

J. E. WRIGHT.
 PRINTING TELEGRAPH RECEIVER.
 APPLICATION FILED JULY 24, 1914.

1,171,379.

Patented Feb. 8, 1916.
 9 SHEETS—SHEET 1.

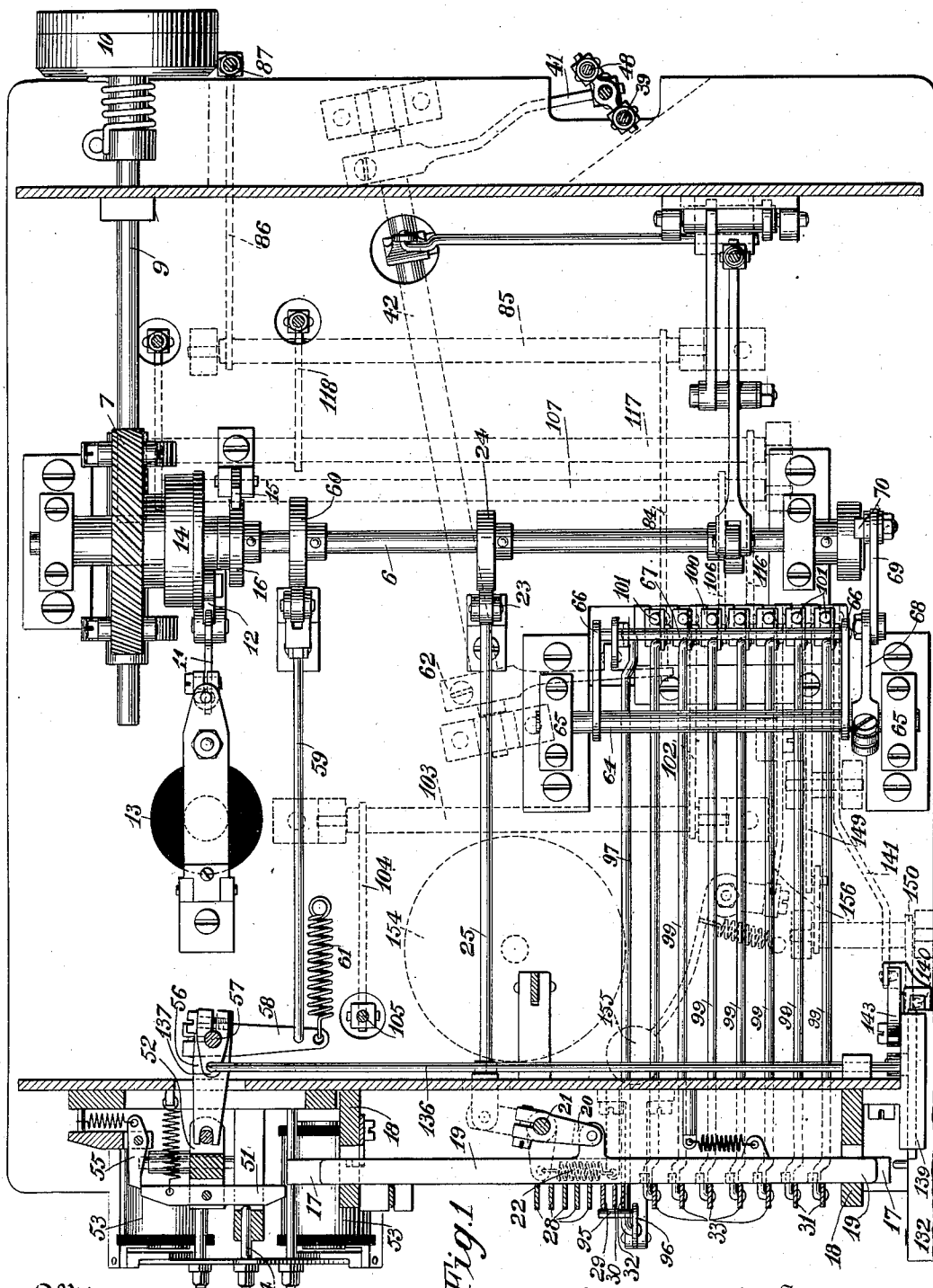


Fig. 1

Witnesses:
Raphael Ketter
Thomas J. Byrne

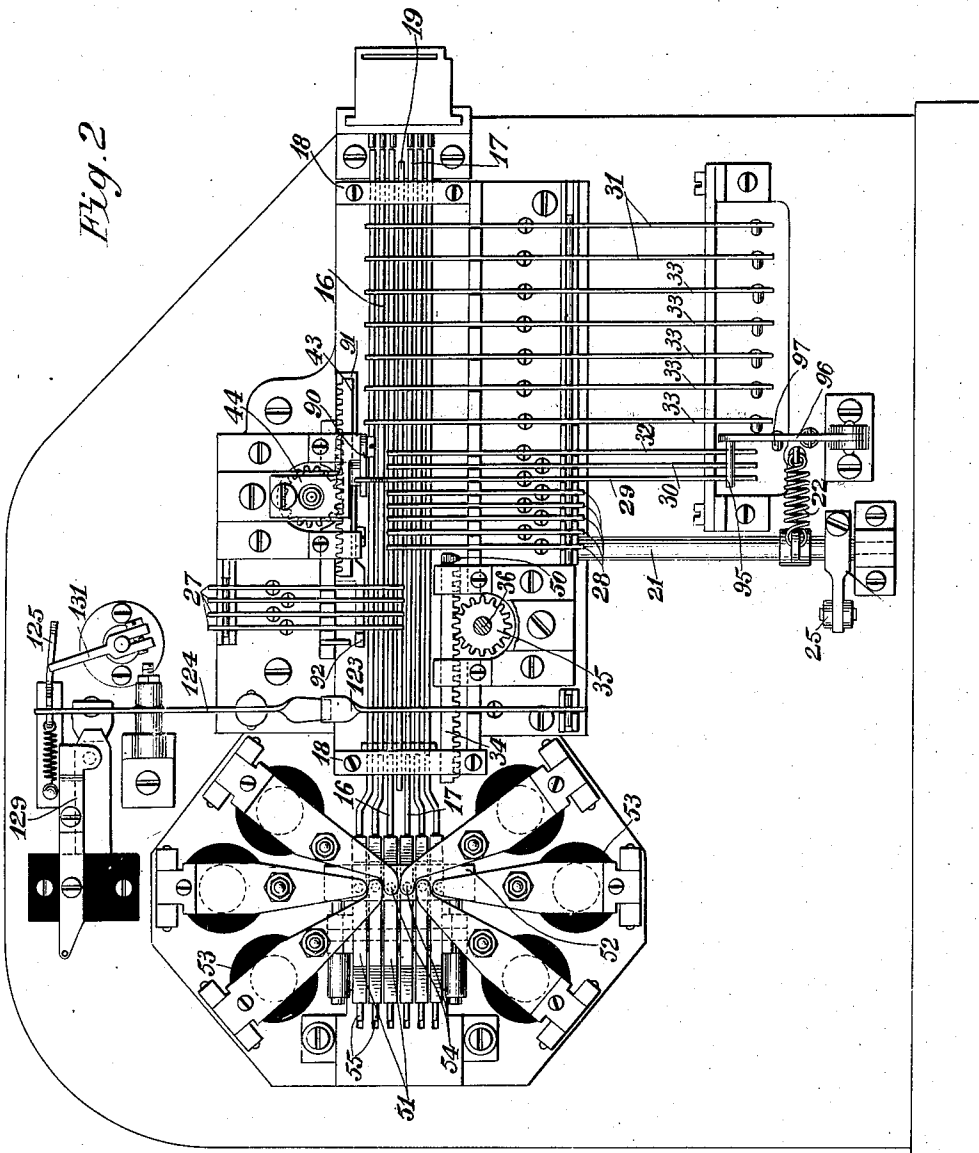
John E. Wright, Inventor
 By his Attorneys
Nerr, Page, Cooper & Hayward

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9 SHEETS—SHEET 2.

Fig. 2



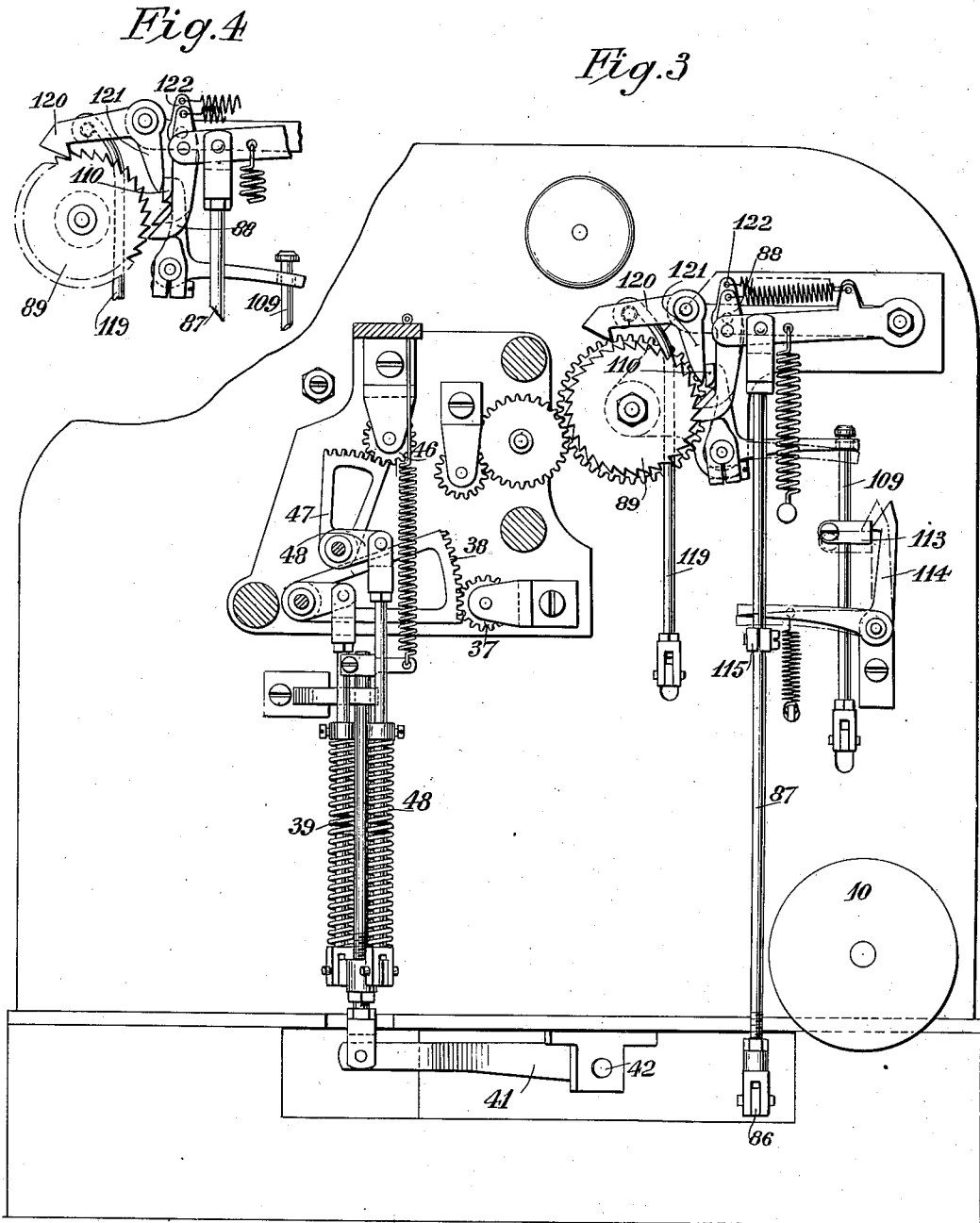
Witnesses:
Raphael Better
Thomas J. Byrne.

John E. Wright, Inventor
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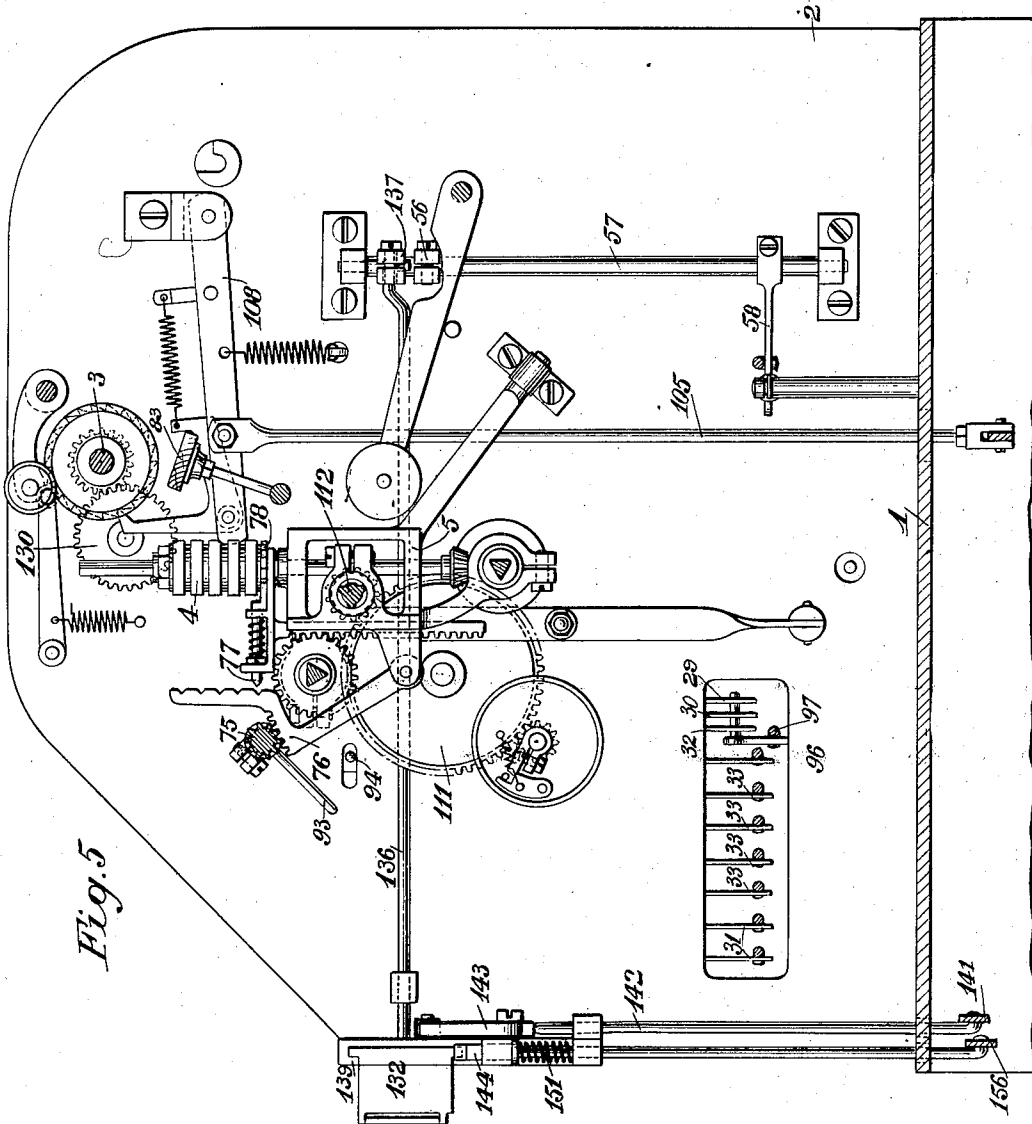


Fig. 5

Witnesses:
 Raphael better
 Thomas J. Byrne.

John E. Wright, Inventor
 By his Attorneys
 Messrs. Page, Cooper & Hayward

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9 SHEETS—SHEET 5.

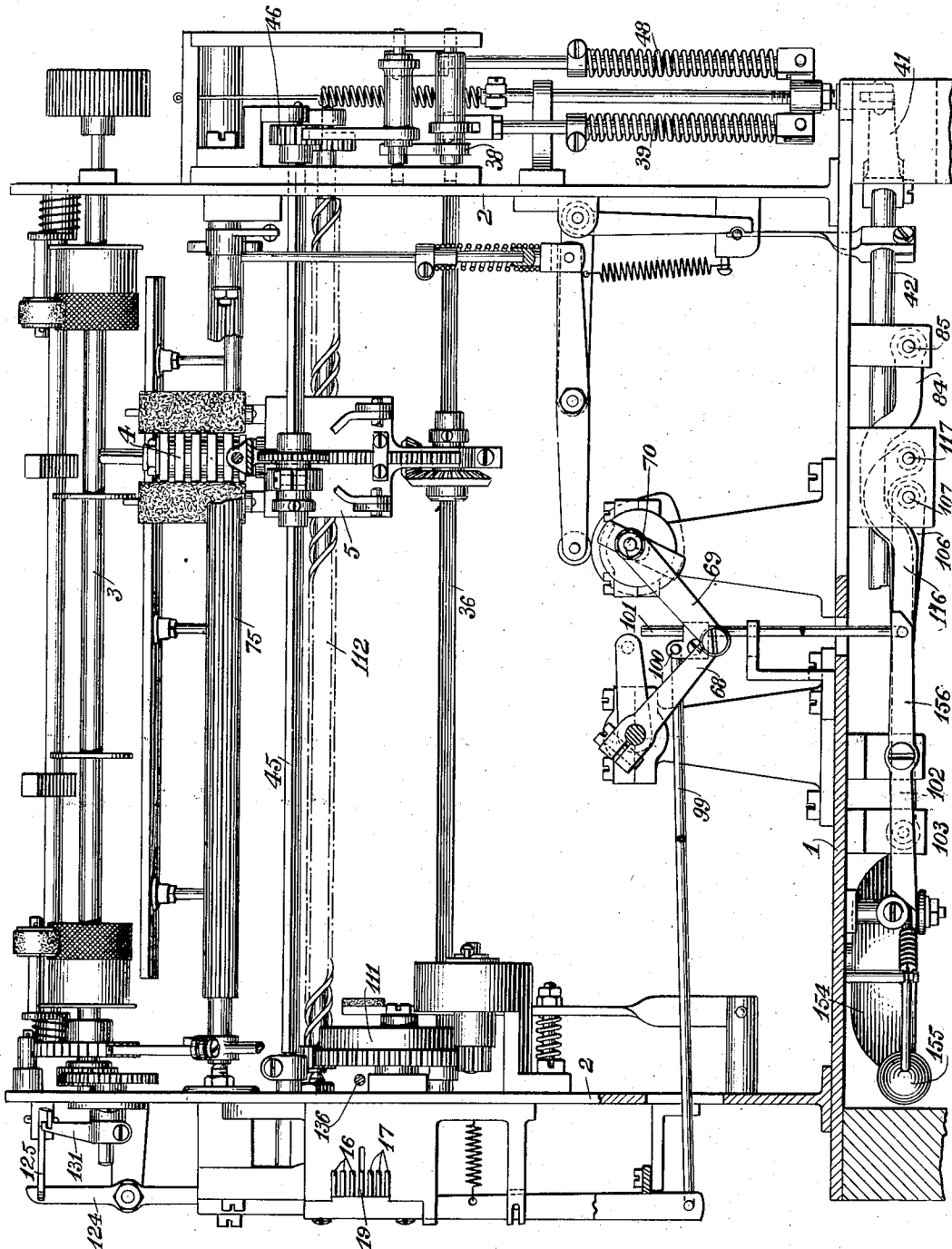


Fig. 6

Witnesses:
Raphael Ketter
Thomas J. Byrne

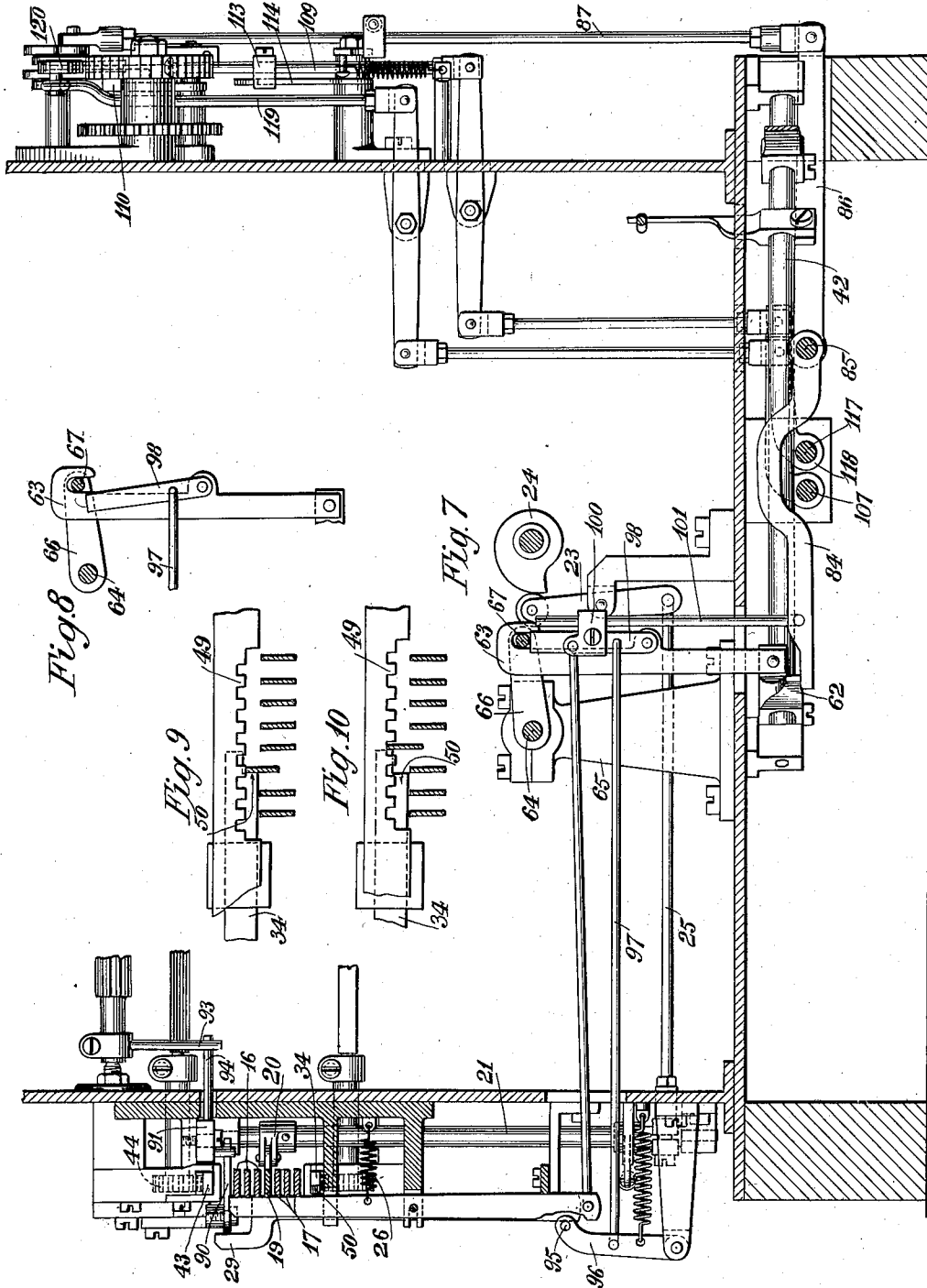
John E. Wright, Inventor
 By his Attorneys
Kerr, Page, Cooper & Hayward.

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Witnesses:
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 Thomas J. Byrne

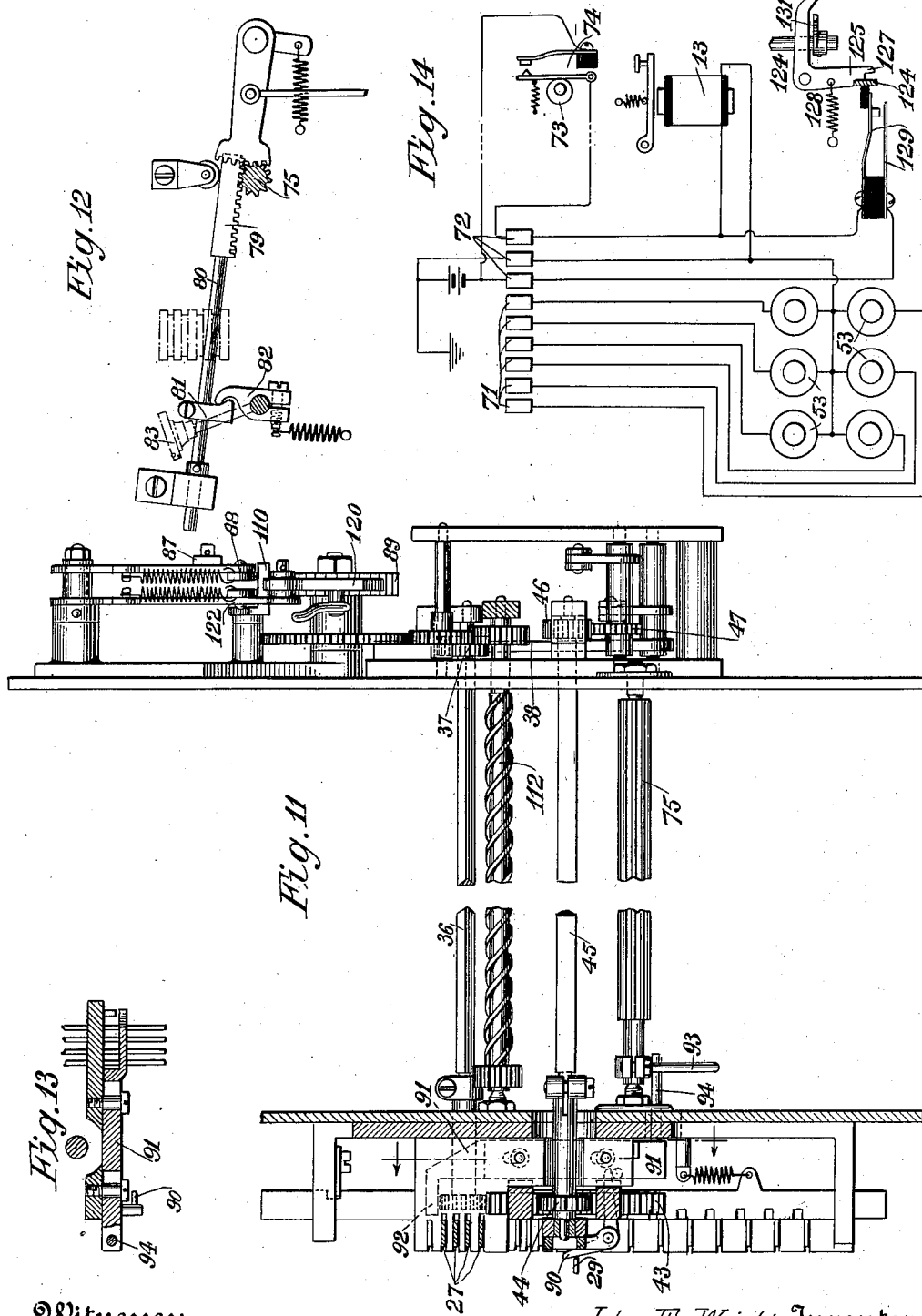
John E. Wright, Inventor
 By his Attorney
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9 SHEETS—SHEET 7.

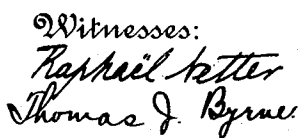


Witnesses:
Raphael Ketter
Thomas J. Byrne.

John E. Wright, Inventor
 By his Attorneys
Herr, Page, Cooper & Hayward

1,171,379.

9 SHEETS—SHEET 8.



John E. Wright, Inventor
By his Attorneys
Nere, Page, Cooper & Hayward.

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 9 SHEETS—SHEET 9.

Fig. 22

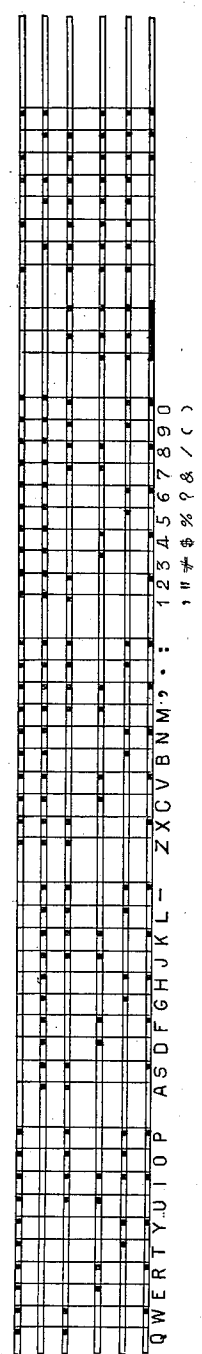


Fig. 20

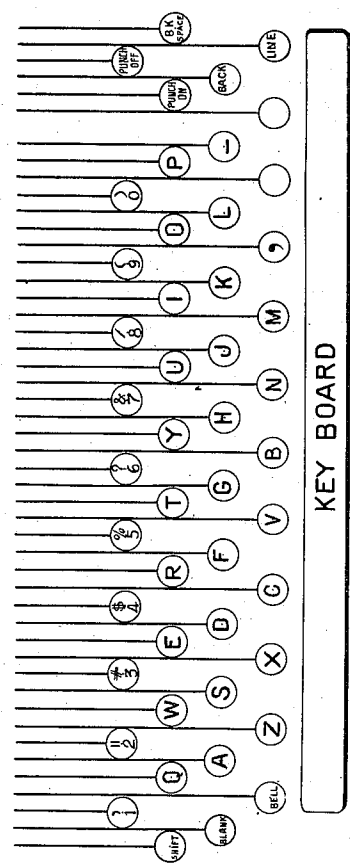


Fig. 21

Q	W	E	R	T	Y	U	I	O	P
A	S	D	F	G	H	J	K	L	-
Z	X	C	V	B	N	M	,	.	:
1	2	3	4	5	6	7	8	9	0
'	"	#	\$	%	&	'	(	)	

Witnesses:
Raphaël better
Thomas J. Byrne

John E. Wright, Inventor
 By his Attorneys
Heres Page, Cooper & Hayward

UNITED STATES PATENT OFFICE.

JOHN EDWARD WRIGHT, OF PITTSBURGH, PENNSYLVANIA.

PRINTING-TELEGRAPH RECEIVER.

1,171,379.

Specification of Letters Patent.

Patented Feb. 8, 1916.

Application filed July 24, 1914. Serial No. 852,807.

To all whom it may concern:

Be it known that I, JOHN E. WRIGHT, a citizen of the United States, residing at Pittsburgh, Allegheny county, Pennsylvania, have invented certain new and useful Improvements in Printing-Telegraph Receivers, of which the following is a full, clear, and exact description.

The subject of the invention which I am about to describe and claim in this application, is a printing telegraph receiver, an instrument which, receiving over a telegraph line a given impulse or group of impulses, is adjusted or set thereby in a certain definite condition, and, by means of suitable power-driven mechanism is caused, by reason of such adjustment, to print a character corresponding to such group of impulses, or to feed the type wheel, or the paper or to perform any other given operation which the group of impulses received may determine. I have shown and described in prior patents and applications, devices of this character, which in general, are constructed and designed to operate in substantially this manner, but in the present instance, I have not only introduced into the machine improvements which make for its greater speed and efficiency, but I have also added certain features which extend its usefulness by giving it certain other and novel functions, and make it capable of performing operations which no other machine of the kind, so far as I am aware, has ever been designed to effect.

In the class of machine to which that of the present application is most closely related, and which I have elsewhere described, I employ what I term a translator, which in general terms is a series of permutation bars or their equivalents and corresponding electromagnets, which latter receiving current impulses in varying order from a sun flower in the line or line-controlled local, operate, together with suitable actuating mechanism, to shift one or more or none of said bars, whereby certain corresponding levers, or their equivalents, are permitted to move into recesses formed by the alinement of notches in the bars, and to thereby determine the extent to which a type wheel is turned or lifted, or both, or to effect any other operation of the machine which may correspond to the lever or levers

which have thus moved from their normal position. In my present machine I employ a device of this character, but I combine all of the shifting permutation bars and moving levers in a single device, and with such device I employ a power-driven shaft that operates by means of cams and other connections to shift the type wheel horizontally and vertically according to the particular levers that have been permitted to move, and to perform such other operations as the moving levers may determine. These levers, for this purpose, may be regarded as belonging to one of three classes, first; those that determine the amount of horizontal movement of the type wheel; second, those that determine the extent of its vertical movement, and third; those which control other power-actuated devices for feeding the type wheel or the paper or performing any of the various other operations of which the device is capable. Given then, a certain number of permutation bars and magnets, and in practice, I use six of each, it is manifest that I may use with them a large number of movable or controlling levers, each capable of effecting, when permitted to swing into an alined series of notches in the bars, a different operation of the instrument. It is possible not only by actuating single levers, but by combining the levers of one set with those of the others, and giving to certain levers special control over the movements of a bar or bars, to permit any one or more of such levers to move, according to the special character of the series of impulses transmitted, to effect their adjustment or operation, and to thereby perform a large number of operations in the machine.

The specific construction and arrangement of these elements and the combination with them of certain novel devices for effecting such operations as I have indicated above, constitute one part or feature of my invention, which being somewhat specific in character will be described by reference to the accompanying drawings. I have, however, introduced a device which I term a manual shift, which operates in conjunction with the other devices which perform the various necessary operations. For this purpose I select any one of a number of what I have designated levers of the third class

which when allowed, by the adjustment of the permutation bars, moves into the path of the swinging lever that effects four lifts of the type wheel, a stop which prevents
 5 that lever from moving. This manual shift is controlled by a special key in the keyboard of the transmitter, which when operated, effects the operation described, but none other and leaves the machine adjusted
 10 so that when the group of impulses corresponding to the character for which the shift is needed is then sent, the mechanism which lifts the type wheel to next in the highest position not being arrested by its
 15 appropriate lever, as that has been blocked, keeps on another step and lifts the wheel to its final or fifth position, from which it is returned to normal position after the selected character in the fifth row has been
 20 impressed, and the stop returned to normal position by the operation of the printing mechanism. This manual shift, it will be observed, requires two groups of transmitted impulses for its full operation, but
 25 I use it only for the dollar mark, quotation marks and other unusual characters, so that it is seldom required, and in the end adds very greatly to the capabilities of the machine.

30 In the practical use of instruments of this kind, occasion frequently arises for sending a received despatch to a number of different local addresses. For example, this often happens in railroad work, or it may happen
 35 that an operator sending to one city, such as New York, from another such as Washington, desires the message to be transmitted to other cities beyond, such as Boston. To meet such a case I combine with the receiver
 40 a perforator, the punches of which are operated directly by the movable permutation bars, so that when operated it will produce a perforated tape which when run through
 45 an automatic transmitter will reproduce the same signals and message. This device is under the control of the sending operator and may be brought into or thrown out of operative engagement with the receiver at will by the transmission of certain definite
 50 series or groups of impulses. This also constitutes an important specific feature of my present invention.

The above and other improvements in the details of the instrument, are illustrated in the
 55 accompanying drawings, in which—

Figure 1 is a top plan view of the complete receiving or printing mechanism with the upper portions removed. Fig. 2 is an
 60 end view of the apparatus showing the translator mechanism. Fig. 3 is a view of the opposite end of the instrument. Fig. 4 is a detailed illustration of the means for reversing the feed movement of the type wheel. Fig. 5 is a sectional view of the
 65 instrument looking toward the left. Fig. 6 is

a front elevation of the instrument with portions of the same in section. Fig. 7 is a vertical transverse section of the device, omitting certain parts shown in Fig. 6. Fig. 8 is a detail of the controlling mechanism.
 70 Figs. 9 and 10 are detailed views of portions of the stop devices for the feed mechanism, showing the construction of the same. Fig. 11 is a view partly in top plan and partly in horizontal section of portions of the ap-
 75 paratus. Fig. 12 is a detail of the printing mechanism. Fig. 13 is a sectional detail of Fig. 11 looking toward the left. Fig. 14 is a diagram of segments. Fig. 15 is a detail of the mechanism for controlling the per-
 80 forator. Fig. 16 is a horizontal sectional view of the perforator. Fig. 17 is a vertical sectional view of the same. Fig. 18 is a view of a piece of perforated tape. Fig. 19 is an enlarged detail view of the starting
 85 mechanism for the power shaft. Fig. 20 is a diagram of the keyboard of the transmitter. Fig. 21 is a schematic view of the type wheel, and Fig. 22 is a diagrammatic illustration of the translator bars to illus-
 90 trate their mode of operation.

In describing the several parts of the instrument by reference to these drawings, I shall state, as far as may be necessary, their functions or mode of operation, so that the
 95 operation of the machine as a whole will be understood without recourse to a general description of the same.

Referring to Figs. 1 and 6, which afford a good illustration of the general construction of the device, 1 is a base and 2, 2 two
 100 side plates on and between which the operative portions of the mechanism are mounted. These latter consist, in the main, of a paper-holding and feed shaft 3 adapted to carry a
 105 continuous sheet of paper; a type wheel 4 capable of both rotary and longitudinal motion, a type wheel carriage 5, on which the type wheel is mounted, and the shafts, gearing and other appliances for setting and
 110 feeding the type wheel, feeding the paper and performing other operations, which, so far as may be necessary for an understanding of the present invention will be hereinafter more fully described.
 115

On the base plate 1 between the two sides of the instrument is mounted a main driving shaft 6 connected by means of a suitable clutch 14 with a gear wheel 7 that meshes with the worm pinion 8, Fig. 19, on a shaft
 120 9 carrying a friction clutch 10 adapted to be continuously rotated by means of an electric or any other suitable motor. The driving shaft is normally locked, but released by each turn of the sunflower and hence as each
 125 set or group of signal impulses is received, is permitted to make a single revolution. This is effected by a pivoted bell crank lever 11 which normally engages a tooth 12 secured to the shaft. By means of an electro-
 130

magnet 13 the lever 11 is moved sufficiently to disengage the tooth, and as the shaft is connected with the gear 7 through a clutch 14, the shaft 6 is permitted to make one revolution. A pivoted spring actuated lever 15 engages at the proper moment a tooth on the cam disk 16 to prevent back lash of the shaft 6.

On the outside of one of the side plates 2 of the instrument are mounted parts of the mechanism which set the type wheel and feed the paper. On the outside of the other plate 2 is secured the translator, which latter device will be understood by reference to Fig. 2. In this figure, 16 and 17 represent the permutation bars mounted to slide longitudinally in guide plates 18. Midway between these bars is a seventh bar 19, which has a bodily movement at right angles to the plane of the paper and is operated by means of a connection 20, Figs. 1 and 7, with a rock shaft 21 operated against a spring 22 by a connecting rod 25 between an arm on the rock shaft and a pivoted lever 23 carrying a roller which bears on the periphery of a cam 24 on the shaft 6.

Upon the bar 19 bear various levers pivoted to the frame and impelled toward the said bar by spiral springs such as the spring 26 in Fig. 7. Of these levers the four marked 27 are those which control the lifting of the type wheel, while the others control the turning of the wheel and the other operations incident to the machine. It will be understood that all of the aforesaid levers normally rest upon the bar 19, but as this bar, by each revolution of the shaft 6 is retracted, all of the levers come or remain in contact with the bars 16 or 17 or fall into a row of alined notches therein. This device constitutes a device well-known as a translator in which the permutation elements are perforated or notched as indicated, so that owing to their particular position, in this case their longitudinal adjustment relatively to each other, the notches at one or more points will be in alinement, so that the lever at such point will fall into the groove thus formed and move through an arc of definite extent.

The first five levers to the left which are marked 28 in Fig. 2, are those which control the horizontal movement of the type wheel. The sixth lever marked 29 is that which responds to the operation of the manual shift key. The seventh lever marked 30 in conjunction with either of two levers 31 responds to the combination of impulses, which throw in or out of operation the perforator, and the eighth lever 32 responds in conjunction with any one of levers 33 to those combinations of impulses that correspond to other operations of the machine.

If a letter on the type wheel is to be printed which requires the wheel to be

turned, say, one space, that combination of impulses is sent which by the adjustment of the permutation bars permits the first lever in group marked 28 to swing forward into the path of the sliding rack bar 34, which is moved by a pinion 35 on a shaft 36 extending across the machine and operating by the usual mechanism to rotate the type wheel when turned. On the other side of the machine this shaft 36 carries a pinion 37 which engages a segmental gear 38, which is caused to swing by a spring connection 39 with a lever 41 under the machine, and which is a rocking arm on the shaft 42, which latter is arranged to be turned through a partial revolution by each revolution of the power shaft 6. The extent to which the segment 38 will be thus turned depends upon the space through which the rack bar is permitted to move, but if the first lever 28 has swung over into the path of the rack bar, it is manifest that this movement will be very short, in other words, will be only sufficient to rotate the shaft 36 through an arc that turns the type wheel one step. From this the operation of the other turning levers will be understood. The type wheel is lifted by a similar device, that is to say, if the wheel is to be lifted the space of two rows of characters, that combination of impulses is sent that permits, by the adjustment of the permutation bars 16, the second lever 27, counting from the left, to swing forward into the path of the rack bar 43 shifted horizontally by the pinion 44. This pinion is on a triangular shaft 45 extending across the machine and connected by gearing with the type wheel so as to raise the latter when the shaft is rotated. At the opposite side of the machine is a pinion 46 on this shaft which gears with a toothed segment 47 connected by a spring arm 48 with the rocking arm 41. The extent to which the type wheel is lifted therefore depends upon which one of the levers 27 swings into the path of and is encountered by the rack bar 43, and it will be observed that since both segments 38 and 47 are connected by springs, forming a yielding connection with the lever 41, that the type wheel may be both turned and raised or either turned or raised by each movement of the arm 41, that is, once for each revolution of the shaft 6.

The type wheel, by means of the above described mechanism is rotated in steps each equal to two letter spaces. In order, therefore, to print any of the intermediate characters, the transfer is adjusted so that that lever is set which under normal conditions would permit the machine to expose and print the character immediately preceding, in the selected row, the character desired. But in addition to the impulses sent to effect this adjustment a shift impulse is sent which

without reference to the other permutation bars that may have been shifted, moves the bottom bar 17 forward and thereby brings under the turning lever which is permitted to swing by the combination, a shoulder or stop 49, see Figs. 9 and 10, in a cutaway portion of the said bar. The lever therefore can not swing through its full normal arc, but only about half way, so that it does not stand in the path of the end of the rack bar 34, but encounters an offset or shoulder 50 on said bar, which is at a short distance from the end. The movement of the bar 34 is, therefore, greater than the swinging lever would ordinarily determine, and hence the type wheel is turned to an additional letter space and presents one of the intermediate characters to the printing position.

The permutation bars are shifted and adjusted by the mechanism shown in Figs. 1 and 2. Immediately in line with the series of bars 16 and 17 is a series of pivoted and spring actuated levers 51, mounted on a sliding block or frame 52. Normally these levers lie in a different plane from that occupied by the ends of bars 16 and 17, but are adapted to be shifted into position to engage the ends of said bars by means of a series of six electro-magnets 53, the armatures of which operate sliding pins 54 over said levers 51. When any one or more of said magnets is energized by an impulse received from the sunflower, the corresponding lever 51 is depressed and by means of the pivoted latched lever 55 at its rear end it is held in such depressed position.

The sliding block or support for the levers 51, is adapted to be shifted by an arm 56 fixed to a shaft 57, see Fig. 5, which in turn is connected by an arm 58 to a rod 59 reciprocated by a cam 60 on the power shaft 6. By each revolution of the power shaft, therefore, the shaft 57 is rocked and the levers 51 are thereby moved forward with the result that all of those which are depressed will force forward their corresponding permutation bars 16 or 17.

The cam 60 is so shaped that almost immediately after the power shaft has started in movement, the roller on the end of rod 59 passes over a projection and into a depression which permits a stout spring 61 connected with the arm 58 to turn the shaft 57 and shift the levers 51. The cam immediately returns the rod 59 and as the levers 51 are carried away from the latched levers 55, they force the latter backward on their return movement and are no longer depressed. As these parts are restored to normal position some time before the final operation of printing is effected, they operate as a storage device to receive and to store a new signal before the old one has been recorded.

It has been explained above that the shaft

42 under the machine is caused to make a partial turn by the rotation of the power shaft, and to thereby perfect the adjustment of the type wheel. This shaft has fixed to it an arm 62 that is connected to a vertical strip or bar 63, which latter is adapted to be reciprocated and turn the shaft 42 by the mechanism shown in Figs. 1, 6 and 7. This comprises a rock shaft 64 mounted in suitable standards 65 and provided with fixed arms 66 joined by a cross bar 67, and the shaft itself is rocked by a rigid arm 68 pivotally connected with a link 69 eccentrically pivoted to a disk 70 on the power shaft 6. By each revolution of the latter the shaft 64 is therefore rocked and the frame composed of arm 66 and bar 67 is formed downward carrying with it the side bar 63 and rocking shaft 42.

By the mechanisms which I have now described, the proper permutations and combinations are established and the type wheel is set to a position corresponding to such combination. It may therefore be now explained, by reference to Fig. 14, how the instrument is operated to effect these and the other results to be hereinafter described. In this figure, 71 represents the six line terminals of the machine leading to the six magnets 53, while the remaining contacts 72 are connectors for the battery and other devices. The machine, as will be well understood from what precedes, is operated by current impulses delivered to the terminal 71 from a sunflower, which in Fig. 14, I have indicated by the cam 73. This cam is on the sunflower shaft and operates after the line impulses have been distributed to the terminals 71. It then closes a circuit breaker 74 which completes the circuit of the starting magnet 13 and permits the power shaft of the instrument to make one complete revolution, by means of which, so far as the description given above sets forth, the type wheel is adjusted in position.

The next operation will obviously be the printing of the exposed character and the transverse feed of the type wheel through one letter space, and these operations are effected as follows: Between the side plates of the device is a long threaded pinion 75 which engages with the locking arm segment 76 and when turned forces the pin 77 into engagement with a ratchet 78 on the type wheel shaft to fix rigidly the position of the type wheel while being printed from. The pinion 75 also gears with a rack bar 79, see Fig. 12, on a sliding bar 80, and when turned moves said rack bar and thereby shifts a stop 81 and pulls an arm 82 on the spring actuated shaft of the printing bar 83 and this causes said bar to be thrown against the paper and effect the printing of the presented character. Whenever this operation is performed the feed mechanism for moving

the type wheel bodily through one letter space is also operated. The mechanism for this purpose consists of a lever 84 fixed to a rock shaft 85 mounted under the machine and said lever lies directly beneath the end of lever 62, so that whenever the latter is operated to transmit movement to the type wheel, its depression operates the cross feed lever 84. When the shaft 85 is rocked in this way, it swings an arm 86 that operates a rod 87 that shifts a pawl 88 which rises into engagement with a new tooth on a feed ratchet 89 and on its downward movement turns the same through a space sufficient to advance the type wheel one letter space.

With the exception of means for feeding the paper and spacing between words, which I have not as yet described, the above constitutes a completely organized printing telegraph receiver, capable of such operation as the ordinary requirements of practice demand, but I propose to effect certain other useful operations by different combinations of impulses, among which are the following: shifting the type wheel to present the fifth row of characters to the printing position; feeding the paper line by line; transverse feeding for spacing without printing; returning the type wheel to its original position from any point in the line; feeding the type wheel bodily backward step by step for any desired distance; ringing a bell for conventional signaling purposes; bringing into operation a perforator, and throwing it out of operation. Other operations are possible but for purposes of this case they need not be gone into in detail.

The operation of raising the type wheel to a fifth position, is effected by the operation of a special key in the keyboard which sends a certain combination of impulses that adjusts the permutation bars to such position that the sixth lever 29 swings forward. This movement of the lever engages a bell crank lever 90 which causes a slide 91 to move a toe 92 into the path of the first lever 27 on the left, which is that lever that permits the type wheel, under ordinary circumstances to be lifted to the fourth position. This operation cuts out the printing mechanism so that the instrument after the operation is completed is left with the stop 92 in line with the fourth lift lever 27. The next combination of signals sent may or may not be composed of impulses that turn the type wheel, but in any event the fourth position lever alone of levers 27 is actuated, but since it encounters the stop 92 the rack-bar 43 does not strike it but passes beyond it sufficiently to raise the type wheel to a position wherein it exposes the lowermost or fifth row of characters.

On the pinion 75 which always operates when the printing operation is effected, is a fixed arm or pin 93 which, on the move-

ment of the pinion, encounters a pin 94 connected with the slide 91 and forces the latter back to its normal position of non-interference.

The operation of the lever 29 as above stated throws the printing mechanism out of action. The lower end of the lever when its other end swings into an aligned series of notches in the permutation bars encounters a bar 95 carried by a pivoted bar 96 which latter is connected by a rod 97 with a plate 98 pivoted to the reciprocating bar 63. When the arm is moved by the lever 29 the plate 98 is drawn backward out of the path of the rod 67, so that the latter descends with arm 66 without lowering the slide-bar 63 and without operating the printing or feed mechanism. The operation of the manual shift key, therefore, puts the instrument into condition to print the characters in the fifth row which may next be selected, and the printing of that character restores the parts to their normal condition. Another operation necessary is the feed of the paper line by line, and when this is done, the printing mechanism should not be operated. To effect this, I throw the lever 32 which also engages the pin 95 and therefore cuts out the printing mechanism, and one of the levers 33. Each of the last named levers is connected by rods 99 with a block 100 secured to a vertical spring actuated plunger 101, which is capable of being drawn by the movement of the bars 99 under the bar 67, but which is normally out of the path of said bar. In the case assumed the plunger which lies over an arm 102 fixed to a rock shaft 103 under the instrument is selected and swung under the bar 67 and by the movement of the bar that particular plunger is depressed and the rock shaft 103 is turned. This shaft is connected by an arm 104 with the rod 105 that connects with any suitable line feed device 108, shown in Fig. 5.

In order to space without printing the lever 32 and that lever 33 which depresses the plunger over the arm 84 on rock shaft 85 are thrown. This operates the transverse feed but not the printing mechanism.

To return the type wheel from any point in a line the printing device is thrown out by lever 32 and that lever 33 which depresses the plunger 101 which lies over an arm 106 on a rock shaft 107 that connects by levers with a rod 109, which when drawn down, as it will be by the operation of the rock shaft 107, swings a stop 110 against the pawl 88 of the ratchet 89, thus releasing the ratchet. As the turning of the ratchet by the pawl 88 in spacing winds up a spring in the casing 111, the release of the ratchet permits the worm shaft 112 to rotate under the influence of the spring and send the type wheel home. The depression of the rod

109 brings a stop 113 thereon under a spring catch 114, which holds the rod 109 down until the type wheel has traversed its full homeward course. On the rod 87 of the spacing mechanism is a stop 115 which lies under the tail of the catch 114, so that after the next character is printed and the rod 87 lifted to space, the catch 114 is released from the stop 113.

10 It may frequently be desirable to turn the type wheel backward step by step, to correct a wrongly printed character, to tabulate, or the like, and to do this the lever 32 and that lever 33 which depresses plunger 101 that lies over the arm 116 fixed to a rock shaft 117 connected by an arm 118 to a rod 119 which is pivoted to a swinging pawl 120 engaging, when in action with the ratchet wheel 89, are selected. The pawl 120 has a tail 121 which when the pawl is depressed by the rod 119 engages and shifts the stop 110, thereby disengaging the retaining pawl 122 and the operating pawl 88 of the ratchet. As the spring in the barrel 111 is under tension, the pawl 120 acts as an escapement and permits the ratchet to turn back by one tooth for each movement of the pawl. By this means the type wheel carriage and type wheel may be sent back step by step to any desired position.

It is sometimes desirable that the sending operator may have some means of transmitting a conventional signal over the wire, as for example, ringing a bell on the receiving instrument. For this purpose a bell 154 is mounted under or at some convenient point on the receiver and provided with a hammer 155 which is operated by a lever 156. To ring the bell the lever 32 and that lever 33 which depresses a plunger 101 immediately over the lever 156 are selected and set in operation.

In ordinary practice it is customary to file away the messages or copies of the same and for this and other reasons it is desirable to have the blanks all of the same size. Sometimes a message covers only two or three lines, in which case a number of blank lines must be fed to bring the blank to the proper point to be torn off. The means for doing this are shown in Fig. 2 and in Fig. 14. A spring actuated lever 123 is pivoted alongside of the bars 16, 17 and by a certain adjustment of said bars is permitted to swing into an aligned series of notches and engage a lever 124. The movement of the latter forward, permits a bell crank lever 125, Fig. 14, to rotate on its pivot 126 and so that the lever 124 is thereafter retained by a shoulder 127. The movement of the lever 124 by means of a piece of fiber 128 carried thereby closes contacts 129 and leaves them closed. So long as this condition continues the magnet 13 is energized and the power shaft, not

being stopped by the catch, continues in revolution feeding the paper line by line.

On the frame of the instrument is mounted a gear wheel 130, Fig. 5, which is in gear with a pinion on the paper feed shaft, and which makes, say, one revolution for each two of the said shaft. On the shaft of the gear wheel 130 is a pin 131 which rotates with the wheel and at a given point this pin engages the tail of the bell crank lever 125 and moves it, permitting the lever 124 to fall back and break the contacts 129. By this device the paper, by the actuation of the proper key of the transmitter will be fed line by line until the pin 131 has made a complete revolution, or until a blank of a given length is fed, and the machine will then be arrested.

The remaining operations provided for are the throwing into and out of operation of the perforator. This device is illustrated in Figs. 15 to 18. It consists of a box or casing 132 in which are arranged a main or feed punch 133 and six character punches 134, all spring seated. The feed punch 133 is operated by a pivoted lever 135 which lies in the path of a rod 136 connected with an arm 137 on the shaft 57 which latter is turned with every operation of the instrument. The lever 135 has a notch 138 which when the perforator is in its inoperative position lies under the end of the rod 136, so that the feed punch is not moved by the movements of the shaft 57.

The box 132 is placed in guide ways 139 and is capable of a limited movement therein, the guide ways being permanently attached to the frame of the machine. Normally, the box is withdrawn from the operation of the punches by the action of a spring 140. To throw the perforator into action a combination of impulses is sent that permits the lever 30 and that one of levers 33 to swing forward which draws under the bar 67 the plunger 101 which is connected with a lever 141 operating a reciprocating rod 142. When the plunger in question is lowered, the rod 142 is raised and engages with a bell crank lever 143 which engages a pin on the box 132 and forces the latter forward until it is caught by a spring latch 144. This position is illustrated in Fig. 17. In this position the six character punches lie directly opposite the ends of the six permutation bars 16 and 17, so that by each operation of the instrument the feed punch is operated to perforate a line of holes along the center of the paper, and such of the character punches as are impelled by the movement of the bars 16 and 17 are also operated to punch one or more holes in a transverse line. Each movement of the lever 135 is communicated to a pawl 145 that operates on a ratchet

wheel 146 to turn the toothed feed wheel 147, the pins or teeth of which engage with the central line of feed perforations. The sending operator may, therefore, at any
 5 time desired, throw into action the perforator which, as long as the above described conditions are maintained, continues in operation and produces a perforated tape 148 which may be run through an automatic
 10 transmitter to repeat the message corresponding to its perforations.

When it is desired to throw the perforator out of operation, a combination of signals is sent that operates lever 30 and that one of
 15 levers 33 which depresses the plunger 101 that lies over a lever 149. This lever raises the end of a second lever 150 and thereby depresses against a spring 151 a rod 152. This draws down the latch 144 from engage-
 20 ment with the box 132 and permits the latter to be withdrawn from the influences of the punches by the action of spring 140.

Referring to Fig. 22. This illustrates the six permutation bars, the blackened portions
 25 of which represent those notches in the bars which are operative when the bars are moved to secure the adjustment necessary to produce the character, applied to the drawing. Of course, it will be understood that
 30 all of the bars have many more notches than are shown in this figure. For example, to print the letter A, one of the bars that raises the type wheel two steps and another bar which turns it one step must be shifted
 35 to bring their notches into alinement. This having been done there must be notches in all of the other bars which have not been moved, to permit the appropriate levers to fall into their operative position. The black
 40 spaces, however, indicate the magnets 53 that must be operated and the bars that must be shifted to secure this result.

In Fig. 21 there is shown diagrammatically such a keyboard as would be used in
 45 transmitting over the line the signals for operating the receiver above described. It will be understood that the functions of the several keys of this device are the same as that in all cases of this kind, to operate or
 50 to control means for sending to line a combination or set of timed impulses corresponding to the special key depressed. The drawing, so far as the function of each key 153 is concerned, is self-explanatory, the
 55 character or name which each key bears indicating what will be effected by its depression. Those keys which contain two characters will transmit the lower character when depressed, but will not transmit the
 60 upper character until the shift key, as hereinbefore explained, has been operated.

Fig. 21 is a development of the type wheel described in connection with this device. The position of any character thereon shows

with respect to its initial position, how many
 65 turns or lifts of the wheel are required to bring that character to the printing position.

It will be understood that the invention is not limited to the details of construction herein shown, for example, translators, hav-
 70 ing in general, the functions of that described, are made in many forms, which in so far as they are the mechanical equivalents of my device are regarded as included with-
 75 in my invention.

What I claim is:

1. In a printing telegraph receiver, the combination with a translator, permutation plates or bars therein and means for moving the same according to the impulse trans-
 80 mitted; stop devices coöperatively associated with the said plates and adapted to move into the paths through portions of said plates which their adjustment may afford, of a type-wheel capable of rotary and of
 85 longitudinal movement, and means for adjusting the same to its different positions, the movements of which are limited in extent by engagement with those stop devices which by their movement are interposed into
 90 the path of movement of said means.

2. In a printing telegraph receiver, the combination with a translator, permutation elements therein, means for moving the same according to the impulses transmitted,
 95 and stop devices which move according to the adjustment of such elements, of a type wheel and rack bars shifted by the rotary and by the longitudinal movements of the same respectively, and limited in the extent
 100 of their movement by engagement with the stop devices which by their movement are interposed in their path.

3. In a printing telegraph receiver, the combination of a type-wheel capable of
 105 rotary and longitudinal movement, and parts having a movement proportional thereto, of a translator, a single group of coöperating permutation plates or bars therein, means for moving said plates in
 110 response to the particular impulses transmitted, a part of said plates being adapted to control the rotation and another part the longitudinal movement of the type-wheel, stop devices engaging with and movable
 115 according to the adjustment of the permutation plates into the path of the parts moving with the type-wheel, for determining the extent of the two movements imparted to the type-wheel, all of said stop
 120 devices being associated with and operated by the said single group of permutation plates.

4. In a printing telegraph receiver, the combination with a type-wheel capable of
 125 rotary and of longitudinal movement, of a translator, permutation elements therein, means for moving said elements in response

to particular impulses transmitted, a part of such elements being adapted to control the rotary and another part the longitudinal movement of the type wheel, and three
 5 classes of stop devices or levers movable according to the adjustment of the permutation elements, and all associated with and operated by a single group of the same, one class being adapted to determine the extent
 10 of rotary movement of the type-wheel, another class the longitudinal movement of the same, and the third class adapted to cause other operations of the instrument.

5. In a printing telegraph receiver, the combination with a type-wheel capable of rotary and of longitudinal movement, of a translator, a series of notched permutation bars therein, means for moving said bars longitudinally according to the character of
 20 the impulses transmitted, a retaining bar, levers normally resting upon the retaining bar and adapted when said bar is withdrawn to fall into such alined notches as the adjustment of the permutation bars may
 25 present, means for withdrawing the retaining bar when the permutation bars are adjusted, and means for turning or lifting the typewheel and for performing other operations in the machine according to that one of
 30 said levers which may be shifted.

6. In a printing telegraph receiver, the combination with a type-wheel having a plurality of rows of characters and capable of movement about its axis and of movement
 35 in line with its axis, of a translator, means comprised in or controlled thereby for turning and for lifting the said type-wheel to bring any one of several rows of characters into line with the printing position, means
 40 for stopping the type-wheel when it has reached the next to the last or highest position, means for operating the same, and means for preventing said operation whereby the lifting means may operate to shift the
 45 type-wheel to a point beyond said position.

7. In a printing telegraph receiver, the combination with a type-wheel having a plurality of rows of characters and capable of movement about its axis and of movement in
 50 line with its axis, of a translator, means comprised in or controlled thereby for turning and for shifting the said type-wheel, to bring any one of the several rows of characters into line with the printing position,
 55 means for stopping the type-wheel when it has reached the next to the last or limiting position, means for operating the same, means adapted to be interposed in the path of said stopping means for checking or preventing its operating and means for interposing
 60 said stopping means whereby when operated the shifting means may move the type-wheel along its axis to a point beyond such position.

8. In a printing telegraph receiver, the combination with a type-wheel having a plurality of rows of characters and capable of movement about its axis and of movement in line with its axis, of a translator, means comprised in or controlled thereby for turning
 70 ing and for shifting the said type-wheel to bring any one of several rows of characters into line with the printing position, a movable lever for stopping the type-wheel shifting means when said wheel has reached the
 75 next to its last or limiting position, a stop adapted to be interposed in the path of said lever and means for interposing said stop whereby when operated the said shifting means may move the type-wheel along its
 80 shaft to a point beyond such position.

9. In a printing telegraph receiver, the combination with a type-wheel having a plurality of rows of characters and capable of movement about its axis and of movement
 85 in line with its axis, of a translator, means comprised in or controlled thereby for turning and for shifting the said type-wheel to bring any one of several rows of characters into line with the printing position, means for stopping the type-wheel
 90 when it has reached the next to its last position, means for operating the same, means for locking or throwing the same out of operation, and special circuit connections
 95 and devices for operating the same whereby when prevented from acting the shifting means may move the type-wheel along its shaft to the last or final position.

10. In a printing telegraph receiver, the combination with a type-wheel capable of movement about its axis and of movement in line with its axis, of a series of permutation bars, means for moving the same according
 100 to the character of the impulses transmitted, a series of stop levers adapted to move into alined notches in said bars, which the adjustment of the latter may present, mechanism controlled thereby for lifting
 105 and turning the type-wheel to its different positions, and means for throwing out of operation that lever which stops the type-wheel in the next to its highest position, whereby the lifting mechanism will pass beyond said lever and raise the type wheel
 110 another step.

11. In a printing telegraph receiver, the combination with a type-wheel capable of movement about its axis and of movement in line with its axis, of a series of permutation bars and means for moving the same according
 120 to the character of the impulse transmitted, a series of stop levers adapted to move into alined notches in said bars, which their adjustment may present, means
 125 for effecting the rotary and longitudinal movement of the type-wheel and thereby bringing the same to its different positions,

a movable stop adapted to be brought into the path of the lever which stops the type-wheel in the next to its highest position, and means for shifting said stop whereby the lifting mechanism will pass beyond the said lever and raise the type-wheel another step.

12. In a printing telegraph receiver, the combination with a type-wheel having a plurality of rows of characters and capable of movement about its axis and of movement in line with its axis, of a translator, means comprised in or controlled thereby for shifting the type-wheel about its axis or in line with its axis to bring any one of its several rows of characters into the printing position, means for stopping the type-wheel in the next to its last or highest position, means for throwing the same out of operation, whereby the lifting means may raise the said type-wheel beyond such position, printing mechanism and means connected with and operated by the same for restoring the said stopping means after a character has been printed.

13. The combination with a printing telegraph receiver, and a translator for operating the same, permutation elements therein and means for moving the same according to the character of the signal transmitted, of a perforating device, movable into and out of operative relation with the receiver, punches therein in the path of the moving permutation elements, when the device is operatively connected with the receiver, and means under the control of the sending operator for shifting the perforator into or out of operative relation with said receiver.

14. The combination with a printing telegraph receiver, movable parts therein and means for moving said parts according to the impulses received, of a perforator movable bodily into and out of operative relation with the receiver, punches therein which, when the perforator is operatively connected with the receiver, are operated by said movable parts in the latter, and means under the control of the sending operator for moving said perforator into or out of operative relation with the receiver.

15. A printing telegraph receiver comprising in combination a power device shaft, a type-wheel capable of movement about and in line with its axis, yielding connections with the power shaft for turning and for lifting the type-wheel, a translator for adjusting the position of the type-wheel according to the character of the signal transmitted, and means for imparting to the power shaft a single revolution for each signal or combination of impulses received.

16. In a printing telegraph receiver, the combination with selecting, printing and feed mechanism for the paper and for the type wheel, of a translator for controlling

the operation of the same, a series of permutation bars therein, means for adjusting said bars according to the character of the signal transmitted and levers associated therewith that move according to the adjustment of the permutation bars to determine the particular operation of the instrument, one or more of said levers being adapted to throw the printing and the type-wheel feeding mechanisms out of operation whenever they are not required for the operation determined by the translator.

17. In a printing telegraph receiver, the combination with the selecting, printing and feed mechanisms, of a type-wheel movable longitudinally with respect to the paper sheet, a spring wound by the forward movement of the type-wheel, two feed devices for moving the type-wheel in opposite directions, and a translator for operating either of said feed mechanisms according to the character of the impulses acting upon it, whereby the type-wheel may be advanced or returned step by step as desired.

18. In a printing telegraph receiver, the combination with the selecting, printing and feed mechanisms, of a translator, permutation elements therein, and means for moving the same according to the character of the signal transmitted, levers adapted to move according to the adjustment of the permutation elements, a power shaft adapted to make one revolution for each signal received, means operated thereby for feeding the paper, and performing other operations independently of the movement of the type-wheel, and plungers connected with certain of the translator levers and adapted by the movement of the latter to be shifted to complete the engagement of the power mechanism with the paper feed or other devices.

19. In a printing telegraph receiver, the combination with type-wheel setting and printing mechanisms, of a translator for controlling the same, a group of permutation bars therein for moving the same according to the character of the signals transmitted, levers adapted to move according to the adjustment of the said bars, one of the permutation bars having stops which when brought under the said levers arrest them at an intermediate point in their normal travel, and a rack-bar movable to an extent proportional to the arc through which the type-wheel is turned, said bar having an offset or shoulder near its end, whereby the end of the bar encounters a translator lever which has moved its full distance and the shoulder encounters a lever which has only partially moved, and thereby shifts the type wheel to an intermediate position.

20. In a printing telegraph receiver, the combination with a type-wheel capable of

movement in line with its axis to present
any one of a plurality of rows of characters
to the printing position, means for raising
the type-wheel, and means for stopping the
5 wheel at each of its selected positions except
the highest, means for blocking or throwing
out of action the stop mechanism for the po-
sition next to the highest, whereby the lift-
ing mechanism will raise the wheel to its
10 highest position, and means connected with

the printing mechanism for unblocking said
stop and restoring the parts to their normal
position.

In testimony whereof I affix my signature
in the presence of two subscribing witnesses. 15

JOHN EDWARD WRIGHT.

Witnesses:

THOMAS J. BYRNE,

WILLIAM P. JOHNSON.