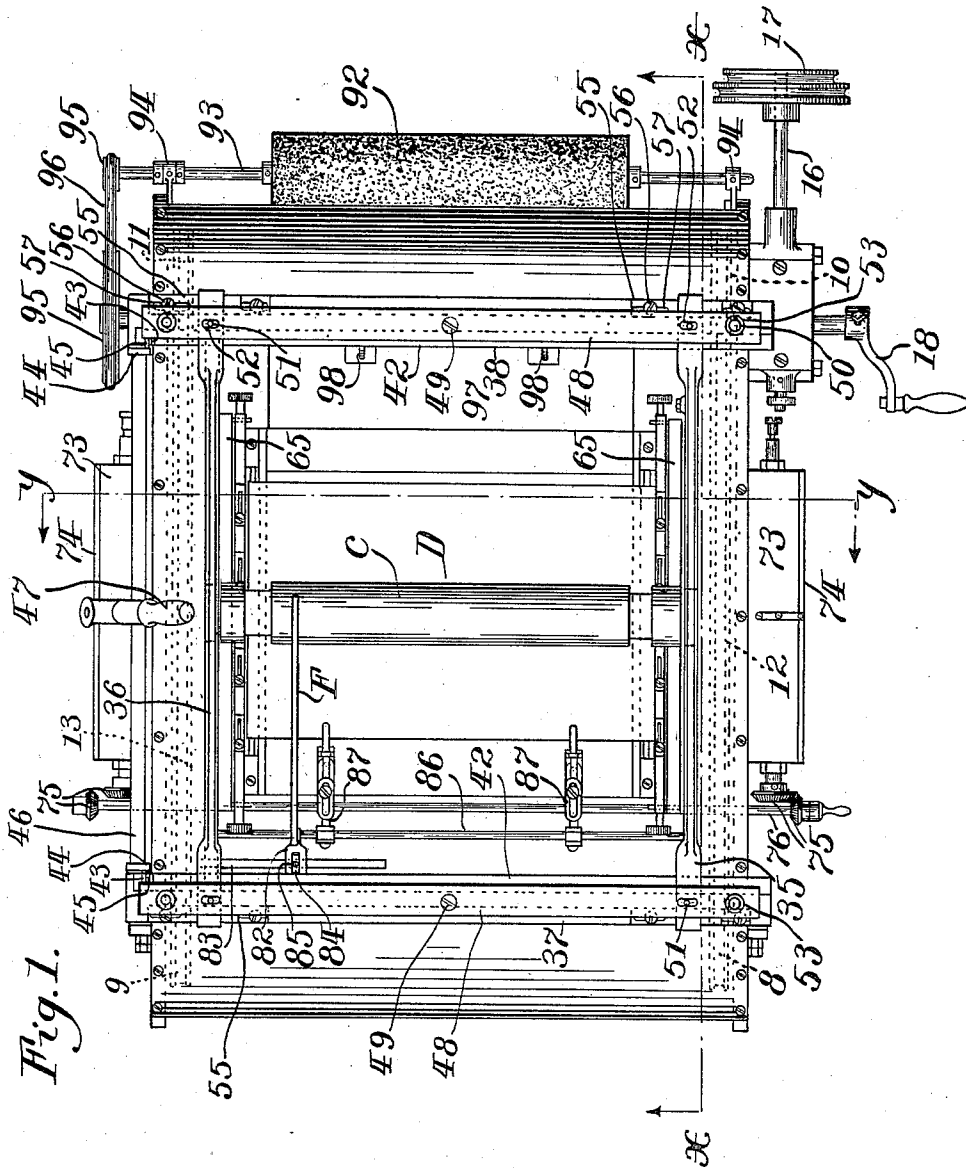


W. A. SORG.
PRINTING MACHINE.
APPLICATION FILED JULY 12, 1909.

1,044,095.

Patented Nov. 12, 1912.

4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

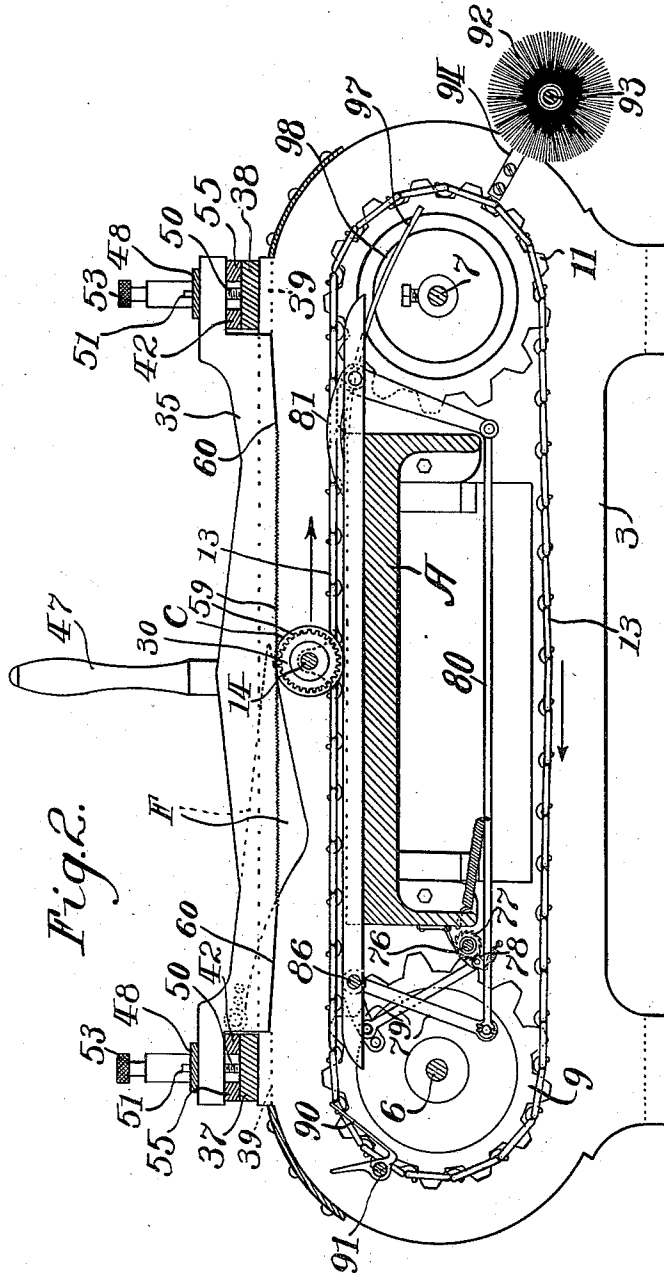


Fig. 2.

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4 SHEETS—SHEET 3.

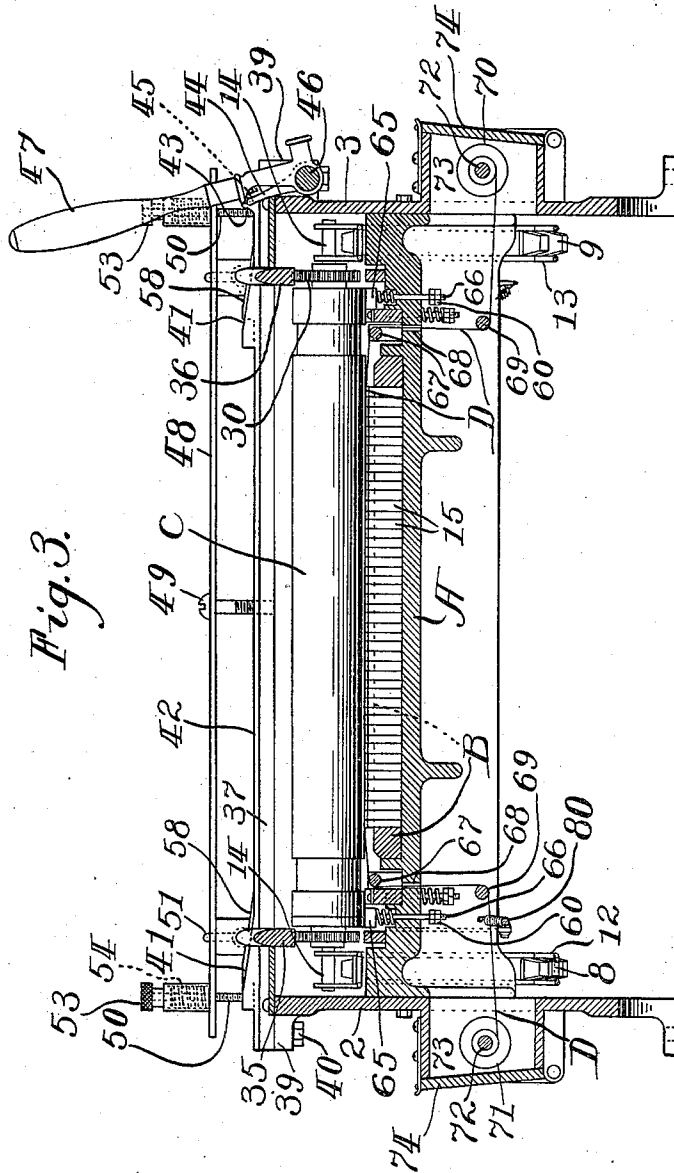


Fig. 3.

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4 SHEETS—SHEET 4.

Fig. 4.

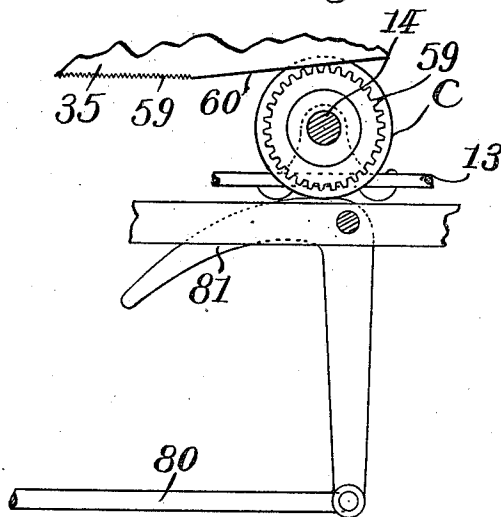
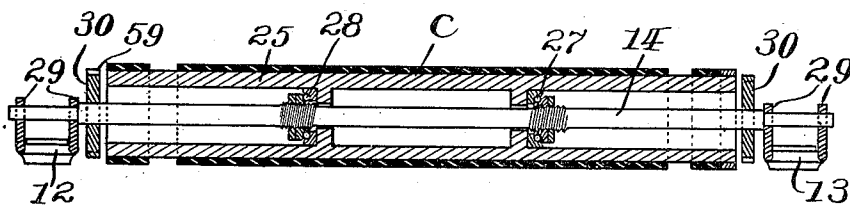


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM A. SORG, OF MINNEAPOLIS, MINNESOTA.

PRINTING-MACHINE.

1,044,095.

Specification of Letters Patent.

Patented Nov. 12, 1912.

Application filed July 12, 1909. Serial No. 507,125.

To all whom it may concern:

Be it known that I, WILLIAM A. SORG, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented a new and useful Improvement in Printing-Machines, of which the following is a specification.

My invention relates to improvements in that class of printing machines employing a type bearing member and an impression platen.

The primary object of this invention is to produce sharp impact between the impression platen and type upon the material being printed whereby perfect imitation of typewriting is produced.

Heretofore it has been customary to employ a single contact by the cooperating printing members upon the sheet of material being printed and the result has been that only a poor imitation of typewriting has been produced and there has been no sharp impact or succession of blows between said cooperating parts as in my invention and I believe myself to be the first to employ any means for producing impact as distinguished from single pressure between the printing parts.

The principle involved in this invention is that the ink from the inking medium is transferred or assisted in being transferred to the material printed upon by vibratory motion or a succession of blows as distinguished from constant pressure without vibration. This is a distinct improvement over prior devices for much less power and ink are required for printing and a much sharper and a more distinct impression is produced by the type.

In the following specification is described one way in which my invention can be carried into use but it will be understood that various modifications and variations may be made without departing from the principles involved.

In the following specification I will describe my invention as applied to the machine which is described in my application for Letters Patent Serial No. 437,302 filed on June 8, 1908, and for greater particularity the details of said machine will be found fully described in the specification accompanying said application.

In the accompanying drawings forming part of this specification Figure 1 is a plan

of a printing machine illustrating my invention; Fig. 2 is a longitudinal section taken on the line X—X of Fig. 1; Fig. 3 is a transverse section taken on the line Y—Y of Fig. 1; Fig. 4 is an enlarged detail view of the impression roller and the cooperating parts which are adapted to produce impact between the printing elements of the machine and Fig. 5 is a longitudinal section of the impression roller a detail of its shaft being shown.

In the drawings A represents a horizontal rigid bed which is secured to sides 2 and 3 forming a stand. Upon the surface of the bed is placed a type form B and at the forward and delivery ends of the frame are journaled in the sides, shafts 6 and 7. Sprocket wheels 8 and 9 are mounted upon the shaft 6 and sprocket wheels 10 and 11 are mounted upon the shaft 7 each pair of said wheels being distanced apart so as to carry a pair of chain belts 12 and 13. Between these belts, a transverse shaft 14 is secured upon which an impression platen roller C is freely journaled. The upper laps of the belts 12 and 13 travel over and the lower laps below the bed and the impression roller is thereby caused to impinge against the type 15 in the type form during each cycle of the belts. The shaft 7 as shown is adapted to be driven by a longitudinal shaft 16 and a drive pulley 17 thereon or the shaft 7 can be driven directly by a hand crank 18 when preferred. The connections between the shaft 7 and the longitudinal shaft 16 are fully set forth and described in detail in my application for patent above referred to.

The platen roller C consists of a shell having on its surface a thin jacket of resilient material such as vulcanized rubber and through which shell the shaft 14 extends longitudinally. The roller is freely journaled upon the shaft 14 by means of ball bearings 27 and 28 of ordinary construction which are located between the ends and within the casing of the roller, the bearing places being situated so that pressure upon the surface of the roller is equally distributed and uniform impression always made. The ends of the shaft 14 are freely journaled in flanges 29 on a pair of the links of the belts. Immediately adjoining each end of the roller, impact guide wheels 30 are rigidly mounted upon the shaft 14.

Above the roller (when on the upper lap

of the belts) is impact mechanism which serves to press the platen roller downwardly toward the type in the form while the platen roller is passing over the type. This impact mechanism has a pair of longitudinal and parallel impact bars or hammers 35 and 36 below the lower edges of which the perimeters of impact wheels 30 run and cause the platen roller to press downwardly upon the sheet of material being printed which is placed above the type in the form. These impact hammers are carried by means of transverse supports 37 and 38 which are rigidly secured upon brackets 39 on the sides of the stand by means of bolts 40. The ends of the bars rest upon inclined upwardly extending draw shoulders 41 which are formed on the upper surfaces of shift bars 42. The shift bars are adapted to slide on the supports 37 and 38. The corresponding ends of the shift bars at one side of the machine are notched at 43 and a pair of crank arms 44 have their power ends 45 in said notches and their work ends rigidly secured upon a longitudinal shaft 46 which is journaled in two of the brackets 39. A handle 47 is secured to the shaft 46 and by swinging it backward and forward said shaft is turned and the shift bars 42 moved. Above the shift bars 42 is a pair of equalizing flat springs 48 the ends of which rest across the ends of the impact bars. These flat springs are secured to the transverse supports 37 and 38 by vertical screws 49 passing through said springs substantially midway between their ends. The ends of the impact bars are held in place by the threaded pins 51 passing freely through slots 52 in the ends of the springs 48 and secured to supports 37 and 38. The ends of the flat springs are held down under pressure over the ends of the impact bars by means of impact helical springs 54 and adjusting nuts 53 which are secured on threaded ends of the stud bolts 50. Below the end of each impact hammer is a stop 55 which is secured to the transverse supports 37 and 38 by means of screws 56 passing through slots 57. These stops have inclined shoulders 58 which limit the downward movement of the impact hammers by their ends resting thereon. By loosening the screws 56, moving the stops and setting said screws, the inclined shoulders 58 can be changed in position to limit the downward movement of the impact bars. All of the inclined shoulders on the stops 55 and shift bars 42 taper in the same direction. As the belts travel around the bed, the impact wheels 30 impinge and run upon the lower edges of the bars and cause the roller to press down toward the type in the form. The wheels 30 and lower edges of the bars are serrated or toothed at 59 the effect of which is to present a succession of high spots between the perimeters of the

wheels and the lower edges of the bars as the wheels roll thus producing a series of blows or vibrations which are imparted by means of the impression roller to the type form. The lower edges of the ends of the impact bars have smooth inclined surfaces 60 thus preventing severe jar between the parts when the wheels 30 run upon or leave the impact bars.

Auxiliary guiding mechanism is provided for preventing the platen roller from coming into contact with the form on the bed and the inking ribbon during the entire movement of said roller when the hammers are in superior position and for revolving the roller forwardly at the same surface speed as that of the belts when the hammers are down. This auxiliary guiding mechanism has a pair of longitudinal track or guide bars 65 one of which is located below each end of the impression roller casing. Each of these track bars 65 is mounted upon a pair of vertical stud bolts 66 to the lower ends of which are secured lock nuts 61 which permit but limited vertical movement of said track bars. Helical springs around said vertical bolts are interposed between said track bars and the bed and have sufficient expansive strength to cause the roller to be lifted with said track bars when the pressure bars are in superior position but are depressed when said pressure bars are down. Thus the pressure bars 35 and 36 serve as guides for causing the platen roller or element to cooperate with the type in the form and the resiliently supported guide bars 65 serve to revolve the impression roller when said bars 35 and 36 are down and to guide the platen element out of cooperation with the type holding element when the impact bars are in superior position.

Suitable means may be provided such as described in my application for patent above referred to for raising the roller in alignment to work generally in a horizontal plane on the bed without disturbing the latter.

Running transversely across the bed and above the type form is a ribbon D of suitable transfer material. This ribbon is carried upon antifriction rollers 67 above the bed thence down through slots 68 in the bed, around antifriction rollers 69 below the surface of the bed, to magazine spools 70 and 71 upon which the ribbon is adapted to be wound. All of these rollers are journaled in the frame. The spools 70 and 71 are mounted upon longitudinal shafts 72 which are journaled on magazine frames 73. These frames are formed on the sides 2 and 3 of the stand and are closed by hinged doors 74. The shafts 72 are of usual construction for supporting magazine spools of the character described and their ends are provided with intermeshing beveled gears 75 connecting

with a counter shaft 76 in the usual manner. Said counter shaft is journaled so as to slide and cause one pair of beveled gears to intermesh while the opposite pair is out of engagement. Thus the spools can be wound either way desired. The counter shaft 76 carries suitable ratchet mechanism 77 which is operated by means of a dog 78, system of levers 79, connecting rod 80 and cam 81 by which the ribbon is spaced a step forward each time the platen passes over the type form. This spacing mechanism will be found described in detail in my application for patent above referred to, said cam being placed in the path of the platen roller to trip the spacing mechanism which operation is described.

A paper guide F is provided in the form of a longitudinal and vertical plate resting normally with its lower edge upon the ribbon above the type form on the bed and is secured to a bifurcated support 82 through which a transverse rod 83 passes. This rod is supported on the side of one of the impact bars 36. A collar 84 through which the rod 83 also passes is secured between the bifurcations of the support 82 by means of the set screw 85. By loosening the set screw, the guide can be set in any desired position transversely. Supported upon the rock shaft 86 is a pair of rear guides 87 for the paper. Each time the impression roller coöperates with the type form, it impinges against the cam 81 of the ribbon feed mechanism and causes the shaft 86 to lift the paper guides 87 and raise the rear edge of the sheet of paper which is placed on the guides 87 and against the guide F. At this instant, a pair of paper removers 90 mounted upon the shaft 91 which is carried by the belts 12 and 13, engage the rear edge of the sheet of paper which has been lifted by the guides and slides the sheet of paper off of the bed.

At the delivery end of the machine is a carrier brush 92 which is mounted upon a transverse shaft 93. This shaft is journaled in bearings 94 and is operatively connected with the shaft 7 by means of pulleys 95 and a belt 96. The surface speed of the brush is greater than the surface speed of the belts and impression roller. A carrier plate 97 is secured to the bed and a pair of carrier wheels 98 secured upon the shaft 7 coöperate with the carrier brush to assist in removing each sheet of paper from the machine after it has been printed. The carrier brush operating at an accelerated speed causes the carrier mechanism to operate efficiently and effectively to the end desired.

In operation the sheets of paper to be printed are placed by hand one at a time against the guides upon the form with their rear edges resting upon the guides 87 and a side edge placed against the guide F. As

the belts move forward the platen roller impinges upon the material being printed and presses down toward the type in the form. The platen roller receiving vibratory motion by contact between the serrated impact wheels 30 and the serrated lower surface 59 of the impact bars causes the platen to vibrate and as it rolls forward, coöperates with the type form and ribbon and prints upon the material lying on the ribbon over the form. As the platen roller advances the strippers 90 follow and engage the rear edge of the material and remove it from the machine.

The platen roller travels over the surface of the type in the form while the ribbon and material being printed upon are interposed between said parts, the force imparted to said roller by the pressure bars being continuous yet varying in degree, thus in effect the platen is vibratory.

The strength of impact is regulated by the impact springs. Tightening these springs has the same effect as a typewriter operator striking the keys harder. Loosening them, vice versa. In construction the impact wheels are cut deep and the impact hammers shallow. This may be reversed or only one of said elements serrated to accomplish substantially equivalent results.

Where the term impact is used throughout the specification and claims, it is intended to imply that the printing impression is made by the coöperating parts through a hammer blow as distinguishing from prior devices in which a constant pressure between the type and the platen not augmented by a blow or blows is employed to more nearly resemble the force delivered by type bars against a platen roller in a typewriting machine.

In accordance with the patent statutes I have described the principles of operation of my invention together with apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the construction shown is only illustrative and that the invention can be carried out by other means and applied to uses other than those above set forth within the scope of the following claims.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:—

1. In a printing machine, two coöperating printing elements, one holding a plurality of rows of type and the other a platen element, means for causing said elements to produce a succession of impact blows together during one operation of said members, each of said blows being imparted against a plurality of type, and means for modifying the strength of said blows, whereby a sharp impression is made upon the material being printed.

2. In apparatus of the class set forth, a

type holding element, a platen element associated with said holding element, said platen element being adapted to travel in an undetermined plane as regards the type, and means for vibrating one of said elements whereby impact is produced upon the material printed.

3. In apparatus of the class set forth, a type form, a pressure platen mounted to travel over said form and means for vibrating said platen; whereby a succession of impact blows are delivered upon the material being printed by the type in said form.

4. In a printing machine, two cooperating printing elements, one a type form and the other a platen roller adapted to pass over the type in said form, means for causing said elements to cooperate and produce a printing impression and means for imparting impacts to one of said elements during each impression, each impact being directed against a plurality of type and means for modifying the strength of said impacts.

5. In a printing machine, two cooperating elements, one a type form and the other a platen roller having a wheel, an impact bar having a rough face with which the periphery of said wheel cooperates causing said roller to produce a plurality of impact blows against said type form each being adapted to be imparted to a plurality of type and means for modifying the strength of said impacts.

6. In apparatus of the class set forth, a supporting frame, a type form on said frame, a pressure platen adapted to be vibrated while in motion and mounted to travel over said form and an inking ribbon between said type form and platen; whereby an impression is adapted to be made by impact between said parts upon the material being printed.

7. In apparatus of the class set forth, a supporting frame, a type form on said frame, a platen roller mounted to travel over said form, an inking ribbon between said type form and platen roller, and hammers cooperating with and adapted to deliver a succession of impact blows upon said roller whereby an impression is made upon the material being printed.

8. In apparatus of the class set forth, a supporting frame, a type form upon said frame, a platen roller mounted to travel over said form, impact wheels carried by said roller and hammer bars cooperating with said impact wheels to press the platen toward said type form and deliver a succession of blows upon the material being printed.

9. In apparatus of the class set forth, a supporting frame, a type form on said frame, an inking ribbon over said type form, a platen roller mounted to travel over said ribbon, wheels carried by said roller having

serrated perimeters and hammer bars cooperating with the perimeters of said wheels to force the platen roller down upon the material being printed and deliver a succession of impact blows by the type upon said material.

10. In a printing machine, a type form bed, a platen element passing over the form of type to produce a printing impression, a ribbon interposed between said elements and over the form of type, means for imparting a succession of oscillations to said platen while it cooperates with a plurality of type in said form to produce a printing impression from said type and means for modifying the strength of said oscillations.

11. In a printing machine, two cooperating printing elements, one holding a plurality of rows of type and the other a platen element, and means for causing said elements to produce a succession of impact blows together during one operation of said members, each of said blows being imparted against a plurality of type, whereby a sharp printing impression is made upon the material being printed.

12. Two cooperating printing elements, one a type form carrying element and the other a platen movable over said carrying element, an inking ribbon between said members, means for causing one of said two cooperating printing elements to produce a succession of impact blows, each blow being transmitted to a plurality of type whereby a sharp impression is made upon the material being printed, and a plurality of devices for regulating the strength of said blows upon different portions of the type form.

13. Two cooperating printing elements, one a stationary type form and the other a movable platen roller and means for imparting to each of said elements a plurality of impact blows, each blow being transmitted to a plurality of type whereby a sharp printing impression is produced upon the material being printed and means for modifying the strength of said impacts.

14. Two cooperating printing elements, one a stationary type form and the other a movable platen roller adapted to cooperate with a plurality of type in said form simultaneously, an inking ribbon passing between said elements and means for imparting to one of said elements a plurality of impact blows, each blow being transmitted to a plurality of said type whereby a sharp printing impression is produced upon the material being printed.

15. In a printing machine, two cooperating printing elements, one a stationary type form and the other a movable platen roller adapted to cooperate with a plurality of type in said form simultaneously and an impact bar cooperating with said roller to

produce a plurality of impact blows by said roller against said plurality of type, whereby a sharp printing impression is produced upon material being printed.

5 16. In a printing machine, two cooperating printing elements, one a stationary type form and the other a movable platen roller, an inking ribbon passing between said elements, and a pair of impact bars bearing
10 down upon said roller to produce a plurality of impact blows as it passes below said bars, whereby a sharp printing impression is produced upon the material being printed.

15 17. In a printing machine, two cooperating elements, one a type form and the other a platen roller having a wheel and an impact bar having a rough face with which the periphery of said wheel cooperates causing said roller to produce a plu-
20 rality of impact blows against said type each blow being imparted to a plurality of type in said form simultaneously, whereby a sharp printing impression is produced upon the material being printed.

25 18. In a printing machine, two cooperating elements, one a type form and the other a platen roller having a wheel, an inking ribbon passing between said form and roller and an impact bar having a rough
30 face with which the periphery of said wheel cooperates causing said roller to produce a plurality of impact blows against the type in said form each blow being imparted to a plurality of type simultaneously, whereby
35 a sharp printing impression is produced upon the material being printed.

19. The combination of a type bearing member, an impression member cooperating therewith, a ribbon passing over said type
40 bearing member and adapted to receive a sheet of paper to be printed, a traveling support upon which said impression member is rotatably mounted, a paper delivery device movable with said support and adapted
45 to engage the paper after printing and deliver the same and means for imparting to said members a plurality of impacts during a printing impression.

20. Two cooperating printing elements,
50 one a type form and the other a platen roller adapted to pass over and cooperate with a plurality of type in said form simultaneously, an inking ribbon passing between said elements, means for causing said ele-
55 ments to cooperate and produce a printing impression and means for imparting impacts to one of said elements during each impression, each impact being directed against a plurality of type.

60 21. In apparatus of the class set forth, a supporting frame, a type form upon said frame, a platen roller mounted to travel over said form, impact wheels carried by said roller, hammer bars cooperating with

said impact wheels to press the platen 65 toward said type form and deliver a succession of blows upon the material being printed and means for modifying the strength of said blows.

22. In apparatus of the class set forth, a 70 supporting frame, a type form on said frame, an inking ribbon over said type form, a platen roller mounted to travel over said ribbon, wheels carried by said roller, ham-
75 mer bars having serrated edges cooperating with the perimeters of said wheels to force the platen roller down upon the material being printed and deliver a succession of im-
80 pact blows by the type upon said material and means for regulating said hammer bars to vary the strength of said blows.

23. In a printing machine, a type form bed, a platen element passing over the form of type to produce a printing impression, a ribbon interposed between said elements 85 and over the form of type, step by step mechanism for feeding said ribbon, means for imparting a succession of impacts to said platen while it cooperates with a plu-
90 rality of type in said form to produce a printing impression from said type and means for modifying the strength of said impacts.

24. In a printing machine, a type form bed, a platen passing over the form of type 95 to produce a printing impression, a ribbon interposed between said elements and over the form of type, step by step mechanism for feeding said ribbon, means for position-
100 ing printing material laterally and longitudinally over the form of type, means for imparting a succession of impacts to said platen while it cooperates with a plurality of type in said form to produce a printing
105 impression from said type and means for modifying the strength of said impacts.

25. In a printing machine, a type form bed, a platen passing over the form of type to produce a printing impression, means for positioning printing material longitudinally 110 and laterally over said form of type, means for imparting a succession of impacts to said platen while it cooperates with a plurality of type in said form to produce a printing
115 impression from said type and means for modifying the strength of said impacts.

26. In a printing machine, a type form bed, a platen passing over the form of type to produce a printing impression, means for inking the type in said form, means for po-
120 sitioning printing material over the form of type, means for imparting a succession of impacts to the type in said form to produce a printing impression from said type and means for modifying the strength of said
125 impacts.

27. In a printing machine, a type form bed, a platen element passing over the form

of type to produce a printing impression, means for inking the type in said form, means for removing the printing material from over said form, means for lifting said printing material in position to be engaged by said removing means after a printing impression has been made, means for imparting a succession of impacts to said platen while it coöperates with a plurality of type in said form to produce a printing impression from said type and means for modifying the strength of said impacts.

28. Two coöperating printing elements, one a type form and the other a platen roller adapted to pass over and coöperate with a plurality of type in said form simultaneously, an inking ribbon passing between said elements, step by step mechanism for feeding said ribbon, means for causing said elements to coöperate and produce a printing impression and means for imparting impacts to one of said elements during each impression, each impact being directed against a plurality of type.

29. Two coöperating printing elements, one a type form and the other a platen roller adapted to pass over and coöperate with a plurality of type in said form simultaneously, an inking ribbon passing between said elements, step by step mechanism for feeding said ribbon, means for causing said elements to coöperate and produce a printing impression, means following said platen roller for removing the printing material from said form, means for positioning the printing material on said form and lifting it into position to be engaged by said removing means and means for imparting impacts to one of said elements during each

impression, each impact being directed against a plurality of type.

30. Two coöperating printing elements, one a type form and the other a platen roller adapted to pass over and coöperate with a plurality of type in said form simultaneously, means for inking the type in said form, means for positioning printing material to register with type in said form, means for causing said elements to coöperate and produce a printing impression and means for imparting impacts to one of said elements during each impression, each impact being directed against a plurality of type.

31. Two coöperating printing elements, one a type form carrying element and the other a platen movable over said carrying element, means for causing one of said coöperating elements to produce a succession of impact blows, each blow being transmitted to a plurality of type in said form whereby a sharp impression is made upon the material being printed and a plurality of devices for regulating the strength of said blows upon different portions of the type form.

32. Three coöperating elements, one a type form, another an impression roller and the other a pressure bar, said bar and roller having serrated contact faces adapted to produce impacts.

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

WILLIAM A. SORG.

Witnesses:

AXEL SUNDBORG,
H. L. FISCHER.