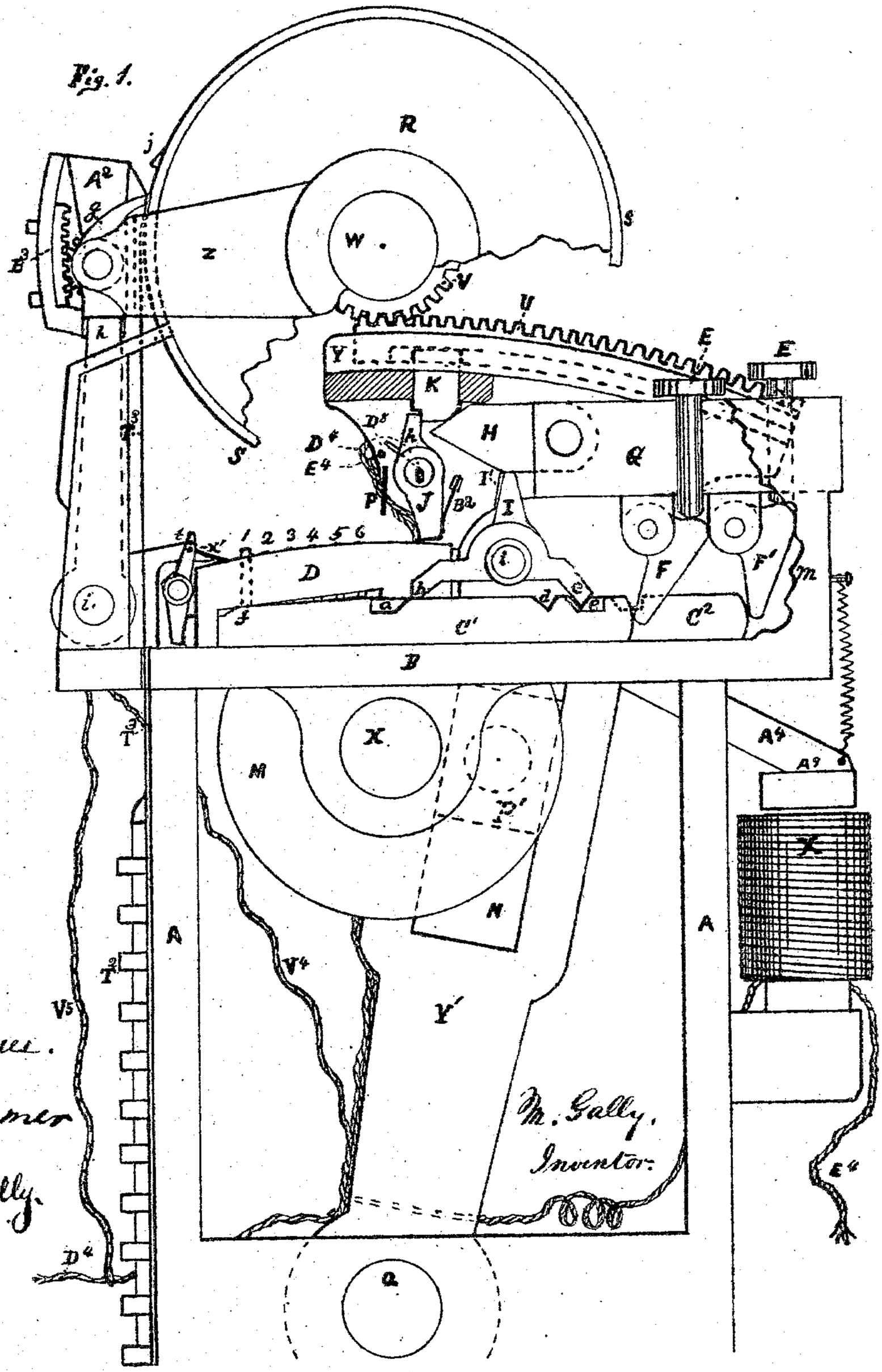
3 Sheets--Sheet 1.

M. GALLY.

Combined Stereotyping and Telegraphing Machine.

No. 129,725. Patented July 23, 1872.

Fig. 1.



3 Sheets--Sheet 2.

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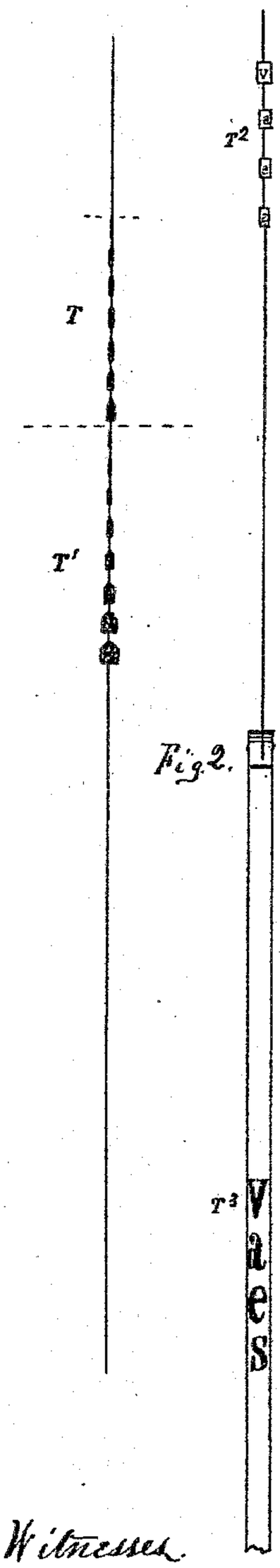

Fig. 2.

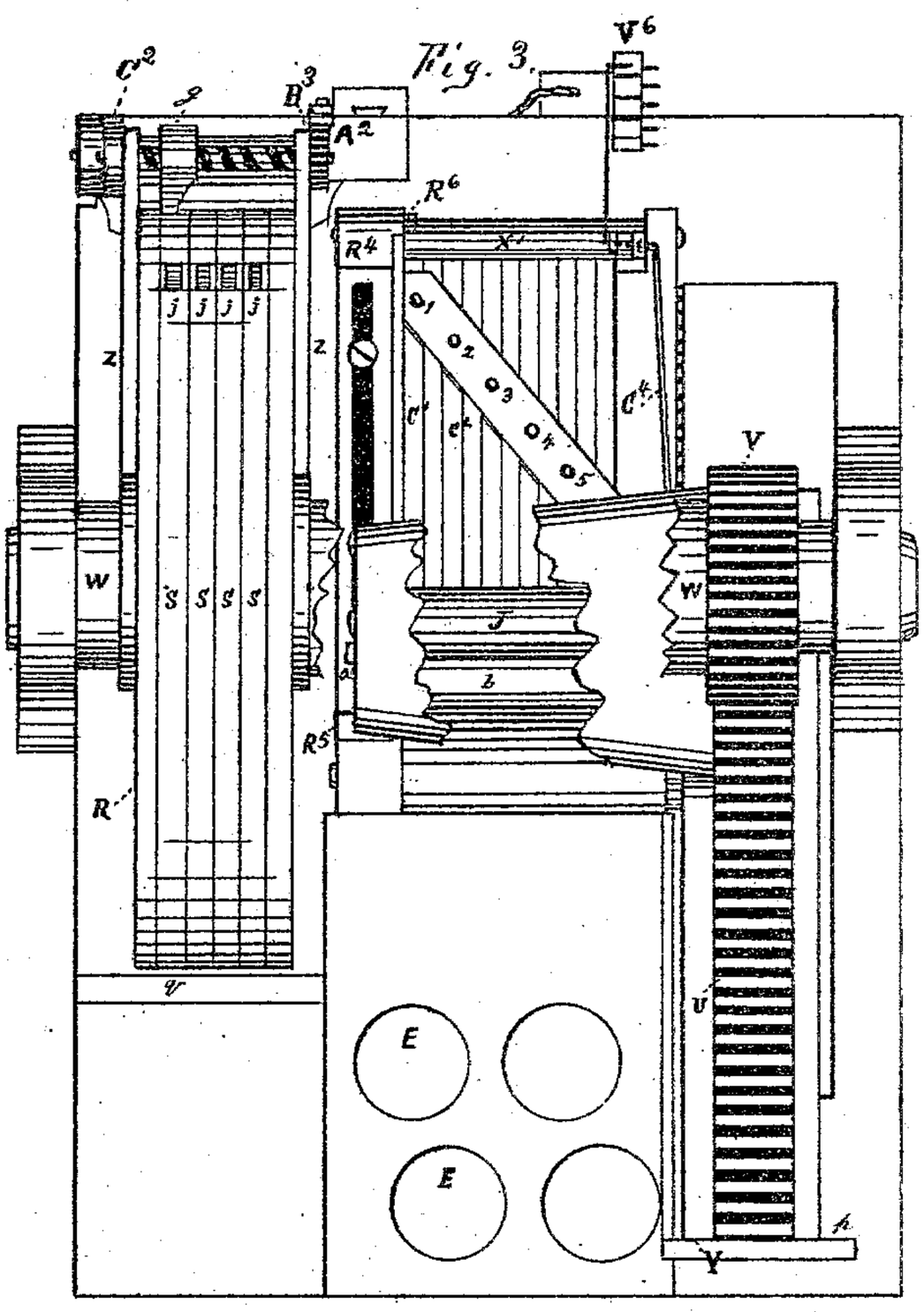

Fig. 3.

Witnesses.

Wm. Counes.

Wm. A. Gally.

M. Gally,

Inventor.

3 Sheets--Sheet 3.

M. GALLY.

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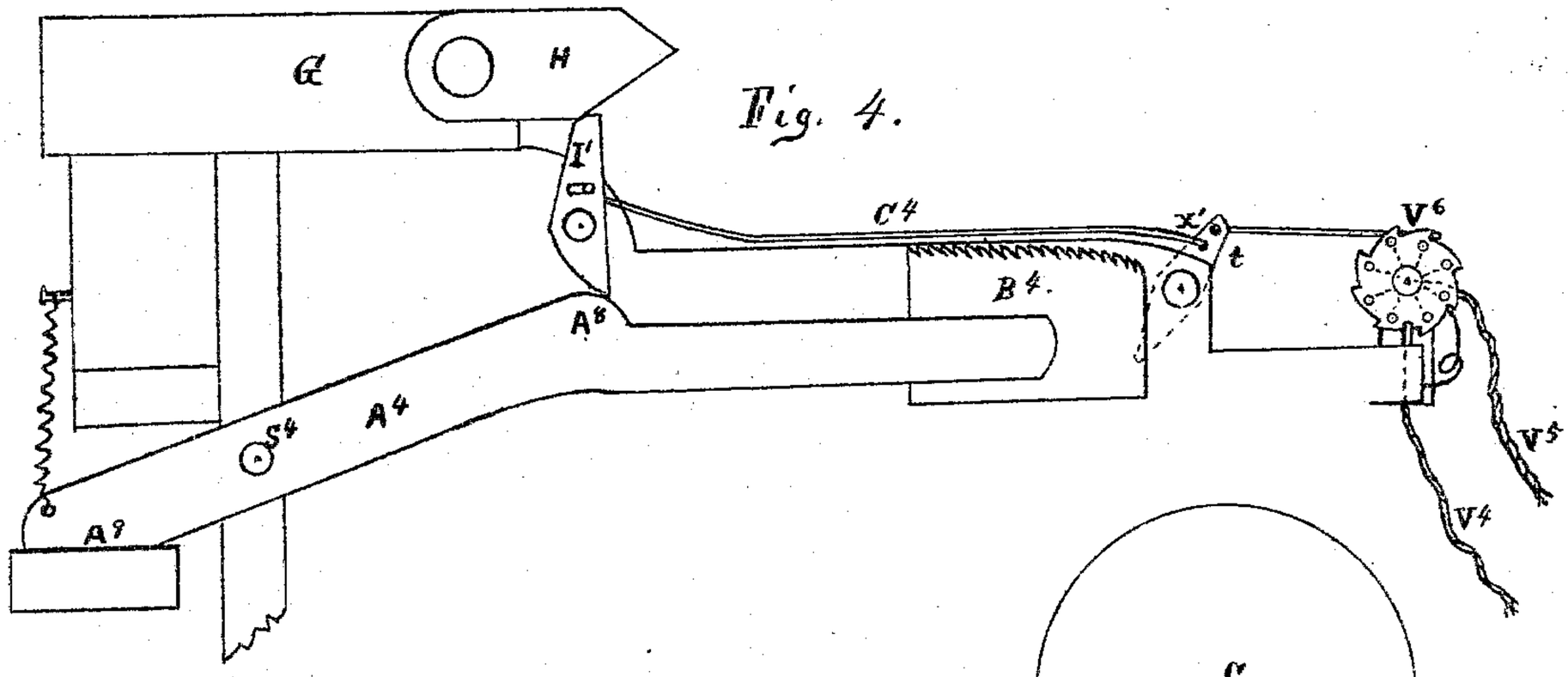


Fig. 4.

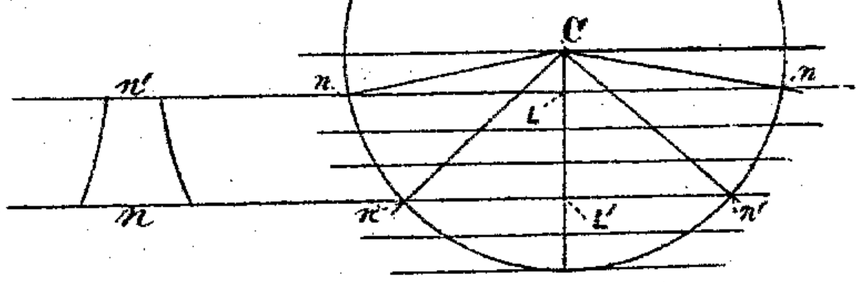


Fig. 5.

$n : n' :: \sqrt{CL} : \sqrt{CL}$

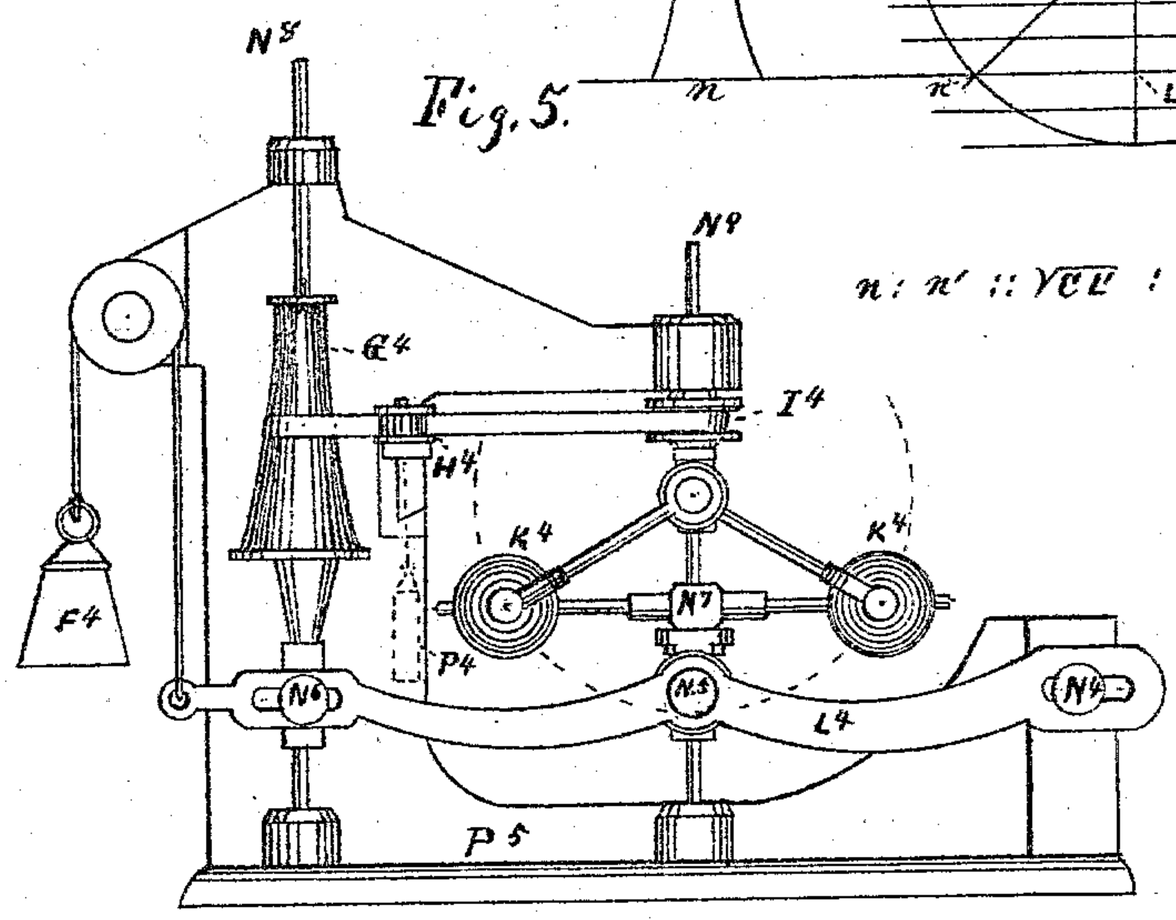
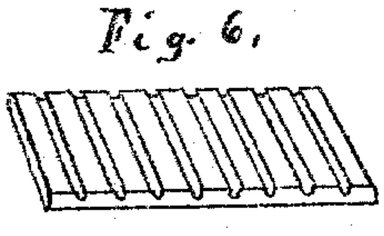
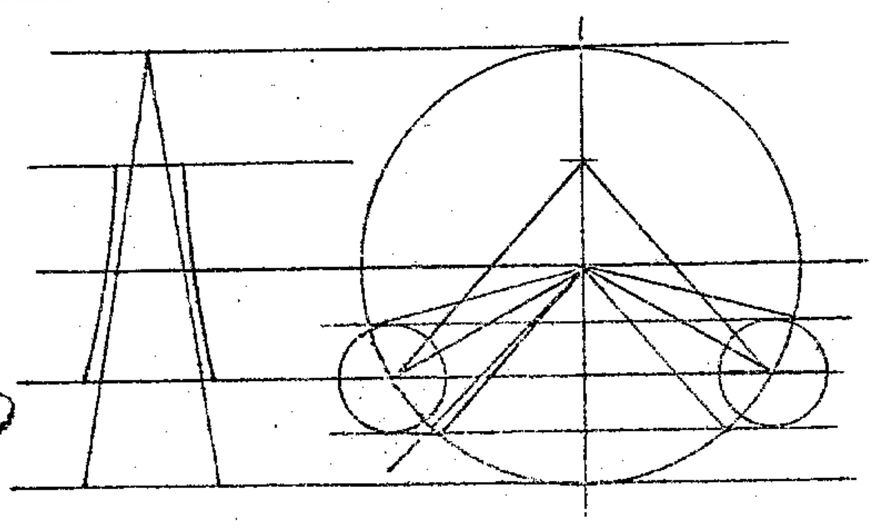
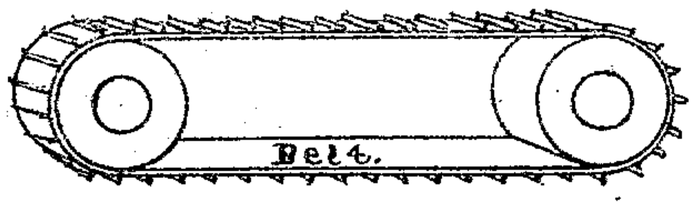


Fig. 6.







Witnesses.
Wm. Crowner
Wm. A. Gally.

Merritt Gally
Inventor.

UNITED STATES PATENT OFFICE.

MERRITT GALLY, OF ROCHESTER, NEW YORK.

IMPROVEMENT IN COMBINED STEREOTYPING AND TELEGRAPHING MACHINES.

Specification forming part of Letters Patent No. **129,725**, dated July 23, 1872.

To all whom it may concern:

Be it known that I, MERRITT GALLY, of Rochester, in Monroe county and State of New York, have invented certain new and useful Improvements in Machinery for Stereotyping and Telegraphing; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon.

My invention consists, first, in the means for securing to the key-movement a proper and certain period of dwell, the keys remaining depressed when struck until the power-working machinery has brought to place the required die, the key then being driven back to its former position by a positive movement of the machinery; secondly, in the means for preventing a second key movement until after the operation of the machine, indicated by a key previously struck, is fully accomplished, this being done by means of keys and connected devices, any one of which keys, by its depression, locks or renders inoperative the remaining keys until it is returned to its first position; thirdly, in the use of a reciprocating-carriage for giving motion to a rack, the rack partaking only of such parts of the movements of the carriage as are indicated by operating-keys, different keys indicating different movements of the rack; fourthly, in the use of a pawl with screw-movement and operating mechanism for engaging consecutively the catches of the rings; fifthly, in the use of a stereotype-blank a part or parts of the face of which are removed, so that the compression in forming one part of the stereotype may not displace another part previously formed, or other parts of the face not compressed.

In the accompanying drawing, Figure 1 is a side elevation, showing the general construction of the devices claimed. Fig. 2 is a part of a die-strip, showing a part of a set of dies, the strip being attached to a ribbon, upon the face of which are large plain letters corresponding with the dies on the strip; also a set of spaces. Fig. 3 is a plan of the machine, with only a partial key-board, with a few of the rings represented. Fig. 4 is a side view of devices on the opposite side from Fig. 1, showing the armature and connecting parts for engaging and disengaging the carriage and rack by means of an electro-magnet. Fig. 5, with diagrams, represents the chronometric speed-governor, with the formula for obtaining the different diameters of the conoidal wheel or pulley; and Fig. 6 represents a stereotype-blank, with a part or parts of its face removed.

General Description.

This machine is intended to be an improvement upon a machine for similar purposes for which I filed application for patent the 21st day of August, 1871, and has some parts in common, which will be merely alluded to in this description. The die-strip, Fig. 2, remains as in the former description, except that it is moved by a different means. To the die-strips are attached ribbons T^3, which wind upon the ring S when the rings are turned upon their bearing, and thus draw the die-strips along the plane upon which they rest. Upon the ribbons, or upon the face of the rings, are placed large printed letters, which can be read much more easily than the small dies. These large letters, not requiring a distance between them, as in the case of the dies, allow the letters to be very large and plain, and still occupy only the same amount of space in length of strip as the small dies. So it will be seen that the large letters on the ribbons may be made to follow the same arrangement as the dies, and can be read instead thereof at a glance, to ascertain the correctness of the line. The rings S are moved consecutively by means of a pawl, G, which is moved along by a screw-movement, the screw working in connection with the moving-gear of the machine. At one end of the feed-screw is a pinion, which works in connection with the rack B^3 when the pawl *g* is brought to its starting position. This moves the pawl the distance of a single strip of dies. As the pawl moves forward, it is not moved by the screw, as the rack is caused to slip gear with the pinion by means of a receding slide movement on the support A^2. After the pinion has passed the rack in its forward movement, the rack drops back to place to engage the pinion on its return movement. The arms Z, which carry the pawl *g*, in moving the rings S, rock upon the center shaft W, and make nearly an entire revolution back and forth. These arms are connected to the shaft of pinion V, and are actuated by the rack U. The carriage Y has a reciprocating move-

ment, produced by the driving crank-wheel M. The rack is made to slide loosely in the carriage without any forward motion, unless connected with the carriage by means of the bolt K. The connection can only be made when the carriage is back in the position shown in the figure. When the bolt K is raised to engage the rack, the trigger *h* J falls under the bolt, and retains it in place for any desired part of the movement of the carriage. By tripping the trigger at any point in the movement, the rack may be instantly stopped and the carriage pass on. On the return movement of the carriage, the rack will be carried back to its first position. In this manner any part of a revolution can be given to each of the rings through the arms Z, thus moving consecutively the die-strips the required distances for the arrangement of the dies of the line. The bolt K and trigger J are operated by the keys E E, &c., through the slides C^1 C^2, &c., or by means of electric impulses. Now, if the carriage Y be driven with a constant reciprocating motion, and during a movement toward the right hand in Fig. 1 a key, E, is depressed, the depression of the key will work a bell-crank, F, and drive forward a slide, C^1. This will move the tumbler I *b c*. The part I of the tumbler will raise the cam-lifter H, and when the bolt K arrives at the cam-lifter it will be raised and engage the rack. At the same time the trigger J will fall under the bolt and hold it in place. In the movement of the tumbler I it will be seen that the projection *b* is raised and held by the slide C^1 being driven under it, and the projection *c* is forced down into notches in the remaining strips, preventing the working of another key until the one depressed has been forced back to place. The strips have bevel-cams *f*, lying under trippers 1 2 3, &c., at different distances from the starting points in the forward movement of the carriage. It will be seen that the depressed key in driving forward the strip C^1 has lifted the tripper 1 in the line of the track of the trigger. This trigger extends across the plane in which the trippers are arranged, so that it may come in contact with any one of them which has been raised by the movement of a strip, C^1, C^2, &c. As the carriage moves forward, the rack will operate the pinion V, and thus the arms Z, until the trigger strikes the tripper, when the rack will immediately stop, and the carriage pass on until the stop P strikes the shifter X′, turning it on its pivot and forcing back the slide C′ to place, bringing back to their first position the tripper 1, tumbler I, and the depressed key. During the return movement of the carriage the rack and arms are brought back to their former position, and another key may be struck. No key can be depressed while the carriage is moving forward, but only when it is in its backward movement. This secures invariably the action of bolt K at the proper time previous to the tripping process. When the carriage is traveling forward and a key is not depressed, the keys are all locked by means of a slide with raised ends, R^4 R^5, Fig. 3. This slide has a projecting spur, R^6, which articulates with the shifter X′ and prevents the movement of the keys by preventing the movement of the strips C^1, &c. The shaft of the shifter X′ is made flat at one side of its extremity, so as to form a plane tangent to the curve of said shaft, and when the plane-faced spur R^6 is driven upon the plane of the shaft the shifter is held firmly in position for preventing movement of the slides C^1, C^2, &c. The slide is worked by a spur, *a′*, on the arm of the carriage. The spur locks the shifter when it strikes the lug R^5, and relieves the shifter when it strikes the lug R^4, by engaging or disengaging the spur R^6 and the plane face of the shifter X′. The trigger J is slotted at its pivot, so that if any of the trippers are in its track during the backward movement of the carriage the trigger will pass over such tripper without effect, and after the rack is engaged the trigger will be tripped in the next forward movement of the carriage.

Although the operator can operate the keys only during a part of the time for each entire movement of the machine, nevertheless he is not required to exercise any care in respect to the time. The finger is placed upon the key, which does not yield until the proper time, and the dwell will always be perfect whether the stroke of the finger is long or short. The key will remain depressed in either case until driven back by the machinery. The keys thus arranged are very easily operated. Neither the hand nor even a finger is lifted by the operator. The hand is slid lightly over the keyboard, and the desired key yields to a light pressure of a finger. The finger may remain until lifted by the positive return movement of the key, when a second key will yield to a second pressure. No skill is required for a proper manipulation of the keys. In justifying a line of types, the spaces between some of the words will bear a much greater increase than others, as between l and i, and y and w—the same space between these different letters appearing very differently in print. In using compound sets of spaces and giving to them a simultaneous movement between the words of a line, to justify the line, I employ sets with different graduations between different classes of letters, and in other places where needed, to secure the highest degree of perfection in artistic justification.

In Fig. 2, T T′ represent sub-combinations of differently-graduated spaces, arranged upon the same strip. In automatically justifying lines of movable types I use the same style of spaces, except that the combinations are made up of movable spaces, any one of which may be left in the line, the sets being placed in slides moving simultaneously instead of being attached to strips. In such case the bevels are at the ends of the spaces, and their movement to correspond.

It will be seen that the arrangement of the

dies depends entirely upon the operation of the trippers 1 2 3, &c., and the lifter H at certain intervals during the movement of the driving machinery. To operate the machine perfectly, nothing is necessary but to operate the desired keys. To control the arrangement of the dies by means of electric impulses, it is only necessary to give to the machinery a certain proportional or invariable velocity, and then at the proper intervals of time operate the trigger J and lifter H by means of an electric current operating by means of an electro-magnet, as hereinafter described. No governor which merely controls the source of power, such as a steam or water governor, is sufficient for insuring an exact invariable velocity to any machine. A line-shaft driven by steam or water power, even with the best steam or water governors, is so affected by the constantly-changing conditions of the source of power as to be subject to almost a constant variation. Any kind of governor in which a brake is used is not only objectionable on account of the consumption of power, but an unavoidable inaccuracy. For securing an exact invariable speed, I construct a chronometric speed-governor, as shown in Fig. 5 and accompanying diagrams. I use the common governor-balls, K^4, which are suspended from the driving-shaft N^9. Beside the suspending-rods of the governor-balls, I use a rod upon which the balls loosely slide, which rod slides up and down on the driving-shaft at N^7. This rod represents the base of the different cones formed by it and the suspending-rods at different velocities of the balls. Above the figure is shown the mathematical formula for determining the different velocities at different heights of the cone. Upon the driving-shaft N^9 I place the fixed pulley I^4, and upon a shaft, N^8, which attaches to the machine to be worked, I place a conoidal pulley, which slides upon a feather. The wheel or pulley I^4 is in diameter equal to the mean diameter of the conoidal pulley G^4. The wheel or pulley I^4 is connected with the conoidal wheel or pulley either by belt or gear. The conoidal pulley is moved upon its shaft, in proportion to the rise and fall of the governor-balls, by means of a lever pivoted to the framework at N^4, to a thimble supporting the conoidal pulley at N^6, and to a swivel connecting with the rod N^7 at N^5. In the figure these pivots are represented as equidistant, but they may be arranged on any desired proportion by correspondingly varying the length of the conoidal pulley. The lever L^4, conoidal pulley G^4, and all the rest of the apparatus except the governor-balls are exactly balanced by the weight F^4. Now, if the arrangement of the lever L^4 be such that the mean diameter of the conoidal pulley connects with the pulley I^4 when the governor-balls are at their mean velocity, the speed of the shaft N^8 will always remain at the mean velocity of the governor-balls, although the speed of the governor-balls and shaft N^9 may vary, provided that the several diameters of the conoidal pulley be accurately and mathematically ascertained, and constructed accordingly. To ascertain these several diameters, let us consider the diagram above Fig. 5. Let $n\ n'$ on the circle represent the extreme velocities of the balls. Let us then divide the height of the cone C n' n' into any number of equal parts, one part representing the height of the cone formed by the balls at their highest speed, the heights of the two cones being represented by L and L^1. We then have the proportion—

$n : n' :: \sqrt{CL^1} : \sqrt{CL}$.

Let $n = 100$, and x the unknown speed n'. We then have the following proportion:

$100 : x :: \sqrt{4} : \sqrt{1}$.

We find $x = 50$.

In the same manner the exact speed of the balls at any of the points of direction may be ascertained. Now let us consider the formation of the conoidal pulley G^4. The extreme diameters will be as 50 and 100. Now, as the pivots N^4, N^5, and N^6 are represented as equidistant from each other in the figure, the conoidal pulley will rise or fall twice as rapidly as the pivot N^5; therefore the conoidal pulley will be twice the length of that represented in the diagram. Now let us divide the length of the conoidal pulley into the same number of equal parts as the perpendicular C L^1; and as we make the extreme diameters of the pulley proportionate to the extreme velocities of the balls, the several diameters of the pulley at its different points of division will bear a like proportion to the several velocities of the balls at the several points of division of the line C L^1. In timing together two machines by the use of these governors at different altitudes the slight difference in time of the movement of the balls may be easily adjusted by means of an adjustment of the pivot N^4. This chronometric governor is a mathematically-accurate instrument, and as it is intended to be used for regulating the speed of any kind of machinery it is not herein claimed, but forms the subject of another application.

To operate the within-described machine for arranging types, dies, or matrices, by means of an electric current or currents, by which it is connected to an operating-machine at a distance, I proceed as follows: Connecting with the operating machine is a circuit line, E^4 D^4, connecting with an electric battery. This circuit is divided at D^8. The branches V^4 V^5 connect with the insulated wheel V^6, the wheel having metallic points, which break and connect the circuit by working in combination with a point at the extremity of the branch V^4. Connected with the battery-line is an electro-magnet, X, with armature A^9. A momentary connection is also made in the circuit at D^8, Fig. 1, by the tripping of the trigger J. The apparatus worked by the armature of the magnet in the distant machine is shown in Fig. 4. The armature pivoted at S^4 is extended to a toothed tripper, B^4, and a cam, A^8. The tumbler I^1 corresponds with the arm of the tumbler I in Fig. 1. When a key is struck in the

operating-machine, the shifter X′, being turned on its pivot, turns the ratchet-wheel V⁶ one tooth by means of a hooked pawl connecting with the shifter. This makes momentary connection in the circuit, charges the magnet in the distant machine, and works the armature, which, through the tumbler I¹, raises the lifter for engaging the rack. At the same time the tripper B⁴ is raised, but without effect, as the carriage is moving backward. At the instant the trigger is tripped in the operating-machine another connection is made in the current at D⁸, which again works the armature in the distant machine, tripping the trigger with the toothed tripper B⁴. The lifter H is worked again at this impulse, but without effect, as it is connected through the tumbler I¹, by means of the connection C⁴, with the shifter. The hooked ratchet-pawl of the ratchet V⁶ is removed from the distant machine, unless connecting with a third machine. It will be seen that if any number of machines are driven by any kind of power and regulated to an exactly-corresponding speed by means of the described chronometric governor or its equivalent, and the machines are all started instantaneously by means of an electric signal or impulse, so long as they run with an invariable velocity the operations of one machine will be repeated by all the others. Only a single battery-line is represented. The arrangement of main lines and local batteries common to telegraphing-machines may be used. In the former specification (Case A) only the connections for the main line are shown, the arrangement of magnets in connection with the pulsating-levers and local circuits being of so common use as not to require description. When a stereotype is to be directly formed without the use of a mold, I use the stereotype-blank, Fig. 6. This blank is made with the parts of the face which will fall between the lines removed, so that the compression of one line will not disturb the previously-made line, or the parts of the face not compressed.

As a modification of the face of the impression-roller of Case A I use a belt with like divisions on its face and like guards. This allows an extended traverse of the formed material in connection with the belt, so that the drying process may be performed slowly.

When the machine described is used simply for the transmission of messages the addition of an inking-roller will ink the dies, and paper may be used for the impressed material. In this manner a beautifully-arranged printed letter may be produced instead of the rude samples of printed telegrams commonly produced by stamping one letter at a time in the old way.

Claims.

1. In a mechanism for arranging types, dies, or matrices, I claim the combination, with an operating-key, of the returning shifter X′, connection C¹, and connecting-joint F, substantially as set forth, for returning to place a depressed key by a positive movement of the machine.

2. The locking-tumbler *b i c* and set of strips C¹, &c., or their equivalents, combined for the purpose of rendering inoperative the remaining keys while one key is depressed.

3. The carriage Y, or equivalent, having a reciprocating motion, in combination with a movable rack, U, the rack partaking only of such parts of the movements of the carriage as are indicated by or through the operation of operating-keys, different keys indicating different movements of the rack, substantially as set forth.

4. The pawl *g* having a screw-movement for engaging consecutively the catches *j* of the rings S, operated by the means described, substantially as set forth.

5. A stereotype-blank a part or parts of the face of which are removed, as described, so that the compression in forming one part of the stereotype will not displace the parts previously formed, or other parts of the face not compressed, substantially as set forth.

MERRITT GALLY.

Witnesses:
WM. CROWNER,
WM. A. GALLY.