No. 676,137. Patented June 11, 1901.

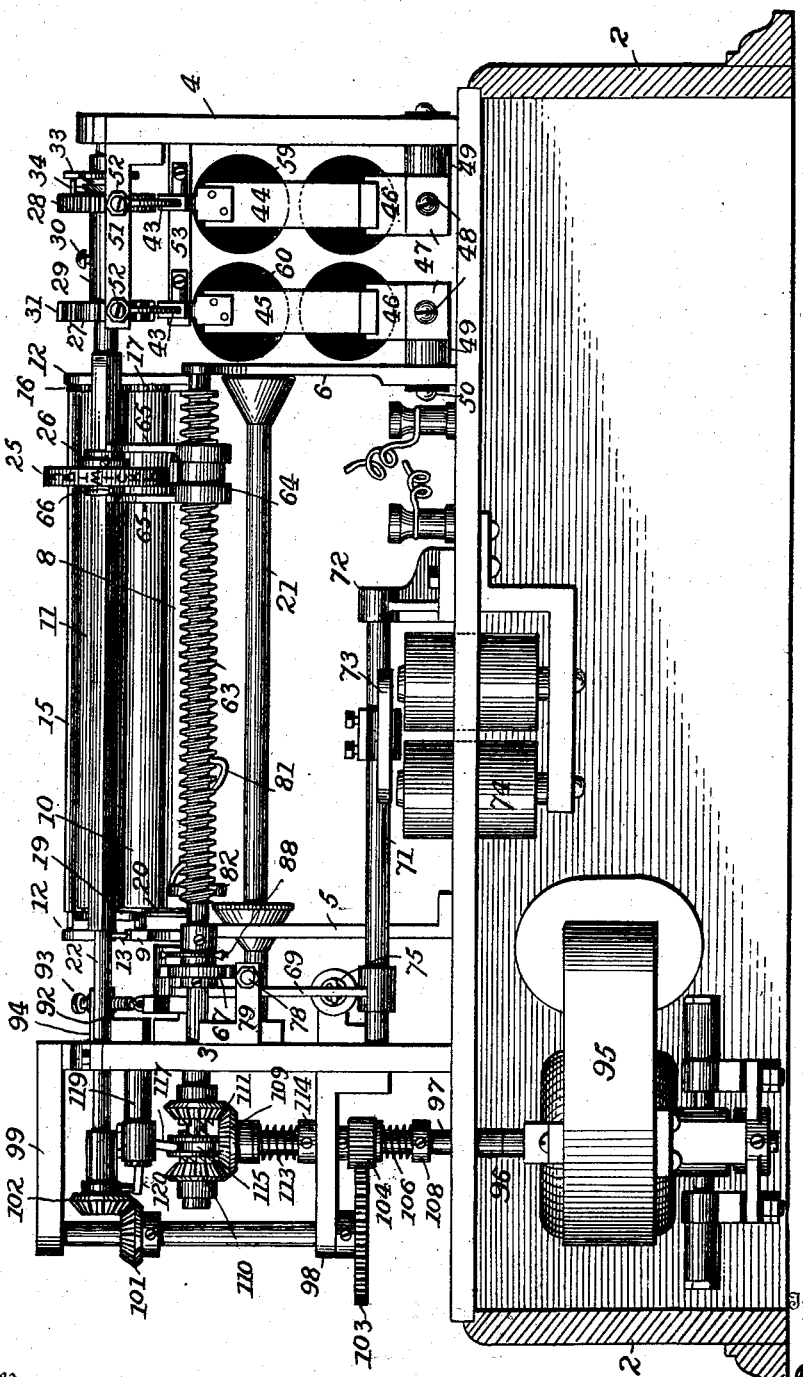
J. M. JOY.

PRINTING TELEGRAPH RECEIVER.

(Application filed Sept. 20, 1900.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



Witnesses
J. G. Tinkel
H. M. Gillman Jr.

Inventor
John M. Joy

By Foster Freeman Attorneys

No. 676,137. Patented June 11, 1901.

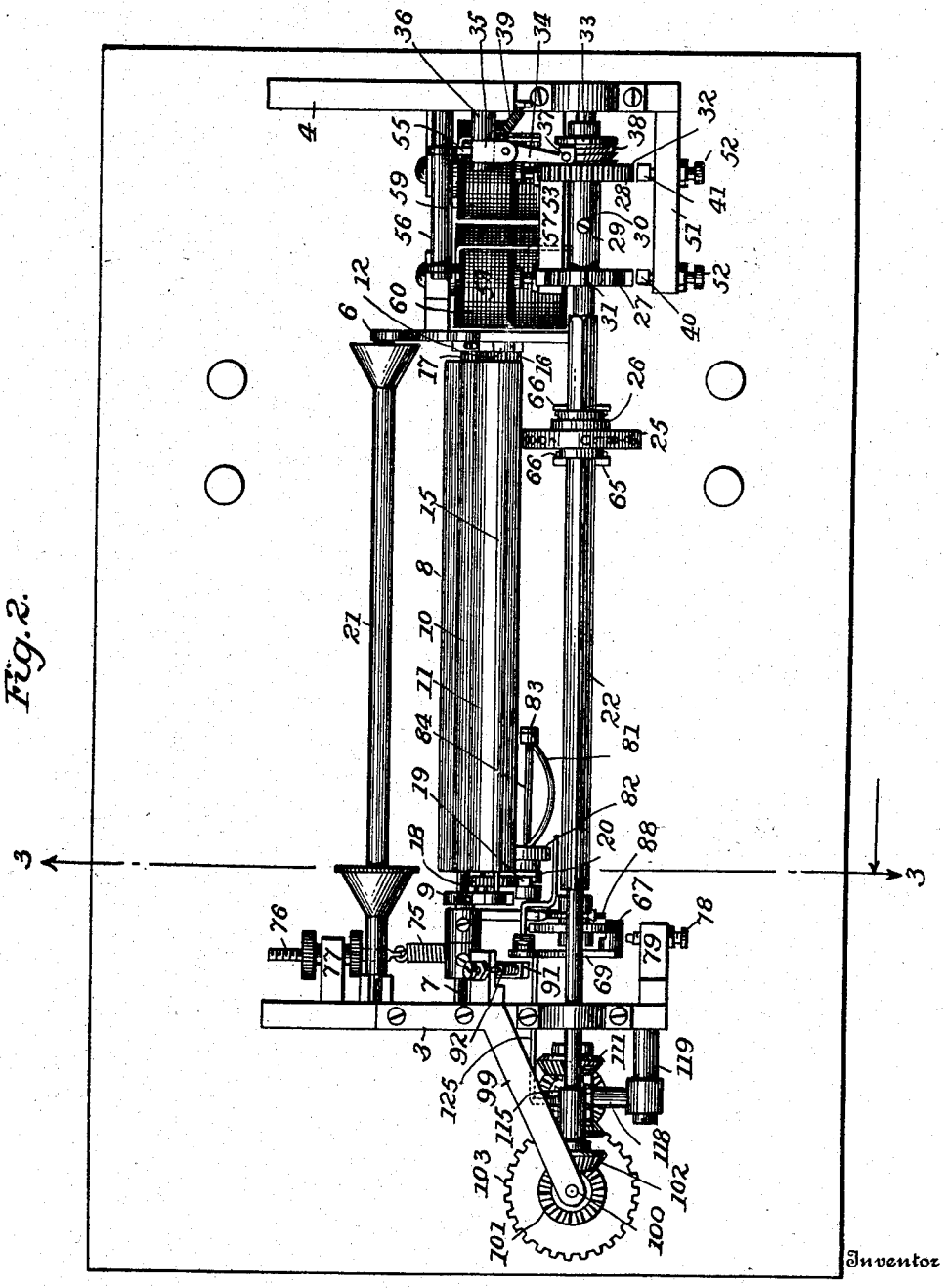
J. M. JOY.

PRINTING TELEGRAPH RECEIVER.

(Application filed Sept. 20, 1900.)

(No Model.) 4 Sheets—Sheet 2.

Fig. 2.



Inventor

Witnesses

J. J. Dinkel

Hon. Pellman Jr.

John M. Joy

By Foster Freeman Attorneys

No. 676,137. Patented June 11, 1901.

J. M. JOY.

PRINTING TELEGRAPH RECEIVER.

(Application filed Sept. 20, 1900.)

(No Model.) 4 Sheets—Sheet 3.

Fig. 3.

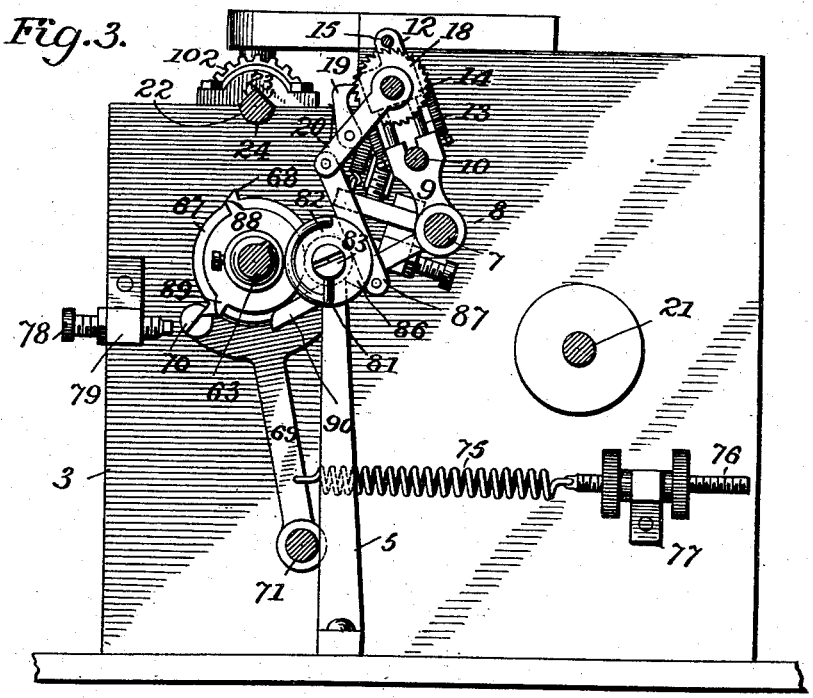


Fig. 4.

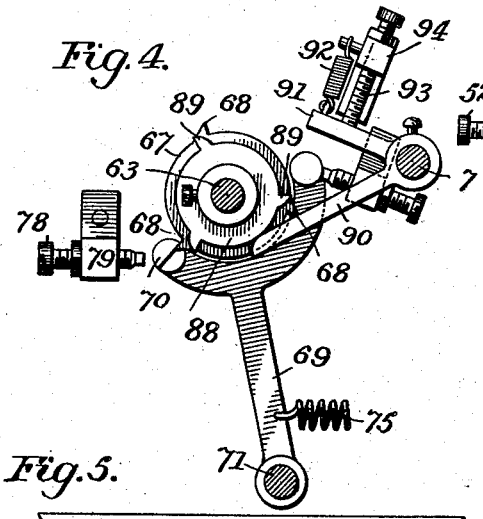


Fig. 5.

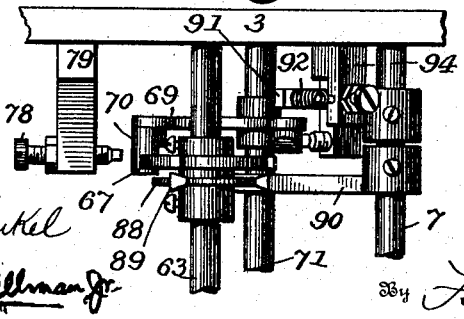
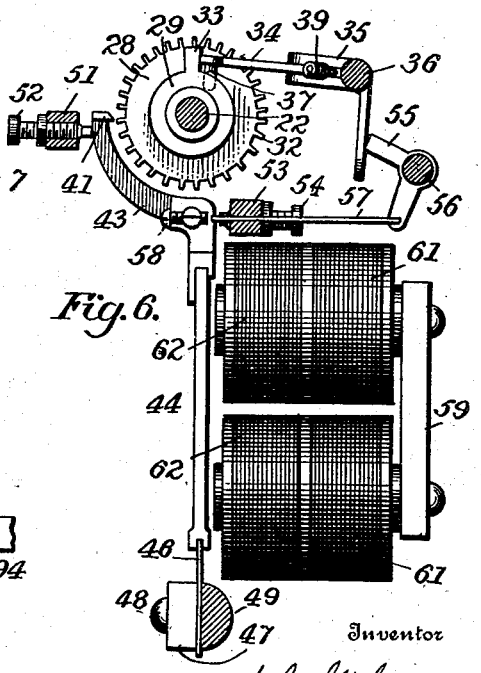


Fig. 6.



Witnesses

J. J. Finkel

A. M. Gillman Jr.

Inventor

John M. Joy

By Foster Freeman Attorneys

No. 676,137. Patented June 11, 1901.

J. M. JOY.

PRINTING TELEGRAPH RECEIVER.

(No Model.) (Application filed Sept. 20, 1900.) 4 Sheets—Sheet 4.

Fig. 7.

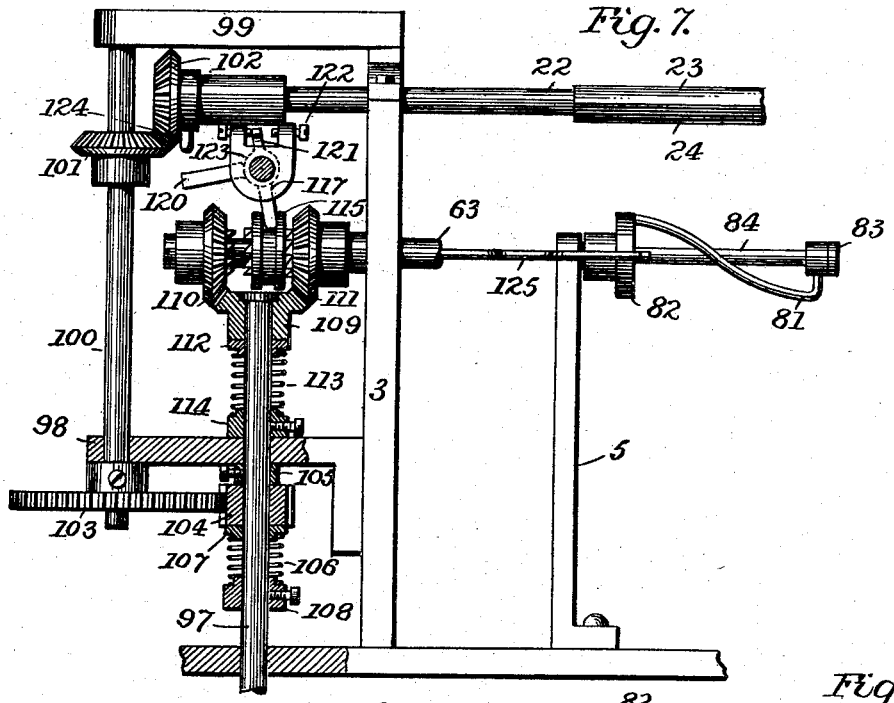


Fig. 8.

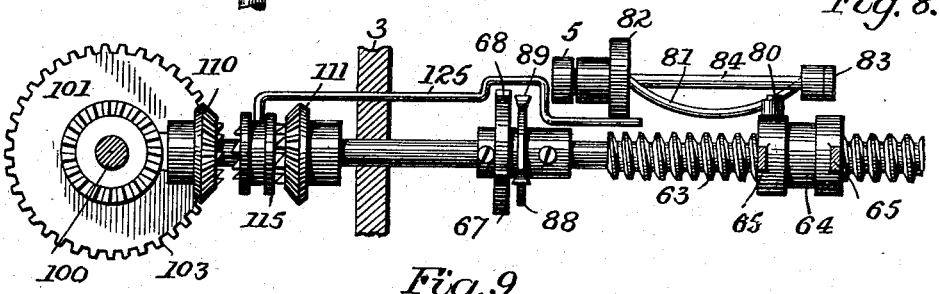
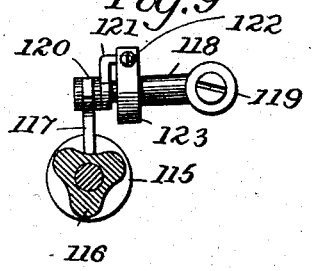


Fig. 9



Inventor,

John M. Joy

Witnesses
J. G. Hinkel
Thos. Gilman, Jr.

By Foster Freeman Attorneys.

UNITED STATES PATENT OFFICE.

JOHN M. JOY, OF NEW YORK, N. Y., ASSIGNOR TO THE PRINTING TELEGRAPH NEWS COMPANY, OF SAME PLACE.

PRINTING-TELEGRAPH RECEIVER.

SPECIFICATION forming part of Letters Patent No. 676,137, dated June 11, 1901.

Application filed September 20, 1900. Serial No. 30,580. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. JOY, a citizen of the United States, residing at New York city, in the State of New York, have invented certain new and useful Improvements in Printing-Telegraph Receivers, of which the following is a specification.

My invention relates to printing-telegraph receivers of the class known as "page-printers;" and it has for its object to provide an improved and simplified apparatus which is capable of working at a high rate of speed with the minimum of power and which is compact and not liable to get out of order; and to these ends my invention consists in a printing-telegraph receiver embodying various features of construction and arrangement of parts having the general mode of operation substantially as hereinafter more particularly set forth.

Referring to the accompanying drawings, wherein I have illustrated a preferred embodiment of my invention and sufficient to enable those skilled in the art to make and use the same, Figure 1 is a front elevation of the receiver. Fig. 2 is a plan view thereof. Fig. 3 is a vertical transverse section on the line 3 3, Fig. 2. Fig. 4 is an enlarged detail side view of the feeding escapement and connections. Fig. 5 is a plan view of the same. Fig. 6 is an enlarged end view of the type-selecting escapement and connections. Fig. 7 is an enlarged detail view of one form of means for propelling the type-wheel and for moving the sheet of paper to form a line-space and connections. Fig. 8 is a plan view of the same, and Fig. 9 is a detail sectional view showing the preferred construction of the clutch.

As above indicated, the principal objects of my invention are to provide a printing-telegraph receiver adapted to print lines transversely of a page of paper or other suitable material and to provide one which is simple while strong of construction, that can be operated with a minimum of power and at a high rate of speed, and one that is practically useful in connection with the distribution of news from a central station, there being preferably a number of such receivers arranged on a single circuit and distributed over a large area at considerable distances from each other, and in order to make a practical instrument for this purpose it is evident that the receiver must be capable of performing its operations constantly and accurately without the necessity of the attendance of a skilled operator, and it must be so constructed as not to be liable to derangement by unskilled persons who may make use of the instrument.

Referring to the accompanying drawings, there is a suitable base 1, which may be supported in any suitable way, as on a case, and connected to the base are suitable upright standards 3 4, supporting the main operative parts of the machine, and arranged intermediate these standards are subsidiary standards 5 6. Mounted in the standards 3 and 6 is a shaft 7, forming or carrying a roller-surface 8, which is preferably of rubber or similar material, and mounted on this shaft are hangers or supports 9, in which is mounted the roller 10, constituting one of the feed-rollers, and also mounted in these supports is the platen or printing-roller 11, it being adjustably mounted with relation to the feed-roller 10 in any suitable way, and in the present instance I have shown it supported in suitable bearing-blocks 12, having pins 13 entering the supports 9 and preferably having a spring 14 tending to hold the platen or printing-roller in elastic contact with the feed-roller 10. There is also mounted and supported in the blocks 12 a small guide-roller 15 for the free end of the paper. The rollers 10 and 11 are preferably geared together, as by pinions 16 17, at one end, and the other end of the platen or printing roller is provided with a ratchet-wheel 18, with which engages a pawl 19, mounted on an arm 20, pivotally mounted on the shaft of the printing roller or platen 11, and this pawl is adapted to be operated in a manner hereinafter described to rotate the rollers to feed the paper to make the proper line-space. Any other suitable paper-carriage or support for the paper and means for feeding the same may be used, that illustrated being found convenient and practicable.

In order to support the supply of paper to be printed, in the present instance I have

shown a reel 21, mounted in the standards 3 and 6, although any other well-known support for the supply may be used.

Mounted adjacent to the paper-carriage and, as shown, in the standards 3 and 4 is a type-wheel shaft 22, and this shaft may be of any desired construction; but preferably it is provided with two inclined sides 23 23 and one curved side 24, and mounted to slide on this shaft is a type-wheel 25, the hub 26 of which is provided with an opening fitting the type-wheel shaft 22, so that the type-wheel will be rotated with the shaft, but is permitted to slide longitudinally on the shaft, and any suitable means may be used for producing these motions of the type-wheel. Preferably, however, the type-wheel shaft 22 is under a constant stress tending to rotate the same in a certain direction, and this tendency to rotate is regulated by suitable means, as an escapement, and in the present instance I have shown an improved escapement or what is more properly termed a "double wheel-escapement," by means of which I am enabled to increase the speed of rotation of the type-wheel shaft and at the same time accurately control it to bring any desired letter into printing position. This escapement is adapted to be controlled by variations in the current transmitted over the main line, and in this double escapement I have so arranged the parts that the escapement is controlled by currents of varying polarity, although, of course, it can be controlled by any other suitable variation of the current impulses. Mounted on the type-wheel shaft 22 are two escapement-wheels 27 28, and while these may be mounted in any suitable way I have shown them, for convenience of manufacture and adjustment, as mounted on a sleeve 29, which is secured to the type-wheel shaft in any suitable way, as by a set-screw 30. This construction of the escapements I find exceedingly desirable, as they are thus made in one piece, and their relations to each other are thus accurately maintained, and they can easily and quickly be adjusted or removed from the type-wheel shaft in case of necessity. These wheels are provided with suitable teeth 31 32, and the teeth on one wheel, as the teeth 31, are arranged around the periphery of the wheel 27 at suitable distances apart, while the teeth 32 on the wheel 28 are arranged closer together and in proper relations with the teeth 31. While these relations may be varied and there may be any desired number of teeth on both wheels, depending primarily upon the number of characters on the type-wheel and the rate of speed at which it is rotated, in the present instance I have arranged on the wheel 27 ten teeth, and on the wheel 28 there are thirty-eight teeth. Each of these wheels is provided with a suitable escapement, and it will be observed that when the escapement coöperates with the wheel 27 the type-wheel shaft can be stopped at ten different points of rotation, and when the escapement operates with the escapement-wheel 28 the wheel can be stopped at any one of thirty-eight positions in its circumference on rotation of the type-wheel. Furthermore, when the two escapements operate together or are successively in connection with the two wheels 27 28 one escapement can be used to control the rotation of the type-wheel shaft in comparatively long steps or spaces by means of the teeth 31, and then by bringing into operation the other escapement the rotation of the type-wheel shaft to any position intermediate those controlled by the escapement-wheel 27 can be effected by the escapement-wheel 28. In this arrangement of course it will be understood that the teeth 31 may be arranged around the periphery of the wheel 27 in any desired order, and they need not necessarily be equally spaced, and as a matter of fact in the present instance I have shown them (see Fig. 1) at varying distances apart, while I have shown the teeth 32 on the wheel 28 at equal distances apart, and they are so arranged that between the teeth corresponding to the teeth 31 on the wheel 27 there are generally three intermediate teeth 32; but, as before stated, this relation may be varied, that shown being one well adapted to the present purposes of the receiver. The purpose and object of this double-wheel escapement as thus described will be apparent to those skilled in the art, and if, for instance, starting from the zero position of the type-wheel, the wheel having thirty-eight printing characters on its periphery and it is desired to print the eighteenth character from zero, by operating the escapement in connection with the wheel 27 four impulses of the current or four movements of the escapement will permit the type-wheel to rotate to a position to bring the sixteenth character into printing position, and then by operating the escapement in connection with the wheel 28 two impulses will bring the eighteenth character into printing position, and it will thus be seen that instead of requiring eighteen separate and distinct impulses or operations of the escapement to bring the eighteenth character into printing position by the use of my improved double-wheel escapement it requires only six impulses or operations of the escapement to attain the same result, and it is apparent that in this manner the speed of operation of the type-wheel to bring it into successive printing positions is very greatly increased, while its operation is more positive and accurate. It will also be observed that this has additional advantages aside from the mechanical ones, in that the number of impulses when the escapements are electrically controlled are largely reduced and they can be more readily adjusted and are less liable to interfere with each other. Again, the shaft being under constant stress the work of rotating the wheel is entirely independent of the escapement, the electric currents being used simply to control the es-

capement to release the escapement-wheels and allow them to rotate under the influence of a separate power. Other advantages of this double-wheel escapement might be pointed out; but they will be apparent to those skilled in the art and need not be recited. Of course it will be understood that this double-wheel escapement can be used in various other connections than those shown, and it may be used in connection with a type-wheel which continuously rotates in one direction; but I have found it preferable in instruments of this class to so arrange the parts that the type-wheel after each impression is made will be automatically restored to its normal or zero position, so that in adjusting each character on the type-wheel to printing position the wheel is rotated from its normal or zero position to the proper position to bring the desired character into printing position. While various means may be used to accomplish this result, in the present instance I have shown a suitable stop or unison device comprising a projection 33 on the extended hub of the sleeve 29 and a pivoted arm 34, mounted on a bell-crank lever 35, pivotally mounted on a stud 36. The arm 34 is also provided with a pin 37, which is adapted to engage a screw-thread 38 on the hub of the sleeve 29, so that when the pin rests in this screw-thread and the hub rotates the arm 34 will be thrown outward to bring it into the path of rotation of the projection 33, so that said projection will impinge upon the end of the said arm 34 and the rotation of the type-wheel shaft be stopped. Normally this pin 37 engages the thread 38; but means are provided whereby it can be thrown out of engagement with the thread to allow the type-wheel shaft to rotate after being stopped thereby. In the present instance the bell-crank lever 35 is adapted to be moved by the escapement so as to raise the arm 34 upward and disengage the pin 37 from the screw-thread 38, and at the same time a spring 39 will move the arm 34 laterally out of the path of the projection 33. This unison movement need not be further described, as its general principles of construction and operation are well understood by those skilled in the art, and any other suitable unison mechanism may be adopted, it only being necessary to provide some suitable means which shall hold the type-wheel and its shaft at a normal or zero position and which shall release the shaft as soon as the escapement commences to operate and which shall interpose to stop the shaft at its zero position after the printing operation is completed and the shaft released.

As above indicated, any suitable escapement may be used in connection with the escapement-wheels; but I have shown escapement pallets or detents 40 and 41, mounted on suitable arms 42 43, which arms in the present instance carry armatures 44 45 as a part thereof, and each arm, with its pallet, is supported upon a spring 46, which is vertically adjustably mounted in a socket 47, which socket is rotatively adjustably mounted in one of the adjacent standards. In the present instance I have shown the socket as provided with an adjusting-screw 48 for controlling the vertical adjustment of the escapement-arm and as having a rounded lateral extension 49, fitting an opening in the standard 4 or 6, as the case may be, and adjustably secured by a set-screw 50. Also mounted in an extension 51 of the standard 4 are adjustable stops 52, opposite the upper portion of each arm, to control or limit the vibration of the arm, and the arms are so adjusted in their sockets or carriers as to normally bear against these adjusting-screws, while being normally out of engagement with the teeth of the respective wheels. There are also suitably mounted, as on an arm 53, extending from the standard 4, suitable stops 54, which serve to limit the movement of the escapement-arms when the pallets are brought into operative position in connection with the ratchet-teeth. With this construction a very accurate and delicate adjustment of the escapement arms and pallets can be obtained and the arms adjusted to operate under varying strengths of current and with a relatively slight movement without affecting the accuracy of the adjustment.

When a unison device like the one above described is used, one convenient way of operating it is by means of a bell-crank lever 55, mounted on a rod 56, supported in the standard 4, to which bell-crank lever are connected pins 57, conveniently sliding through openings in the arm 53 and held in a position adjacent the escapement-arm, and this arm may be provided with an adjusting-screw 58, so that when the arm is moved toward the escapement-wheel this screw will impinge upon the pin 57, move the bell-crank lever 55, and raise the unison-arm 34 in the manner before described. As above indicated, these escapement-arms are preferably operated electrically, and I have shown magnets 59 and 60 as suitably supported by the standards 4 and 6, respectively, with their pole-pieces adjacent the respective armature portions 44 45 of the escapement-arms. Any suitable arrangement of circuits may be used in connection with these magnets, so that they may operate and their operations be controlled by proper impulses sent over the line. For instance, these magnets might be permanent polarized magnets; but in actual practice I preferably utilize magnets with soft-iron cores and polarize them by suitable coils connected to a suitable source of current, and in the present instance I have shown the poles of the magnets as provided with two sets of coils, one set, as 61, being connected with some source of current—as, for instance, the current which supplies the motor hereinafter described—it being only necessary that when the machine is in operation there shall be a constant current flowing through these coils to polarize

the respective cores, and thes ecoils are so wound or the circuits so connected that the cores of one magnet, as 59, will be polarized so that their ends adjacent to the armature will be N, while the ends of the cores of the magnet 60 will be polarized so that their ends adjacent to the armature will be S. Also mounted on the cores are other coils 62, connected in the line-circuit, but over which the impulses are sent for operating the receiver, and these coils are so wound on the respective magnets that when, for instance, a positive current is sent over the line it will strengthen the N pole of one of the magnets and weaken the S pole of the other magnet, and when, vice versa, a negative impulse is sent over the line it will weaken the N pole of one magnet and strengthen the S pole of the other magnet. I deem it preferable to thus arrange the magnets, as I am enabled to very delicately adjust the escapement-arms, so that with no current from the line they will impinge upon their front stops 52, and a very slight current will operate them to control their escapement-wheels and move them in contact with their back-stops, and while this particular arrangement is deemed preferable it is understood that my invention is not limited thereto.

Some suitable means must be provided for moving the type-wheel on the type-wheel shaft in proper position to print the letters in lines, and while various means may be used in connection with the other devices already described I have shown a worm-shaft 63, suitably supported in the standards 3 and 6, and mounted on this shaft is a type-wheel mover 64, comprising a screw-threaded sleeve having arms 65 extending upward on each side of the hub 26 of the type-wheel, so as to move said type-wheel longitudinally on its shaft 22, and I preferably provide the arms 65 with pins 66, adapted to bear on the periphery of the hub, so as to prevent the arms from impinging upon the type-wheel shaft 22. Some suitable means for rotating this worm-shaft 63 must be provided, and in the present instance I have shown means for putting it under constant stress, which will hereinafter be described, and I have shown an escapement device for controlling its rotation. Thus, referring more particularly to Figs. 3 and 4, there is mounted on the shaft 63 an escapement-wheel 67, in this instance provided with three teeth 68, and the screw is cut with a proper pitch to move the type-wheel the desired distance for each letter at each one-third of a rotation of the worm-shaft 63. Of course any other relation of movement can be adopted and the escapement-wheel be properly adjusted to produce the desired result. Coöperating with this escapement-wheel is an escapement-lever 69, having a pallet or detent 70, and this lever is suitably mounted, as on a shaft 71, supported in the standard 3 and in a bracket 72, and in this instance carries the armature 73 of the magnet 74, and I have provided an adjusting-spring 75, connected to an adjusting-screw 76 in a stud 77, for holding the escapement-lever in its normal position, which is with its pallet 70 in the path of or in contact with one of the teeth 68. There may be a suitable adjusting-screw 78, mounted in a stud 79, for limiting the free or forward movement of the escapement-lever 69. With this arrangement it will be seen that when the magnet 74 is energized the armature 73 is attracted, the shaft 71 rocked, and with it the escapement-lever 69, so as to disengage the pallet 70 from the tooth 68, and the worm-shaft 63 is allowed to rotate under the power applied thereto; but the spring 75 will retract the escapement-lever 69 as soon as the magnet 74 is deënergized, so as to bring the pallet 70 into the path of the next succeeding tooth 68. This is the operation when it is desired to feed the type-wheel forward step by step to print the succeeding letters of the line; but when it is desired to retract the type-wheel or bring it to its normal position at the beginning of a line the worm-shaft is rotated in the reverse direction by suitable means hereinafter described, and in order to permit this the magnet 74 is energized and held energized, which will withdraw the pallet 70 out of the path of the teeth 68, so that the worm-shaft 63 can rotate continuously until the type-wheel mover 64 and the type-wheel 25 are brought to the proper positions, ready to print at the beginning of the new line. Of course it is desirable to move the sheet of paper a further line-space when the type-wheel is thus retracted, and while various means may be used to accomplish this purpose I have shown the type-wheel mover 64 as provided with a friction-roller 80, on one side adapted to engage with an arm 81, bent in the form of a screw with a long pitch, and secured to a disk 82 at one end and to a collar 83 at the other end of a rod 84, which is mounted in the standard 5. Connected to move with the rod 84 is a link 86, and this is connected with the arm 20 by a link 87, so that when the bent arm 81 is rotated the arm 20 will be lifted, carrying the pawl 19 into engagement with the ratchet-wheel 18, and the rollers 10 and 11 will be rotated to feed the paper the required distance, ready for a new line.

In order to effect the printing of the desired letter when the type-wheel is in proper position, various connections can be made, and in the present instance I have shown as mounted on the worm-shaft 63 a cam-wheel 88, having three cam projections 89, adapted to impinge upon a lever 90, fast on the shaft 7, carrying the platen or printing-roller, so that it is moved forward, and with it the paper, and the proper impression is made from the type-wheel. This shaft 7 is normally under stress to hold the platen or printing-roller in proper position opposite the type-wheel, and in this instance I have shown a lever 91, fast on the shaft 7, under the stress of a spring 92, and

there is an adjusting-screw 93 in a projection 94 of the standard 3, which controls the upward movement of the printing-roller.

Some suitable means must be provided for operating the type-wheel shaft and the worm-shaft, and while these means may vary I have shown an electric motor 95, the armature-shaft 96 of which may be extended upward or connected to a vertical shaft 97, having a bearing in a projection 98 on the standard 3 and adapted to be rotated by said electric motor. Also mounted in said projection 98 and in a similar projection 99 is a shaft 100, and interposed between this shaft and the type-wheel shaft 22 are bevel-gears 101 102, intermeshing with each other and adapted to rotate the type-wheel shaft. Mounted on the shaft 100 is a spur-gear 103, and this engages a spur-pinion 104, which is frictionally mounted on the shaft 97, so as to be under stress of rotation from said shaft. Different means for thus frictionally mounting the pinion may be employed, and I have shown a collar 105, fixed to the shaft against which the pinion bears, there being a spring 106 interposed between the collar 107, which also bears on the pinion, and an adjustable collar 108, by means of which the tension of the spring 106 can be regulated. This I have found a simple and efficient friction mechanism, which can be delicately adjusted and which is sufficient to furnish power to drive the type-wheel shaft when released by the unison mechanism or escapements or both.

Mounted on the shaft 97 is a bevel-pinion 109, adapted to engage each of the bevel-pinions 110 and 111, loosely mounted on the worm-shaft 63. The pinion 109 is also frictionally mounted on the shaft 97, there being a collar 112, with a spring 113 interposed between it and an adjustable collar 114. Also mounted on the worm-shaft 63 is a clutch 115, it being splined or otherwise connected to the shaft, so as to move longitudinally thereon, but to rotate with the shaft. This clutch is adapted to engage with complementary clutch devices on either the bevel-pinion 110 or 111 according to its position on the shaft, and thus to rotate the worm-shaft in one or the other direction. The clutch 115 in this instance comprises a cam portion 116, having three cam projections and corresponding recesses. Arranged to bear on this cam is an arm 117, pivotally connected to an arm 118, mounted on a stud 119, attached to the standard 3, and it is manifest that as the arm 117 passes alternately over the recesses and projections on the cam the arm 118 will be lifted and lowered. The arm 117 is connected rigidly to another arm 120, forming practically a bell-crank or rocking lever, and also connected to this rocking lever is a projection 121, extending between adjusting-screws 122 in a yoke 123, fixed on the arm 118. Mounted on the bevel-gear 102 is a pin 124, which when in the position shown in Fig. 7 is in the line of upward movement of the arm 120. Also connected to the clutch is a rod 125, the forward end of which, as shown, extends over and adjacent to the disk 82 in a position to be struck by the type-wheel mover 64 as it is retracted to its position to begin the printing of a new line.

Such being the construction of the device, I will now briefly describe its mode of operation, and it will be understood that the receiver is used in connection with some suitable transmitting apparatus adapted to send impulses over the line of different polarity.

The normal position of the parts after the paper has been properly applied to the paper-carriage is with the type-wheel at the proper position to commence the line and the projection 33 against the arm 34 of the unison mechanism, and both the type-wheel shaft and worm-shaft are under stress tending to rotate them; but the worm-shaft is held by its escapement-lever 69. The first impulse over the line may, for instance, be a positive impulse, and this would energize the magnet 60, which moving the escapement-arm 43 would, through the medium of the pin 57, operate the bell-crank lever 55 to lift the arm 34 of the unison mechanism out of engagement with the projection 33 and allow the type-wheel shaft to rotate until the pallet of the escapement comes in contact with the first tooth on its escapement-wheel. Of course whether the magnet 59 or 60 would first be energized would depend upon the letter to be printed. For instance, if it were desired to rotate the type-wheel only through a space corresponding to two or three letters the magnet 59 would be operated by a negative impulse or series of impulses. When the type-wheel has thus rotated to the desired position, the last impulse (whether positive or negative, as the case may be) is increased in strength, so that the magnet 74 is energized, rocking the shaft 71, releasing the pallet 70 from the escapement-wheel 67, and allowing the worm-shaft to rotate through a partial rotation sufficient to feed the type-wheel the distance of a letter-space. Just before or at the end of this partial rotation of the worm-shaft the printing-platen is moved through the medium of the cam-wheel 88 to effect the printing, the printing of the letter practically being done just after the type-wheel has been advanced. After the type-wheel has moved to its new position the current is broken, the magnet 74 deënergized, and of course the escapements fall back to their normal positions, releasing the type-wheel shaft, and this is rotated to bring the type-wheel to its zero position or until the arm 34 of the unison device engages the projection 33 and the type-wheel is brought to rest. Another letter or letters will be printed in the same manner and through the same set of operations until it is desired to retract the type-wheel and bring it to a position to commence a new line. A current impulse or series of current impulses then operates one or the other or both

of the escapement-arms 42 43 to rotate the type-wheel to a position to bring the blank-space, which may be called the "retracting-space," opposite the printing-roller, and this also brings the pin 124 directly over the arm 120, and then the magnet 74, being energized by the last impulse, (which must be prolonged,) removes the pallet 70 from engagement with the escapement-wheel 67, and the worm-shaft at that moment commences to rotate in the direction to feed the type-wheel to the right; but as soon as one of the cam projections 116 impinges on the arm 117 the arm 118 is raised and the arm 120 impinges on the pin 124, shifting the clutch 115 into the position shown in Figs. 7 and 8, and then the worm-shaft rotates in the reverse direction to feed the type-wheel to the left. As soon as the type-wheel reaches its proper position the type-wheel mover 64 impinges on the rod 125 and disengages the clutch from the pinion 111 and causes it to engage with the pinion 110 on the opposite side, and the type-wheel mover 64 impinges against the face of the disk 82, which acts as a positive stop therefor, so that the vertical alinement of the printed lines will be accurate or the starting-point of each line will be in the same relative position with relation to the paper. As soon as this is done the magnet 74 is deënergized and one or the other of the magnets 59 60 operated by proper impulses to bring another letter into printing position. It may be remarked here that the relation of the pallet 70 with the teeth 68 of the escapement-wheel 67 is such that when the worm-shaft is held stationary the arm 117 is at the lowest part of one of the recesses in the cam 116, so that the arm 118 is not rocked and the clutch remains in engagement with the pinion 110 until the end of the line is reached or it is desired to retract the type-wheel and the type-wheel is set in its retracting position.

It will be observed by those skilled in the art that the construction illustrated and described is relatively very simple and that the receiver can operate with a minimum power and at high speed. The use in this connection of the so-called "double-wheel escapement," as above described, conduces to accomplish these results to a large degree. So too the arrangement and adjustment of the parts are such that but a minimum amount of movement is required to accomplish the desired results, either in the escapements or in the adjustment of the printing-wheel. Furthermore the means for retracting the printing-wheel are exceedingly simple and positive in their nature and avoid the use of a retracting force which has to be overcome by a superior force in feeding the type-wheel step by step to printing position, which entails complicated mechanism and a greater expenditure of power. It will further be observed that the arrangement of the worm-shaft or the type-wheel-feeding shaft is in close proximity to the type-wheel, avoiding the use of a heavy type-wheel carrier, the type-wheel mover being very light and easily movable on the worm-shaft to the exact distance desired to attain good alinement or spacing. I have also found it a great advantage to allow the worm-shaft to move but one-third of a rotation for each movement of the type-wheel mover, as this avoids the liability of breaking or distorting the parts, which are stopped and started at short intervals.

Having thus described the construction illustrated in the drawings and pointed out its mode of operation, what I claim is—

1. In a printing-telegraph receiver, a type-wheel adapted to be rotated and moved longitudinally on its shaft, means for rotating said shaft, and a double-wheel escapement controlling the rotation of said shaft, substantially as described.

2. In a printing-telegraph receiver, a type-wheel adapted to be rotated and moved longitudinally on its shaft, means for rotating said shaft, a double escapement comprising two escapement-wheels having teeth at varying distances apart, and escapement-detents coöperating with said teeth, substantially as described.

3. In a printing-telegraph receiver, a type-wheel adapted to be rotated and moved longitudinally on its shaft, means for rotating said shaft, a double escapement comprising two escapement-wheels each having teeth but arranged at different distances apart, and two independent detents controlling the escapement-wheels, substantially as described.

4. In a printing-telegraph receiver, a type-wheel adapted to be rotated and moved longitudinally on its shaft, means for rotating said shaft, a double escapement comprising two escapement-wheels one provided with teeth corresponding to the characters on the type-wheel and the other having teeth corresponding to a lesser number of characters on the type-wheel, and escapement-detents cooperating with the teeth, substantially as described.

5. In a printing-telegraph receiver, a type-wheel adapted to be rotated and moved longitudinally on its shaft, means for rotating said shaft, a double escapement comprising two escapement-wheels having a varying number of teeth, two independent detents, and means for actuating each detent independently of the other to control the movements of the type-wheel, substantially as described.

6. In a printing-telegraph receiver, a type-wheel adapted to be rotated and moved longitudinally on its shaft, means for rotating said shaft, a double escapement comprising two escapement-wheels having a varying number of teeth, two independent detents each actuated independently of the other to control the movement of the type-wheel, and electromagnets adapted to be actuated by currents of opposite polarity to operate said detents, substantially as described.

7. In a printing-telegraph receiver, a type-wheel adapted to be rotated and moved longitudinally on its shaft, means for rotating the shaft, a double escapement comprising two escapement-wheels, and detents cöoperating with the escapement-wheels, one of said detents and escapement-wheels being adapted to allow the shaft to turn through a greater distance than the other at each operation of the escapement, substantially as described.

8. In a printing-telegraph receiver, a type-wheel adapted to be rotated and moved longitudinally on its shaft, means for rotating the shaft, a unison device for holding the type-wheel in its zero position, a double escapement controlling the movement of the shaft, and means connected to be operated by the escapement for releasing the unison device, substantially as described.

9. In a printing-telegraph receiver, a type-wheel adapted to be rotated and moved longitudinally on its shaft, means for rotating the shaft, a unison device for holding the type-wheel in its zero position, a double escapement controlling the movement of the shaft, and means connected to be operated by either or both of the escapement-arms for releasing the unison device, substantially as described.

10. In a printing-telegraph receiver, a type-wheel adapted to be rotated and moved longitudinally on its shaft, means for rotating the shaft, a double escapement controlling the rotation of the type-wheel shaft, a worm-shaft, means for rotating it in opposite directions, a type-wheel mover mounted on the worm-shaft for moving the type-wheel longitudinally on its shaft, an escapement controlling the movement of said worm-shaft, and magnets for operating the two escapements, the magnets being arranged so that the worm-shaft escapement is operated by a current of greater strength, substantially as described.

11. In a printing-telegraph receiver, a type-wheel adapted to be rotated and moved longitudinally on its shaft, means for rotating the shaft, a double escapement controlling the rotation of the shaft, a unison device for holding the type-wheel in its zero position, a worm-shaft, means for rotating it in opposite directions, an escapement controlling its rotation, a type-wheel mover mounted on the worm-shaft, and means for reversing the rotation of the worm-shaft said means being controlled by the double escapement, the escapement first operating to release the unison device and set the type-wheel shaft in its proper position, substantially as described.

12. In a printing-telegraph receiver, a worm-shaft, means for rotating the shaft in opposite directions, an escapement-wheel mounted on the shaft, an escapement-lever coöperating with said escapement-wheel controlling its rotation in one direction step by step, and means for holding said escapement-lever out of the path of the escapement-wheel to allow the worm-shaft to revolve freely in the reverse direction, substantially as described.

13. In a printing-telegraph receiver, a worm-shaft, means for rotating it in opposite directions, an escapement-wheel mounted on the shaft, a cam-wheel, an escapement-lever cooperating with said escapement-wheel, a type-wheel mover mounted on the worm-shaft, and a cam also mounted on said shaft adapted to operate the printing mechanism, substantially as described.

14. In a printing-telegraph receiver, a type-wheel-mover shaft, a motor-shaft, frictional connections between the two shafts, and a clutch connected to the type-wheel-mover shaft and adapted to be shifted to rotate the shaft in opposite directions, substantially as described.

15. In a printing-telegraph receiver, a type-wheel-mover shaft, a type-wheel mover mounted thereon, a motor-shaft, frictional connections between the two shafts, a clutch mounted on the type-wheel-mover shaft, and connections operated by the type-wheel mover to control the position of the clutch, substantially as described.

16. In a printing-telegraph receiver, a worm-shaft, a type-wheel mover mounted thereon, a motor-shaft, connections between the two shafts, a clutch mounted on the worm-shaft, and a rod connected to the clutch and extending into the path of movement of the type-wheel mover, substantially as described.

17. In a printing-telegraph receiver, a type-wheel shaft, a worm-shaft, a type-wheel mover mounted on the worm-shaft, a motor-shaft, connections between the motor-shaft, the type-wheel shaft and worm-shaft, a clutch on the worm-shaft, and means interposed between the worm-shaft and type-wheel shaft for moving the clutch, substantially as described.

18. In a printing-telegraph receiver, a type-wheel shaft, a worm-shaft, a type-wheel mover mounted on the worm-shaft, a motor-shaft, connections between the motor-shaft, the type-wheel shaft and worm-shaft, a clutch on the worm-shaft, a cam connected with said clutch, a rocking arm operated by said cam, and a pin on the type-wheel shaft adapted to engage said rocking arm to shift the clutch, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN M. JOY.

Witnesses:
JOHN H. GRANT,
M. F. GERMOND.