

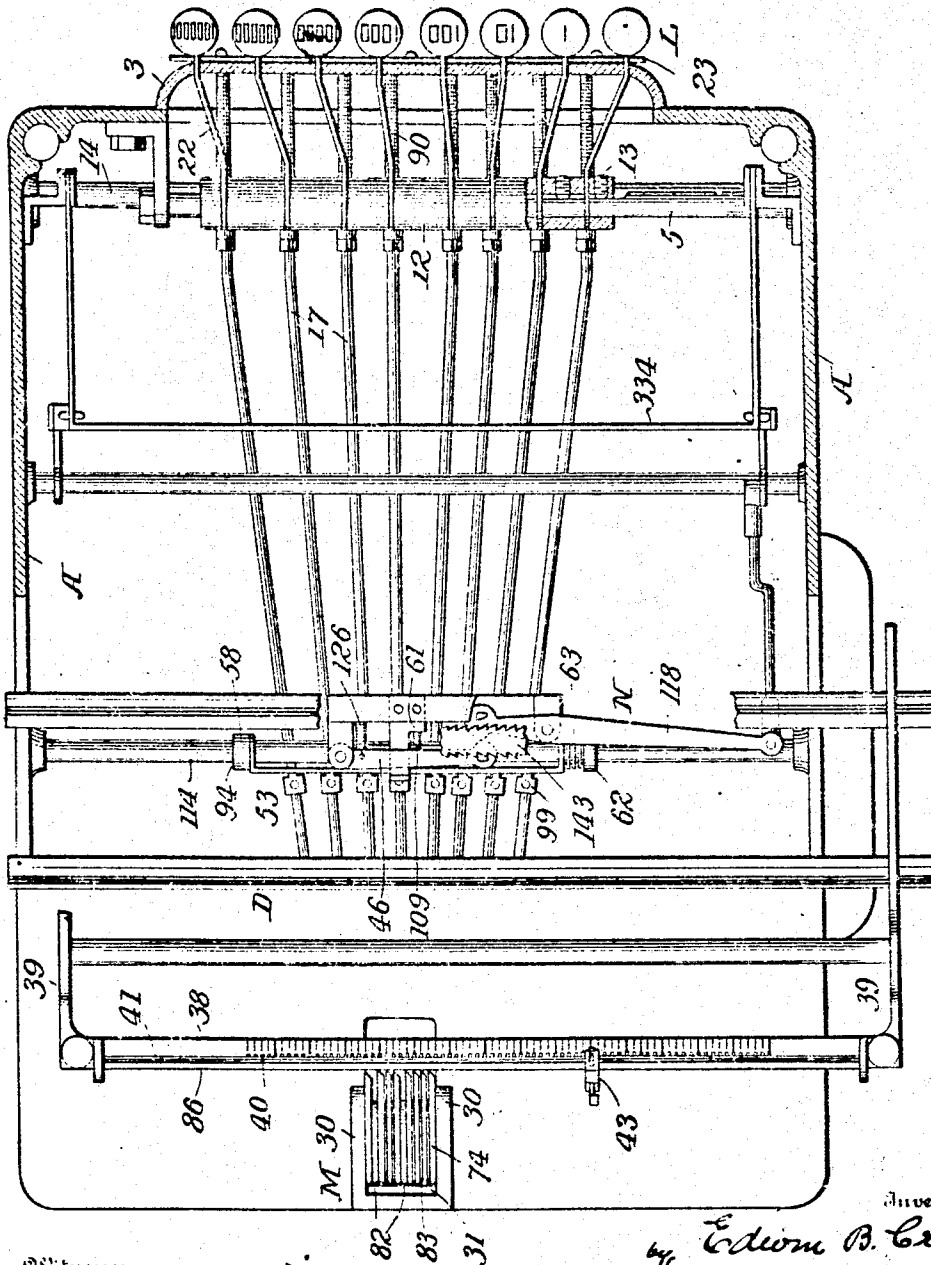
E. B. CRAM.
TABULATOR.

APPLICATION FILED JAN. 11, 1904.

932,763.

Patented Aug. 31, 1909.

3 SHEETS—SHEET 1.



Witnesses
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Fig. 1.

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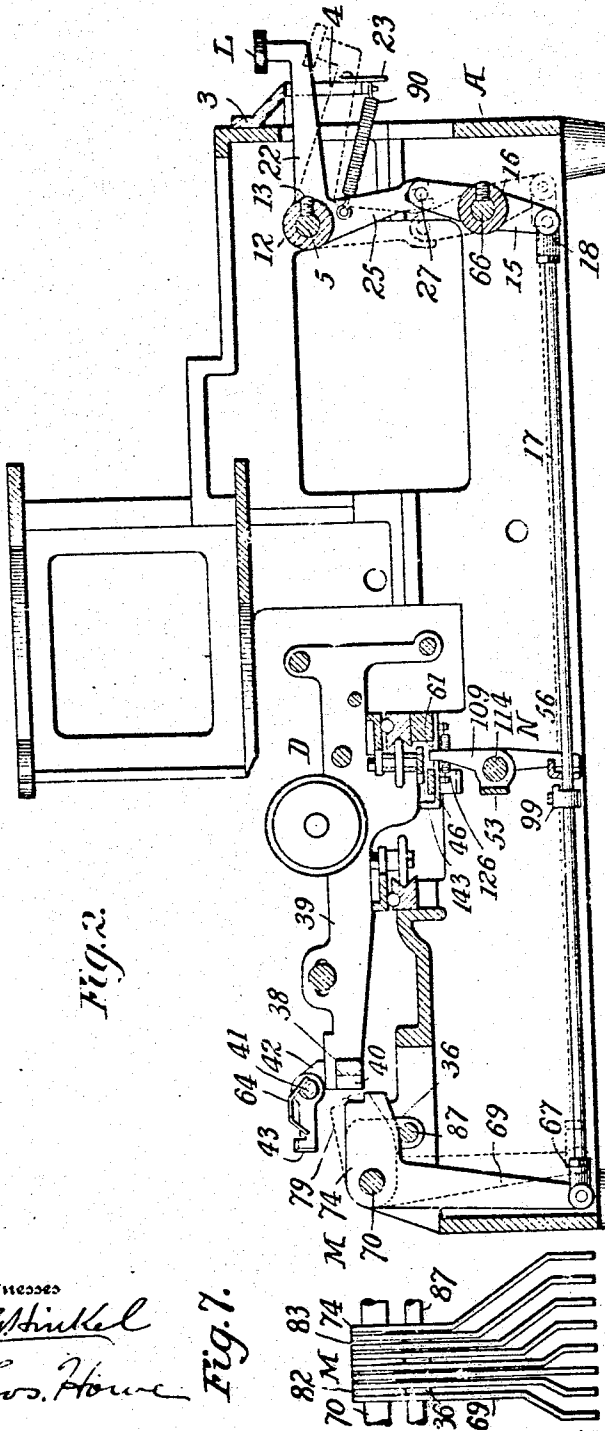


Fig. 2.

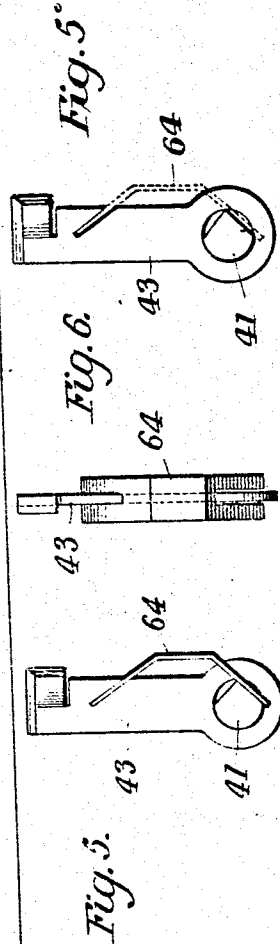


Fig. 5.

Fig. 6.

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Fig. 7.

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 3 SHEETS—SHEET 3.

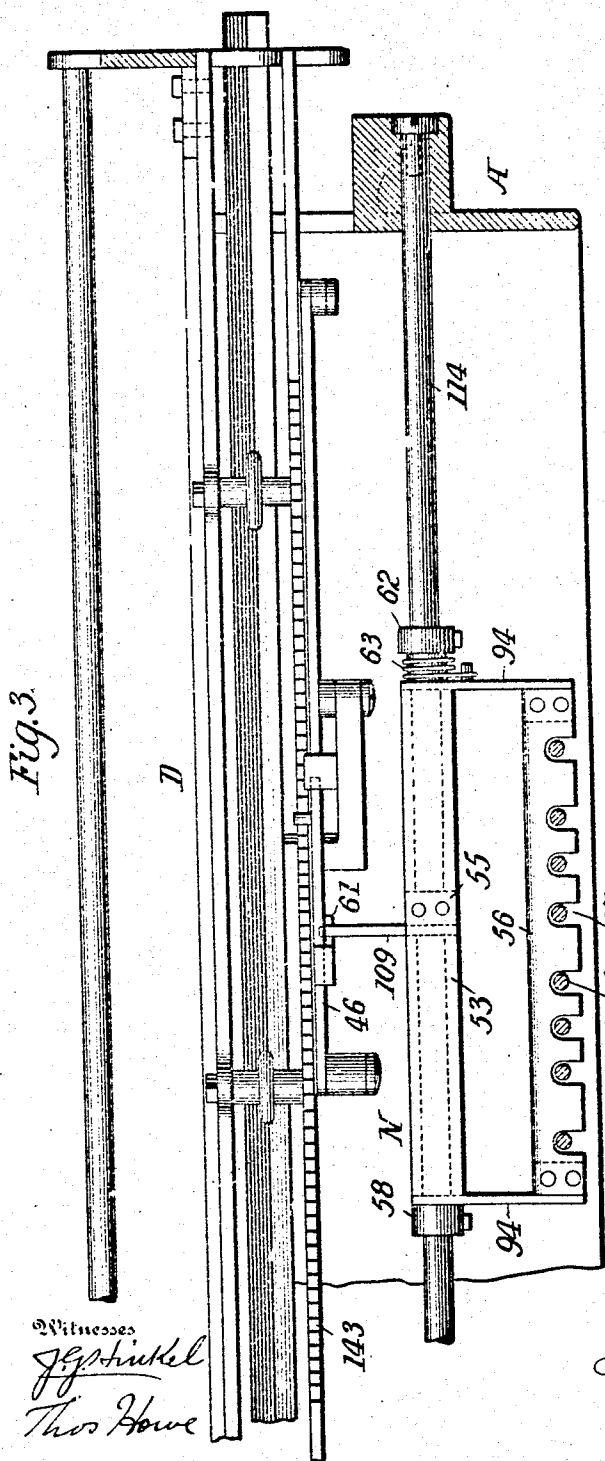


Fig. 3.

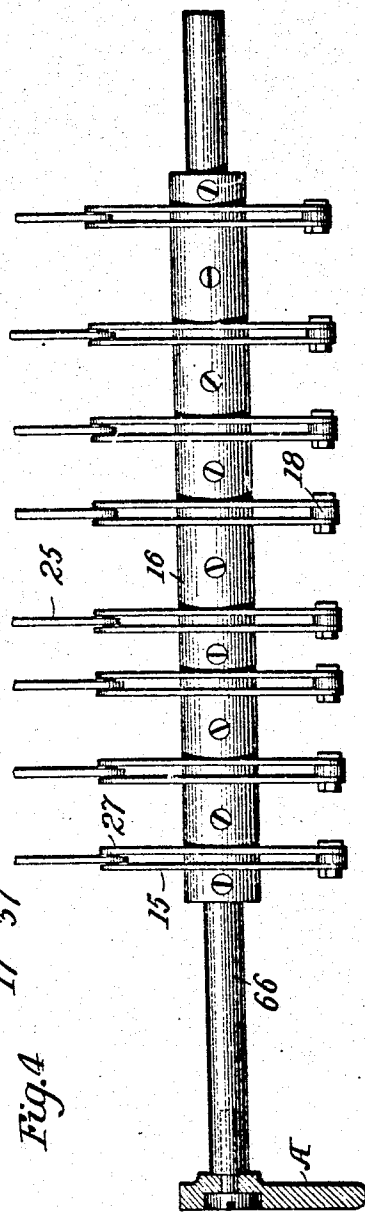


Fig. 4.

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UNITED STATES PATENT OFFICE.

EDWIN B. CRAM, OF BROOKLYN, NEW YORK, ASSIGNOR TO NEW YORK ADDING TYPEWRITER COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF MISSOURI.

TABULATOR.

932.763.

Specification of Letters Patent. Patented Aug. 31, 1909.

Application filed January 11, 1904. Serial No. 188,554

To all whom it may concern:

Be it known that I, EDWIN B. CRAM, a citizen of the United States, residing at Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Tabulators, of which the following is a specification.

This invention relates to tabulators for typewriting machines, and the principal object of the invention is to build the tabulator into and make it a permanent part of the machine.

Further objects are to improve the construction and the mode of operation of devices of this character.

The invention will be fully described hereinafter, reference being had to the accompanying drawings, in which:—

Figure 1 is a plan view of my improved tabulator and so much of a typewriting machine as is necessary to show the tabulator built into it; Fig. 2 is a vertical longitudinal section; Fig. 3 is a vertical transverse section; Fig. 4 is a front elevation of a portion of the mechanism. Fig. 5 is an enlarged side view of a tabulating stop; Fig. 5^a is a view of the tabulating stop showing the parts separated. Fig. 6 is a plan view of the same; and Fig. 7 is an end view of the tabulating stop levers.

The frame A of the machine is suitably constructed to support the operating parts including the typewriting mechanism (not shown), a transversely movable paper carriage D carrying the usual cylindrical platen P and one or more suitable tabulating stops 43, stop engaging devices shown as levers M for engaging with the tabulating stops, suitably marked tabulator keys L and suitable connecting mechanism for controlling the stop levers M, and means N operatively related to the levers M for releasing the carriage from the means for accomplishing the step by step movement during the operation of typewriting, so that during tabulating the carriage is free to move under the influence of the usual spring motor or other means except when restrained by the engagement of levers M with stops 43.

A bar 38, preferably square, is supported on the typewriter carriage D and has a scale on its upper face, and vertical grooves 40 on its rear face coincident with the graduations of the scale. Above the bar 38 a rod 41 is rigidly supported on the carriage and has

two flat sides at an angle to each other. The rod 41 supports the tabulating stops 43, which may turn and slide freely upon it. A slot is cut in one edge of each stop to receive one end of a flat spring 64, the free end of which is adapted to engage the flat sides on the rod 41 to hold the stop in definite positions, Figs. 2, 5 and 6. The slot in the stop may be of such width that the walls therewith will bear so close against the faces of the spring as to hold the latter in position or the spring may be secured to the stop by solder or any other suitable means. The free end of the spring is slotted and lies on both sides of the stop. When not in use these stops will preferably extend horizontally, Fig. 2, but when required for use a stop will be turned downwardly into one of the grooves 40 and will project rearwardly from the groove. The maximum number of stops 43 which will ever be required should be placed upon the rod 41 when the machine is assembled and ordinarily a number of these stops will be out of service. To enable the unused stops to be moved out of the way of those in service, the rod 41 is made to extend beyond the service positions of the stops, that is, in the construction shown, beyond the part of the bar 38 which is provided with the grooves 40, and this extended portion 86 provides a storage place to which the unused stops 43 can be slid out of the way.

The stop levers M are pivoted on a rod 70 secured in the vertical side walls 30, of a pocket or chamber 31, which are preferably cast integral with the frame of the machine. Each lever M has a lateral arm 74 which has a notch 79 at its upper outer corner and the lever has a vertical arm 69, to the lower end of which a rod 17 is pivoted. The other ends of the rods 17 are pivotally connected to the lower ends of levers 15 which rock on a rod 66 rigidly supported by the frame A. Secured in the upper end of each of the lever 15 is a pin 27 which is received in a slot at the lower end of one arm 25 of a bell crank which is pivoted upon a rod 5 rigidly supported by the machine frame. The bell cranks are spaced apart by washers 12 fixed to the rod 5 and their other arms 22 extend outwardly through guiding slots 4 in a plate 3 which is fixed to the front of the machine frame and carry the keys L at their outer ends. Secured to the plate 3 is a stop plate

23 which covers the lower ends of the slots 4 and limits the downward movements of the keys. A spring 90 for normally holding each key L in its uppermost position is secured to each of the arms 25 at one end and to the plate 2 at the other. A depression of a key L will cause the corresponding lever M and connections to assume positions shown in dotted lines, Fig. 2, when the end of the arm 71 of the lever will be in the path of any stop 43 that has been turned down. Normally the arms 71 will be in the position shown in full lines Fig. 2 and the notch will permit the free passage of the stops. Any number of stop levers M may be employed, but in the present instance it is assumed that the maximum number which the machine will be required to tabulate will not go beyond the millions column. Accordingly eight levers are employed as one must be used to space for the decimal point. The key corresponding to one of the levers is marked with the decimal point and the other keys are numbered to indicate the columns from units to millions and by pressing any one of them, the carriage will move to a predetermined position with relation to the printing point. Between the lever at the right hand viewed from the front and the next is a washer 82 of substantially the same thickness as the distance moved by the carriage in one step when the typewriting mechanism is operated and a similar washer is placed between the fourth and fifth levers. Between all the other levers thin washers 83 are placed so that with each washer and an adjacent lever there is a combined thickness equal to that of a thick washer 82. The washers 82 between levers as described are to provide the necessary spaces for writing commas between figures in order to properly point off the number, as for instance, in writing 1,000,000. The washers 83 are placed between the levers M to prevent a lever being moved by friction when an adjacent lever is actuated. All the washers 82 and 83 are perforated for the passage of the rod 70 and each has a lug 36 projecting below the arms 71 of the levers and perforated for the passage of a rod 87 secured in the side walls 30, and the arms 71 are normally drawn against this rod by the springs 90. By thus having the retracting spring at one end of the line of stop lever mechanism, and a stop at the other, the mechanism is held taut from end to end. The arms 74 strike the rod 87 and arrest the upward movement of each key L before it strikes the upper end of the slot 4.

Stops 43 are arranged on the bar 41, one for each tabulating space and engage laterally with stop levers M to determine the points at which the left hand figures of the numbers are to be written as will be hereinafter described, so the number of stops set in position will depend on the number of

tabulating spaces and their positions upon the positions of those spaces.

A portion of the usual carriage rack is indicated by 143, and 46 is the dog which is normally engaged with it, and which in the usual step by step movement of the carriage is moved out of engagement with the rack by the dog 118, which latter is operated by a bail 334 directly under the writing keys and connected to said dog, every time a writing key is depressed. This dog is normally out of engagement with the rack, but engages it when a writing key is depressed.

It is necessary to release the dog 46 from the carriage rack when it is desired to let the carriage move through a space greater than the distance between successive notches on the carriage rack, as from one position to another where it is to be arrested by a stop lever, and while this may be accomplished in various ways, the devices to be now described are very simple and efficient. Each connecting rod 17 is provided with a projection as an adjustable sliding collar 99 having a set screw for locking it to the rod and adapted to engage with a cross bar 56 secured to the lower ends of swinging arms 94 and having openings 57 through which the rods 17 pass. The arms 94 are supported by a rod 114 supported by the frame A and are connected by a bar 53. An arm 109, secured to the bar 53, swings with the arms 94 and at its upper end is in proximity to the dog 46 so that when it is swung toward the rear, the dog is disengaged from the rack. The collar 99 is so adjusted upon the rod 17 that it will not actuate the bar 56 to disengage the dog 46 from the rack until after a tabulating lever has been moved into the path of the stops 43 and conversely the tabulating lever will not be removed from the path of stops 43 until after dog 46 has come into engagement with the rack. The reason for this is that if the carriage were not detained by the dog and rack, or by the tabulating lever and stop, it would be unrestrained and quickly move to the end of its travel. Two collars 58 and 62 are secured upon shaft 114, the collar 58 abutting against one of the arms 94, the collar 62 being a short distance away from the other. Between the collar 62 and the arm a spring 63 is coiled around the shaft 114, one end of said spring being secured to the collar and the other to the arm, and the spring normally tends to press the arm 109 against the stop 61, which is secured to the carriage, and away from the dog 46.

When a piece of work is undertaken in which it is desired that there shall be tabulation, stops 43 are set by turning them down into grooves 40 and the particular grooves may be determined by means of the scale on the upper side of rod 38. The ordinary typewriting is carried on in the usual manner without interference by the tabulating

mechanism, as the springs 90 hold the levers M out of the path of stops 43. If however, it is desired to write a number in its proper location in a tabular space, the appropriate one of the tabulating keys L is depressed thus causing the rod 17 to move toward the front of the machine. This movement of the rod produces two results. It rocks the one of the levers M connected to it so that the end of its arm 74 is carried into the path of stops 43 and also, by the engagement of a collar 99 with the bar 56, the upper end of the arm 109 is carried toward the rear of the machine thereby disengaging the dog 46 from the carriage rack. The carriage then moves until a stop 43 engages with a lever M when the desired number may be written. Let it be assumed that it is desired to write 150.25 in its proper tabular position. The key L marked 100 is first depressed. This engages the fifth lever M from the right hand end and after the carriage has come to rest against this lever, which will occur when the printing point is in the hundreds column, the key L may be released and the number written in the usual manner. So the proper position of the carriage may be obtained for any number by depressing the key L corresponding to its left hand figure.

Without limiting my invention to the details of construction illustrated and described, I claim:

1. The combination with the frame of a typewriter machine, a carriage supported to travel thereon, a rack carried by the carriage, and a dog pivotally supported by the frame and normally engaging the rack, of tabulating keys and stop levers supported by the frame, connecting rods between the keys and levers, a projection on each rod, a swinging bar extending across the connecting rods to be engaged by the projections thereon, an arm rigidly connected to said bar and extending into close proximity to said dog and movable to engage it and release it from the rack when any connecting rod is moved by the depression of its key, substantially as described.

2. In a typewriting machine, the combination of a paper carriage provided with adjustable stops, tabulating levers mounted in the frame of the machine and normally out of the path of the stops on the carriage, a series of keys pivotally mounted in the frame of the machine, a series of centrally pivoted arms, one for each of said keys, means for connecting one end of each of said arms with one of said keys, and means for connecting the other end of said arms with one of the tabulating levers, substantially as described.

3. In a tabulating machine, the combination of a carriage provided at its rear with

adjustable stops, tabulating levers mounted in the frame of the machine in rear of the carriage, the forward ends of said levers being normally out of the path of the tabulating stops on the carriage, a rod connected with the lower end of each tabulating lever and extending toward the front of the machine, a series of centrally pivoted levers having their lower ends connected with said rods, a series of keys fulcrumed above said levers and connected therewith to rock the same and move the rods connected to the tabulating levers longitudinally, whereby said levers will be brought into the path of the stops on the carriage, and means actuated by either of said rods for releasing the carriage from its step by step feeding mechanism as the rod is drawn forward, substantially as described.

4. In a tabulating mechanism, a bar having two flat sides at an angle to each other, a tabulating stop loosely fitted on the bar to slide or turn thereon, and a flat spring rigidly connected to the stop and adapted to bear directly on one or the other of the flat sides on the rod to hold the stop in position thereon, substantially as described.

5. In a tabulating mechanism, the combination with a bar, of a stop mounted to turn or slide on said bar, and a flat spring secured to and extending laterally beyond the stop to engage the bar.

6. In a tabulating mechanism, the combination with a bar, of a stop mounted to turn or slide on said bar, and a spring secured to said stop and engaging the bar on opposite sides of the stop to hold the latter in position on the bar.

7. In a tabulating mechanism, the combination with a bar, of a stop mounted to turn or slide on said bar, and a flat spring secured to the stop and having its end adjacent the bar slotted and projecting beyond opposite sides of the stop to engage the bar.

8. In a tabulating mechanism, a bar having two flat sides at an angle to each other, a tabulating stop loosely fitted on the bar to turn or slide thereon, a flat spring rigidly connected to the stop at one end and slotted at its other end to straddle the stop and extend on both sides thereof to engage one or the other of the flat sides on the rod and frictionally hold the stop in position, substantially as described.

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

EDWIN B. CRAM.

Witnesses:

W. F. CARTER,
E. G. LANGHORNE.