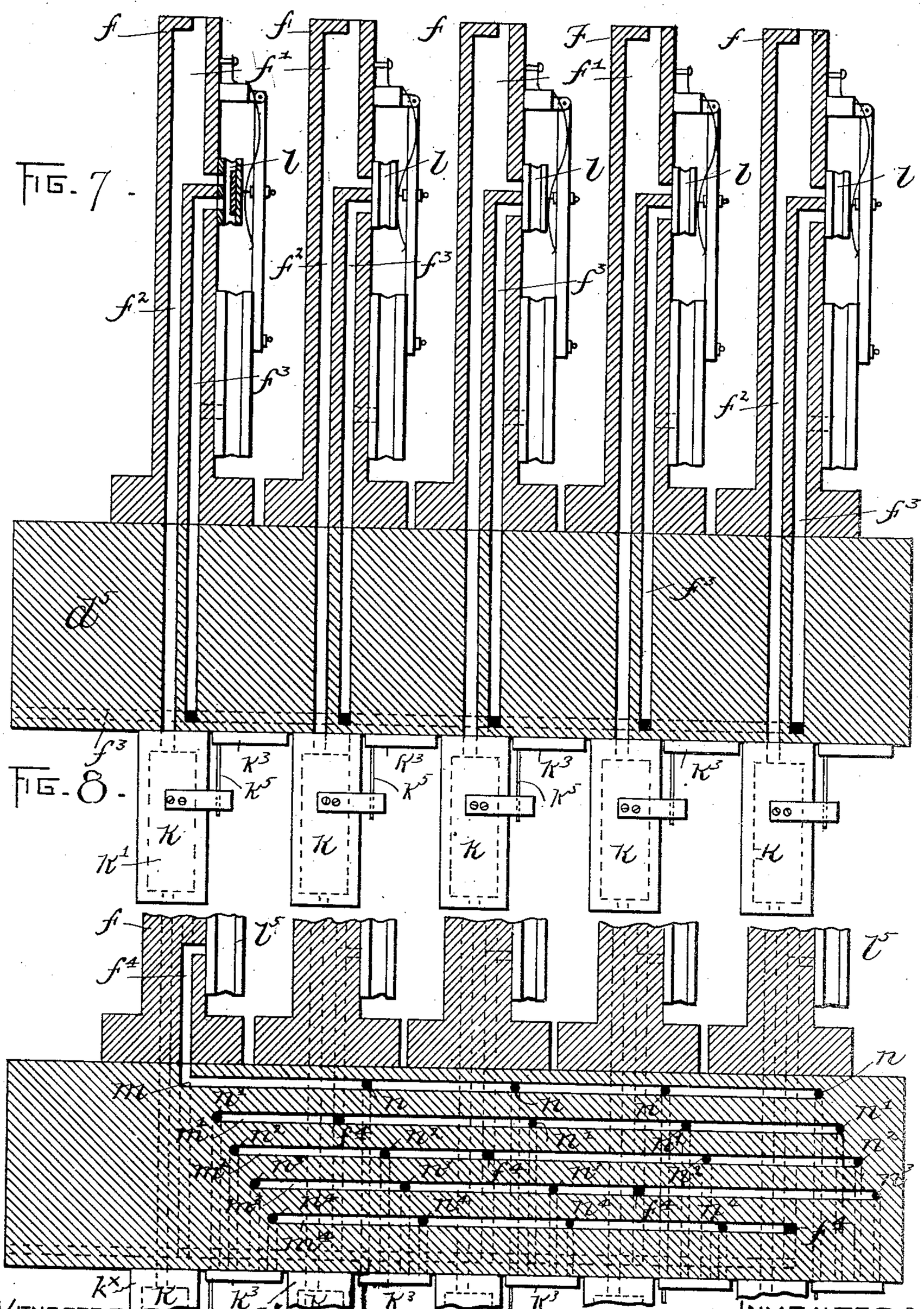

FIG. 8.

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8 SHEETS—SHEET 7.

FIG. 7a.

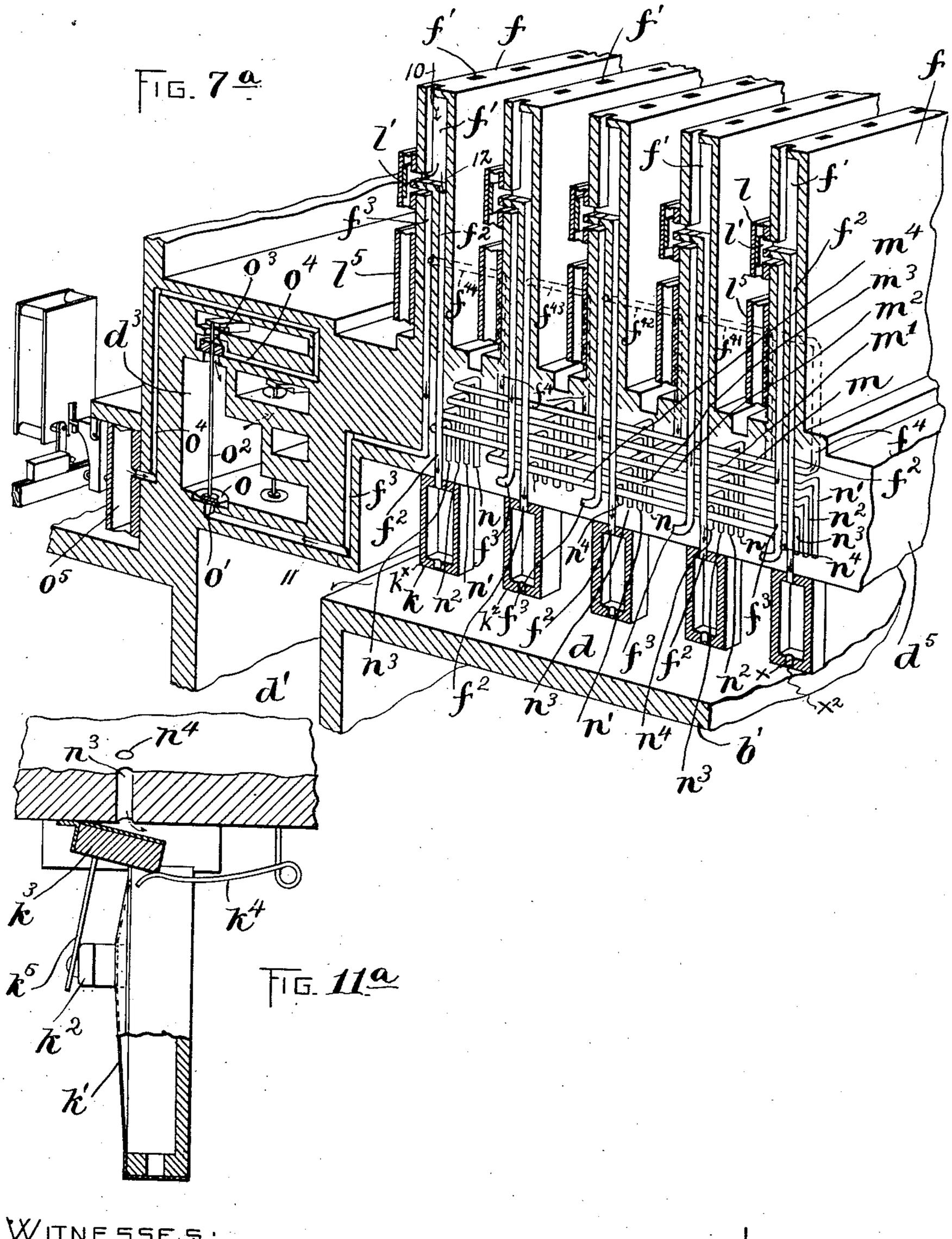

FIG. 11a.

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8 SHEETS—SHEET 8.

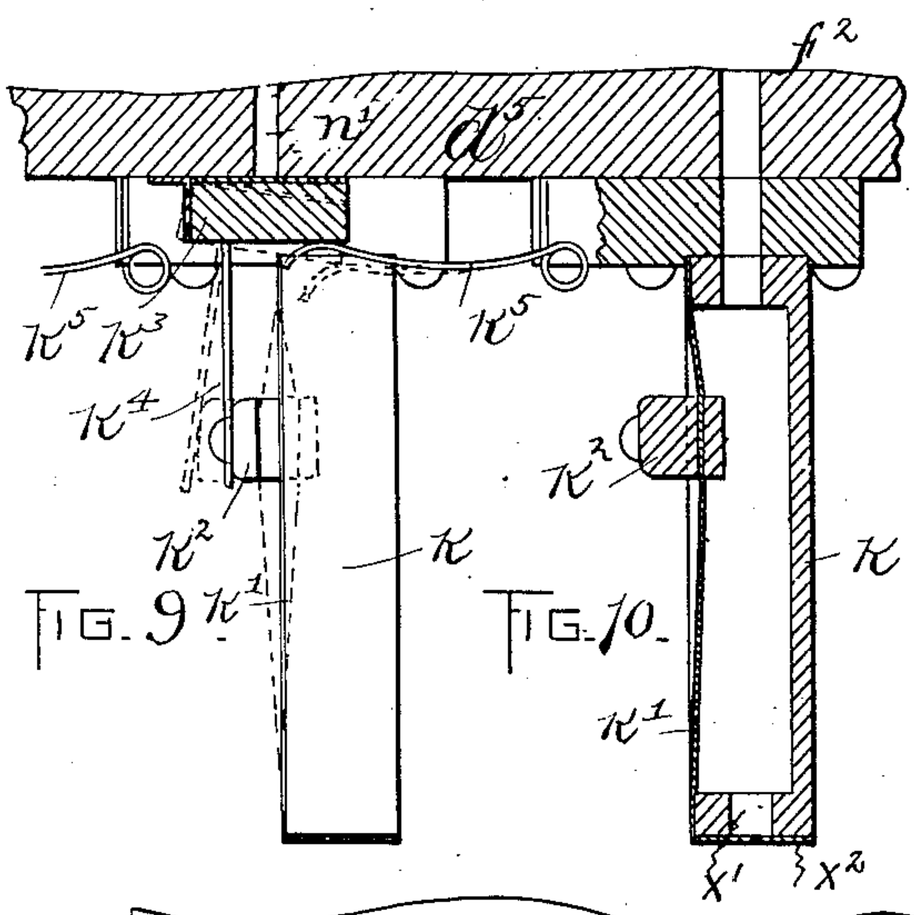

FIG. 9.

FIG. 10.

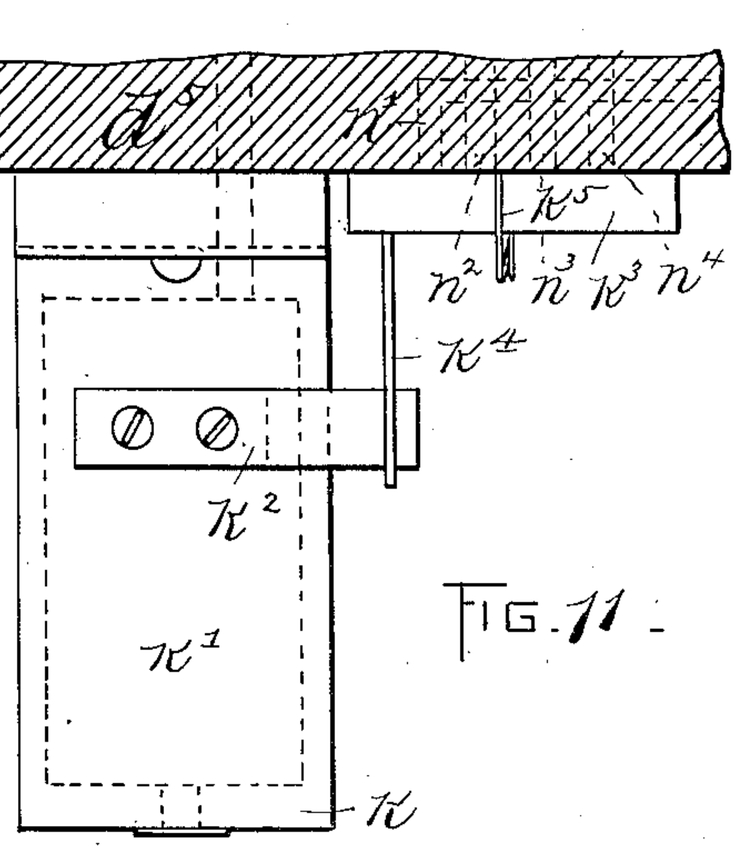

FIG. 11.

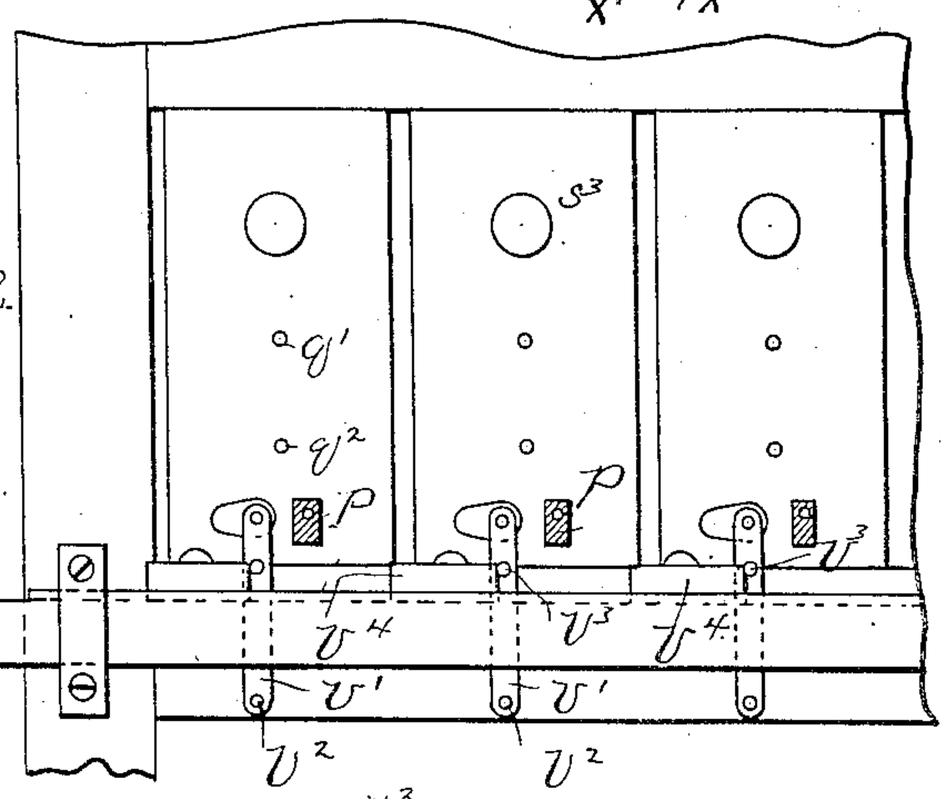

FIG. 12.

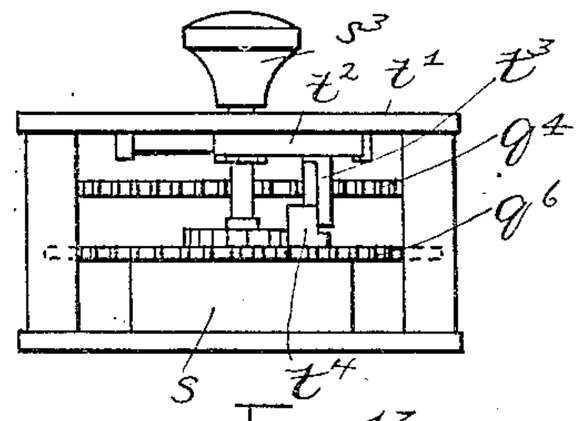

FIG. 13.

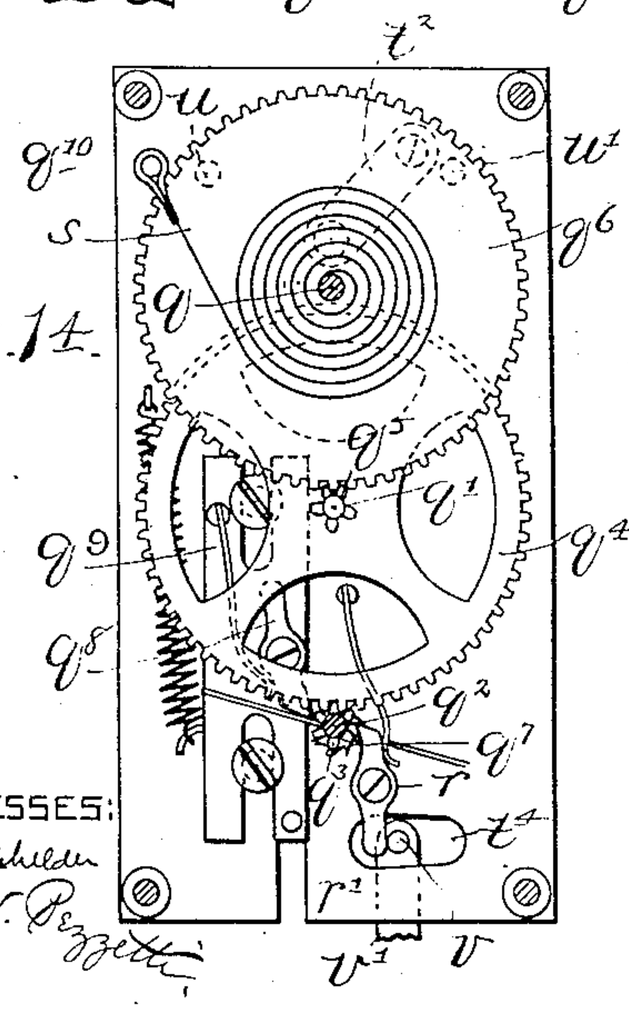

FIG. 14.

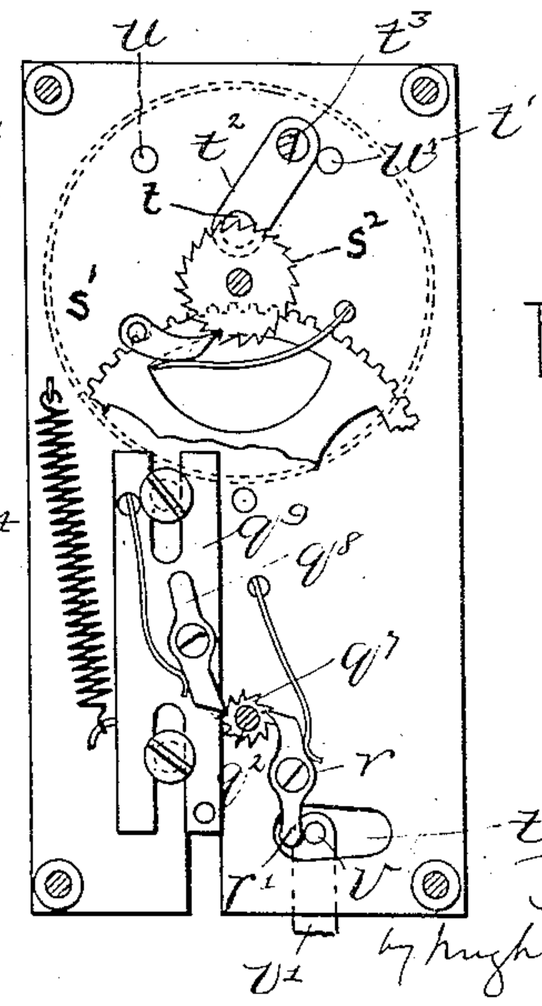

FIG. 15.

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UNITED STATES PATENT OFFICE.

JOHN McTAMMANY AND MORRIS S. WRIGHT, OF WORCESTER, MASSACHUSETTS, ASSIGNORS, BY MESNE ASSIGNMENTS, TO McTAMMANY BALLOT COMPANY, OF PORTLAND, MAINE, A CORPORATION OF MAINE.

COUNTING-MACHINE.

No. 864,675. Specification of Letters Patent. Patented Aug. 27, 1907.

Application filed January 4, 1898, Serial No. 665,523. Renewed January 26, 1907. Serial No. 354,313.

To all whom it may concern:

Be it known that we, JOHN McTAMMANY and MORRIS S. WRIGHT, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Counting-Machines, of which the following is a specification.

The object of this invention is to provide a machine for counting the number of votes which have been cast at an election by determining the number of perforations made in a record or tally-sheet by the punches in a machine in which the voter presses any one of a series of actuators to cause the perforation of a tally-sheet, and the punches or parts which puncture the sheet are staggered or arranged out of the longitudinal line of the sheet, so that if a voter press in all of the push pieces, representing all of the candidates for a certain office, a line of perforations will be made in the sheet which is at an acute angle to the longitudinal lines thereof.

A machine built in accordance with the present invention has its parts so constructed and arranged that the votes which have been legally cast for a candidate for an office will be properly counted, but should the voter vote for two or more candidates for the same office, then those votes will be rejected and not counted.

The machine is equipped with a series of counters, one for each and every candidate for office, and the counters are operated by air valves, the passages to which are open or closed, according to whether but one candidate, or more than one, for a certain office has been voted for by any one voter. The machine possesses certain other features of construction and arrangement which enhance its efficiency and render it more accurate in operation, all as illustrated upon the drawings and now to be described in detail in the accompanying specification, and pointed out with particularity in the claims hereto annexed.

Reference is to be had to the accompanying drawings, and to the letters and figures marked thereon, the same letters and figures indicating like parts or features, as the case may be, wherever they occur.

Of the drawings:—Figure 1 represents in plan view a machine embodying in plan view our invention. Fig. 2 represents a rear elevation of the same with a portion of the casing removed. Fig. 3 represents a front elevation of the machine with the front portion of the casing removed. Fig. 4 represents a transverse vertical section of one end of the machine. Fig. 5 shows in face view the registers for registering the votes for each candidate. Fig. 6 represents a transverse section through one of the channel boards. Fig. 7 represents a section through the machine, taken across the channel boards, and showing the parts somewhat enlarged. Fig. 7ª represents in perspective a portion of the machine on the same sections on which Fig. 7 is taken, and it illustrates conventionally the air ducts of a group of channels. Fig. 8 represents a similar section, but in another plane. Figs. 9, 10 11 and 11ª show in detail some of the air valves which operate various parts of the machine. Figs. 12, 13, 14 and 15 represent in detail the mechanism for simultaneously setting all of the counters at the zero point.

The whole machine is confined within a casing a, of any suitable form and constructed of any suitable material. It is formed with a base a' and placed thereon is a frame consisting of uprights b b, and a partition b' upon which is supported the main portion of the apparatus for counting the votes and rejecting those which have been improperly cast.

Below the partition b are placed the working bellows c wherein is produced the first or greatest reduction of pressure or partial vacuum and the regulating or equalizing bellows c' c', all supported upon suitable supports or braces. The working bellows c is operated from a crank shaft c^2 having a crank rod c^3 connected to a lever c^4 pivoted upon a bracket c^5 and connected by a link c^6 with one of the movable parts of the bellows. When the shaft is rotated the bellows is set in operation and it draws air out from the wind chest in the upper portion of the casing, and tends to form a vacuum therein; while the regulating bellows c' c' operate to equalize the pressure of air in the wind chest.

Mounted upon the partition or cross plate b', is a box d, which constitutes a wind chest, communicating by ducts d^4 d^4 with supplemental wind chests d^3 d^3 at its ends. Above the wind chest are placed grooved boards d^5 d^5, and standing upon the edge of the boards d^5 d^5 are five channel boards f f f f f, held in place by suitable upright walls at their ends.

Beyond the ends of the wind chests are two series of counters, one counter for each channel in the channel boards, there being as many channels as there are candidates for office, or punches in the voting machine in which the tally-sheet was perforated.

The tally-sheet A is drawn across the upper edges of the channel boards, being unwound from a roll g and wound up on a roll h. The roll h is provided with a gear wheel h', rotated by a pinion h^2 fast with a belt wheel h^3, the latter being rotated by a belt h^4 passing around a belt wheel h^5 on a shaft h^6. Upon this last mentioned shaft is likewise placed a sprocket wheel h^7 driving a chain h^8 which passes around a similar sprocket wheel h^9 on the crank shaft c^2 which actuates the bellows c. The shaft h^6 may be driven in any suitable way, as by a crank or by power, if desired. The brackets i which afford bearings for the rolls g h are mounted upon a base plate i' which may be adjusted axially of the rolls by arms i^2 i^2, pivoted to lugs on the said plate i' and mounted upon the ends of a shaft i^3 supported in bearings upon standards i^4 i^4 projecting upwardly from the boards d^5 on the top of the wind chest. A screw i^5, the

head of which is shown in Fig. 2, is passed through a nut supported upon the plate j and has its spherical end in a socket in the plate i', so that by turning the screw, the plate i' may be adjusted to shift the tally-sheet relatively to the channel boards.

Extending up from the plate i' are standards i^6 i^6 on which a frame i^7 is hinged, as at i^8, and across the frame i^7 are placed the holding strips i^9, having their perforations registering with the perforations in the channel boards f. By raising the frame i^7 on its hinges, the tally-sheet A may be placed in the machine or removed therefrom, and when the frame is down to the position shown in Fig. 3, the cross strips i^9 operate to hold the tally-sheet against the upper edges of the channel-boards f, (see Fig. 2.)

The present machine is equipped for counting the votes cast at an election where there are five parties in the field and consequently five candidates for each office, and therefore we provide five channel boards. In each channel board are channels for each candidate of a particular party, thirteen being indicated, and the ends of the channels or orifices are staggered, as shown in Fig. 1; that is to say, a line drawn through the first channels of all of the channel boards is at an inclination to the longitudinal lines of the tally-sheet A and corresponds to the line of perforations made in one of the voting machines previously described, by pressing in all of the push pieces for all of the candidates for a single office. Thus after a voter has fraudulently or by mistake voted for two candidates for the same office, the two perforations made in the tally-sheet by him will simultaneously register with two of the channels in the channel boards ff.

The channels are illustrated in Fig. 4. Each channel f' is divided, one portion f^2 extending directly through the channel board and through the boards d^5 on the top of the wind chest into a pneumatic motor k, as shown in Figs. 4, 9 and 10, which has a flexible diaphragm k' having secured thereto a finger k^2. The other portion of the channel f' leads into a small bellows l on the side of the channel bar and reënters the channel board, continuing, as at f^3, until it reaches the supplemental wind chest d^3. There are two of these supplemental wind chests, one at each end of the wind chest, as before described, and they are connected thereto by trunks d^4 d^4, so that the air is always exhausted out therefrom by means of the main bellows c. In the bellows l is placed a check valve l' which may be moved over to close the channel f^3 and prevent the air being drawn therethrough. The motor k and channels f^3 are each provided with ports x and x', respectively, each of which is covered by a diaphragm x^2 perforated by a minute hole such as would be made with the finest needle. By means of this arrangement any superfluous air remaining in the channels f^2 and f^3 and motor k is drawn through the ports x and x' and the "bleeders" formed in diaphragms x^2, into the wind chest d, thus maintaining a substantial vacuum in said channels.

For the purpose of closing the duct f^3 by operating the check valve l', I provide a lever l^2 hinged at l^3 and held outward by a spring l^4. The end of the lever l^2 is connected to an air motor or bellows l^5 (Figs. 4 and 7) communicating with a duct f^4 extending down through the channel board and communicating with a horizontally arranged windway m (Fig. 8) in the top of the wind chest. The boards d^5 on the top of the wind chest are each grooved to provide a series of windways, and are all glued together. For each group of channels in the five channel boards (*i.e.*, the first channels in said boards) there are five horizontal windways m m' m^2 m^3 m^4.

The duct f^4 of the first channel-board communicates with the windway m, (Fig. 8) the corresponding channel f^{41} of the next channel board communicates with the windway m', and so on, each one of the channels or ducts f^4 to f^{44} communicating with one of the windways m to m^4, respectively. Communicating with the channel m are four ducts n, n, n, n, all terminating adjacent the sides of each of the four air motors or pneumatic motors k, (Figs. 4, 6, and 7 to 11ª.) The channel m' has four similar ducts n' n' n' n', the channel m^2 four ducts n^2 n^2 n^2 n^2, the channel m^3 four ducts n^3 n^3 n^3 n^3, and the channel m^4 four ducts n^4 n^4 n^4 n^4. By the side of the first motor k, are the mouths of the ducts n' n^2 n^3 n^4, all normally closed by the valve k^3 and communicating respectively with the windways m' m^2 m^3 m^4 to which lead the ducts f^{41} f^{42} f^{43} and f^{44}, respectively. By the side of the second motor are the mouths of ducts n n^2 n^3 n^4, communicating with the windways m m^2 m^3 m^4, to which lead the ducts f^4 f^{42} f^{43} f^{44}, respectively. Thus by each motor k is a series of four ducts, closed by valve k^3, which is adapted to be opened by said motor when air passes through channel f^2 thereto. Each of said groups of ducts, is closed by a valve k^3, the latter being normally closed by a spring k^4, and projecting downward from each valve is an arm k^5, resting against a finger k^2 on the diaphragm k' of the air motor k. In Fig. 7ª, the ducts n n' n^2 n^3 n^4 and the windways m m' m^2 m^3 m^4 are shown conventionally as pipes. It will be observed that the windways, ducts, and the channels are also arranged so that the channels f^3 of the channel boards will be immediately closed should any two or more perforations in the tally-sheet register with the corresponding channels in the channel boards. At the end of the channels f^3 is placed a diaphragm o, carrying two blocks o' upwardly through which extends a tracker wire o^2 having on its end a valve o^3 which normally closes a duct o^4, leading to an air motor o^5. When the air is free to rush through the channel f^3 towards the supplemental air chests d^3, the diaphragm o is raised, carrying with it the tracker o^2 and the valve o^3, and the air is immediately drawn out from the motor o^5 and thereby causes the swinging of a lever p which is connected with a portion of the motor o^5 and is pivoted at p'.

There is a lever for each of the channels or windways o^4 and by reason of the great number that are necessarily employed, they are arranged as stated upon both ends of the machine upon a standard o^7. Each lever p controls a counter which is shown in detail in Figs. 12 to 15, inclusive.

The counter is provided with three shafts q q' q^2. On the shaft q^2 is a pinion q^3 driving the gear wheel q^4 on the shaft q' once for each ten of its rotations and on the shaft q' is a pinion q^5 meshing with and driving a gear wheel q^6 on the shaft q. The gear wheel q^6 is rotated once for each ten rotations of the pinion q^5. Upon the shafts are mounted pointers, as shown in Fig. 5, traveling around stationary graduated disks.

To impart a step-by-step movement to the pinion q^3 upon the shaft q^2, we place on the shaft q^2 a ratchet q^7 with which a pawl q^8 on a spring elevated slide q^9 may engage once for each time the slide is reciprocated. A stationarily mounted pawl r engages the ratchet q^7 to hold it against backward movement and it is provided with a downwardly projecting tail or end r', for a purpose to be described. The slide q^9 is connected to the ends of the bell crank lever p so that each time the lower end of the lever is thrown inward by the air motor o^5, the slide q^9 is depressed and the shaft q^2 and pinion q^3 are rotated or advanced one step.

Connected to the shaft q and to a stationary stud q^{10} is a spiral spring s which is wound up as the gear wheel q^6 is rotated. The gear wheel q^6 is loose on the shaft q and it is provided with a pawl s' which engages the ratchet wheel s^2 (Fig. 15) fast upon the shaft q and upon the end of the shaft q is a knob s^3 by means of which the shaft may be partially rotated to obtain the desired tension of the spring.

Pivoted upon a stud t on the plate t' which supports the various shafts is a lever t^2 having on its end a pin t^3, as shown in Figs. 13 and 15.

Upon the gear wheel q^6 is a pin t^4, which when the gear wheel is rotated in one direction strikes against the pin t^3 and throws the lever against a stud u, projecting out from the plate t' and when the gear wheel is rotated in the other direction strikes on the other side of the pin and throws the lever against a stud u'. Thus the gear wheel can complete a little more than a single rotation and is brought to a stop at a predetermined point.

Each plate t' is slotted as at t^{40} to receive a pin v projecting in from the end of a lever v'. These levers v' are all pivoted at v^2 to a cross bar and have outwardly projecting pins v^3 with which plugs v^4 on a slide v^5 may engage. After the votes have been counted upon the machine, the slides v^5 which may be all connected together, if desired, may be moved simultaneously and the pins v engage the ends r' of the pawls r, and throw them out of engagement with the ratchet wheel q^7, so that the springs s may set the registers at their zero position.

The operation is as follows:—The tally sheet is pressed firmly down over the inlets of the channels f by the strips j^9, and said sheet is sucked in close against the mouths of said inlets because of the vacuum maintained in channels f^2 and f^3 through the bleeders x^2. When a perforation comes opposite the mouth of channel f a current of air rushes in (see arrows 10, Fig. 4) and in its downward path divides, one current following the course indicated by arrows 11 and the other following the course indicated by the arrows 12. The current 11 passes into channel f^3 and the bleeders x^2 of the latter being too small to carry off the volume of air, the latter raises diaphragm o and blocks o' whereupon the valve o^3 is lifted and the air in bellows o^5 is exhausted through channel o^4 into chamber d^3 from whence air is exhausted through channels d^4. The exhaustion of bellows o^5 effects the operation of the lever p whereupon the counter is operated. Before this action is completed, however, the current 12 passes down into the motor k and the bleeder x^2 thereof being too small to carry off the volume of air, the latter exerts a pressure on the diaphragm k' expanding the latter. Assuming that the motor k on the left of Fig. 7* is the one operated upon, (which we will term k^x) the valve k^3 adjacent thereto will be thus moved to uncover the outlets n', n^2, n^3, n^4, of windways m', m^2, m^3, m^4 whereupon the air in the several bellows l^5 is exhausted through channels f^{41}, f^{42}, f^{43}, f^{44}, effecting the closing of the corresponding valves l', and thus shutting air off from all the channels f^3 save that one belonging to the channel bar to which the motor k above referred to belongs. The foregoing operation takes place when the perforations have been properly made in the tally sheet by correct voting. Assuming, however, that a voter has balloted for more than one candidate, for instance those represented by the channel boards with which motor k^x and k^x are connected. In such event the valve k^3 adjacent motor k^x is moved to uncover ports n', n^2, n^3, n^4 of windways m', m^2, m^3, m^4, and the valve k^3 adjacent motor k^x is moved to uncover ports n, n^2, n^3, n^4 of windways m, m^2, m^3, m^4. Thus all of the channels f^4, f^{41}, f^{42}, f^{43}, f^{44} are uncovered whereupon air is exhausted from all the bellows l^5, effecting the closing of all of the valves l', and thereby preventing the operation of the counters. In this connection it will be noted that the channels g^2 are much shorter and of less volume than the channels f^3, so that the motors k are operated and ports n, n', n^2, n^3, n^4, respectively, uncovered before the air in channels f^3 can reach the diaphragm o. Thus valve l' is almost instantly closed and any air which enters channel f^3 before closing of said valve l' is insufficient in volume to fill said channel to such an extent as will operate against diaphragm o, but on the contrary is immediately exhausted through bleeder x^2. The valve l' being positively operated is not affected in its action by the currents of air passing through the channels.

Thus from the foregoing, it will be seen that I have provided a machine by means of which the votes cast for each candidate will be tabulated by the counters excepting those that have been improperly or irregularly cast.

The machine is provided with a series of air passages which are normally open except when closed by the tally-sheet and each controlling the motor which actuates the register, and each air passage likewise communicates with a device for closing their air passages which lead to the said motors, whereby when two of the channels or main air passages are open, by reason of two perforations in the tally-sheet registering therewith, communication between the channels and the motors is cut off.

Having thus explained the nature of the invention, and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made, or all of the modes of its use, we declare that what we claim is:—

1. A machine comprising a series of counters, means controlled by the perforations in a tally-sheet for actuating said counters, and automatic locking mechanism for locking said means when two perforations have been made in the tally-sheet for different candidates for the same office, whereby said counters are not operated.

2. A machine comprising a series of counters, a series of devices controlled by the perforations in a tally-sheet for actuating the counters, and mechanism controlled by said perforations for locking the controlling devices, without interrupting the operation of the machine.

3. A machine comprising two counters, two pneumatic

devices, each for actuating one of the counters when a perforation in the tally-sheet is in alinement therewith, and mechanism for locking both said pneumatic devices when two perforations come simultaneously into alinement therewith.

4. A machine comprising two counters, a pneumatic device for actuating each of said counters, an air channel leading to each device, and normally closed by the tally-sheet except when a perforation registers therewith, and mechanism for closing both of said air channels when two perforations simultaneously register therewith.

5. A machine comprising tabulating mechanism, pneumatically actuated means for operating the tabulating mechanism, a series of air channels leading to the said means, with which the perforations in a tally-sheet may register, and means for closing the air channels when two or more perforations register therewith, to prevent the operation of the tabulating mechanism.

6. A mechanism comprising a counter, a pneumatic motor for actuating the counter and having a normally unobstructed air channel with which a perforation in a tally-sheet may register, and an automatic locking mechanism for closing said air-channel and locking the motor.

7. A machine comprising two counters, a pneumatic device for actuating each of said counters, an air channel leading to each of said devices and normally closed by the tally-sheet except when a perforation therein registers therewith, a pneumatic device for closing each of said air channels, and an air duct leading from each channel to the closing device of the other channel.

8. A machine comprising two counters, a pneumatic device for actuating each counter, an air channel leading to each pneumatic device, a pneumatic check valve for obstructing each of said air channels, an air duct for operating each check valve when said air duct is open, a pneumatic means for normally closing each of said air ducts, and a windway leading from each air channel to said pneumatic means for controlling the valve for the other air channel.

9. A machine comprising a series of normally unobstructed air channels closed except when a perforation in the tally-sheet registers therewith, and means for automatically closing said windways when any two or more perforations register simultaneously therewith.

10. A counting machine having a group of counters, an unobstructed channel for causing the actuation of each counter, each channel being normally closed by the perforated sheet, and means for automatically obstructing the channels when any two or more are simultaneously opened by perforations in said sheet, to prevent the actuation of the counters.

11. A counting machine comprising a plurality of groups of counters, a plurality of groups of devices controlled by perforations in a sheet for operating the several groups of counters independently and simultaneously, and means for locking said counter-operating devices of any group against operation when two or more perforations are simultaneously presented to devices in the same group.

12. A counting machine comprising a plurality of groups of counters, a plurality of groups of devices controlled by perforations in a sheet for operating the several groups of counters independently and simultaneously, and means for locking said counter-operating devices of any group against operation when two or more perforations are simultaneously presented to devices in the same group, in combination with means for continuously feeding said sheet independently of the counter-operating devices.

13. A counting machine comprising a plurality of counters, each having a resetting device, a plurality of pneumatic actuators arranged to actuate said counters, means for feeding a perforated sheet in operative relation to said actuators, and means for causing the simultaneous actuation of said resetting devices.

14. A counting machine comprising a plurality of groups of counters each having a resetting device, a plurality of groups of pneumatic actuators for said counters, means for feeding a perforated sheet in operative relation to said actuators, means for causing the simultaneous actuation of the resetting devices in each group, and connections between said means whereby all of said setting devices in all of said groups of counters are simultaneously actuated.

15. A counting machine comprising a plurality of groups of counters each having a resetting device, a plurality of groups of pneumatic actuators for said counters, means for feeding a perforated sheet in operative relation to said actuators, and means for causing the simultaneous actuation of the resetting devices in each group.

16. A counting machine comprising a plurality of counters each having a resetting spring and a detent for said spring, pneumatic actuators for said counters, means for feeding a perforated sheet in operative relation to said actuators, and means for simultaneously disengaging said detents from said springs.

17. A counting machine comprising a group of counters, pneumatic actuators for operating said counters, means for feeding a perforated sheet in operative relation to said actuators, means for preventing the actuation of more than one counter at a time, and means for simultaneously resetting all of said counters.

18. A counting machine comprising a plurality of channel-boards each having a plurality of air-channels adapted to be closed by a perforated sheet and opened by the perforations in said sheet, a plurality of pneumatic actuators controlled by said channels and banked at each end of the machine in groups, a plurality of counters at each end of the machine in operative relation to said actuators whereby they automatically count the perforations in said sheet, and means for simultaneously resetting said counters.

In testimony whereof we affix our signatures, in presence of two witnesses.

JOHN McTAMMANY.
MORRIS S. WRIGHT.

Witnesses:
JOSEPH K. GREENE,
CHARLES H. WOOD.