

Jan. 11, 1944.

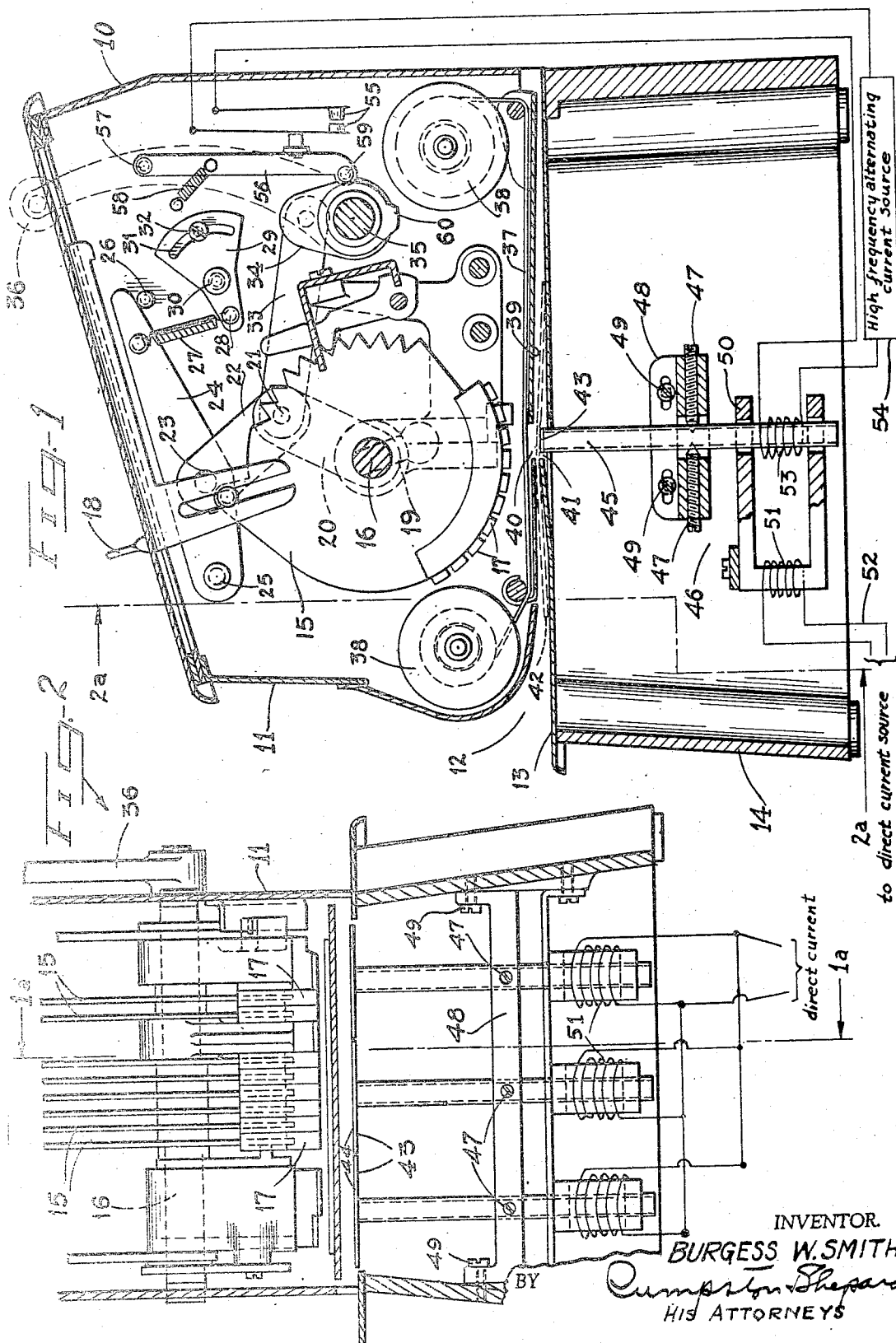
B. W. SMITH

2,339,199

PRINTING APPARATUS

Filed Nov. 6, 1941

3 Sheets-Sheet 1



Jan. 11, 1944.

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PRINTING APPARATUS
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2,339,199

3 Sheets-Sheet 2

Fig-4

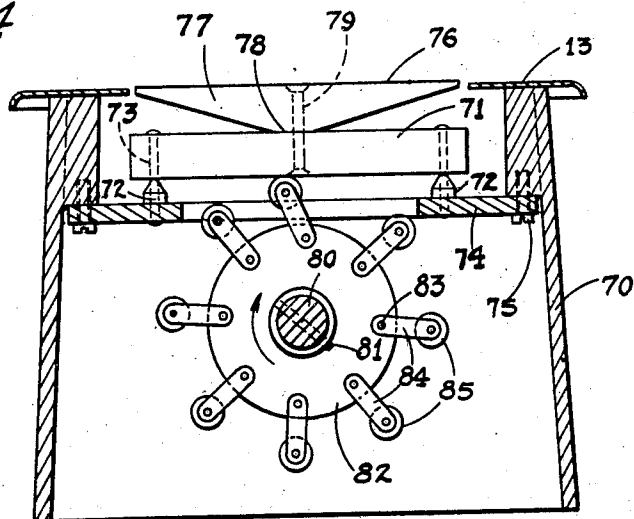
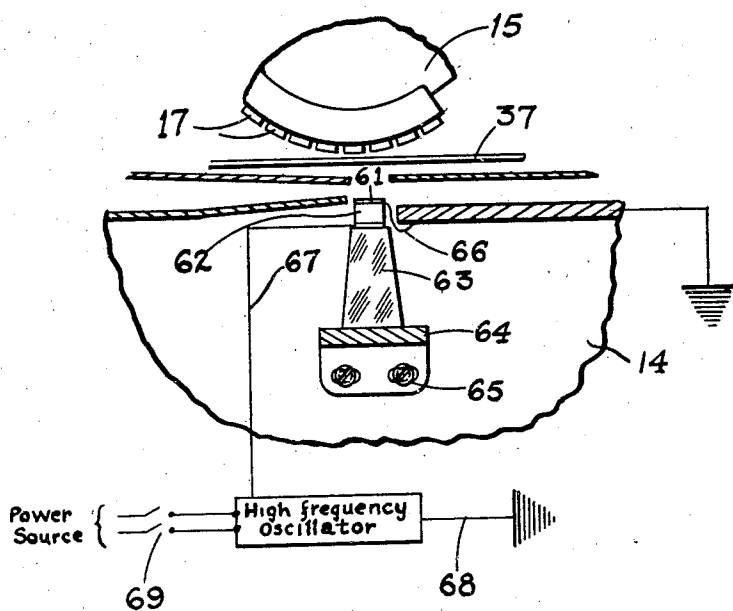


Fig-3



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PRINTING APPARATUS

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3 Sheets-Sheet 3

Fig-5

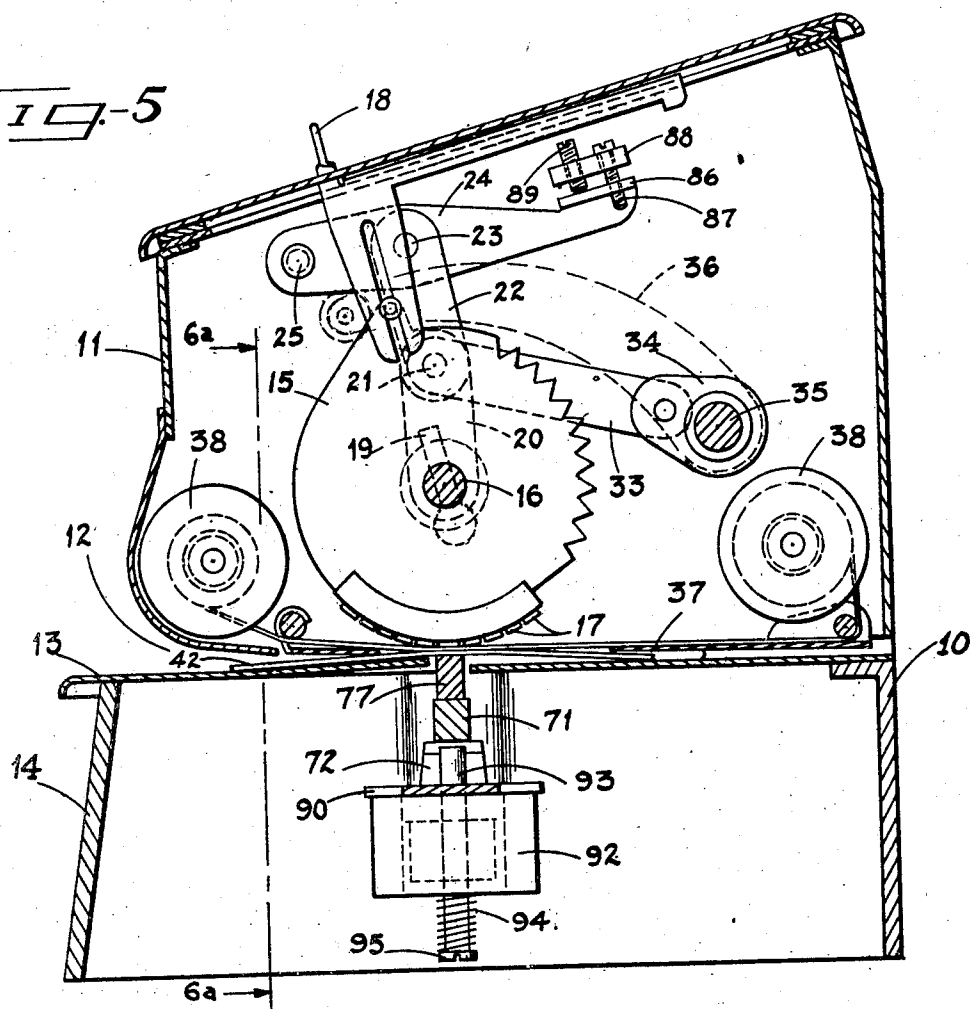
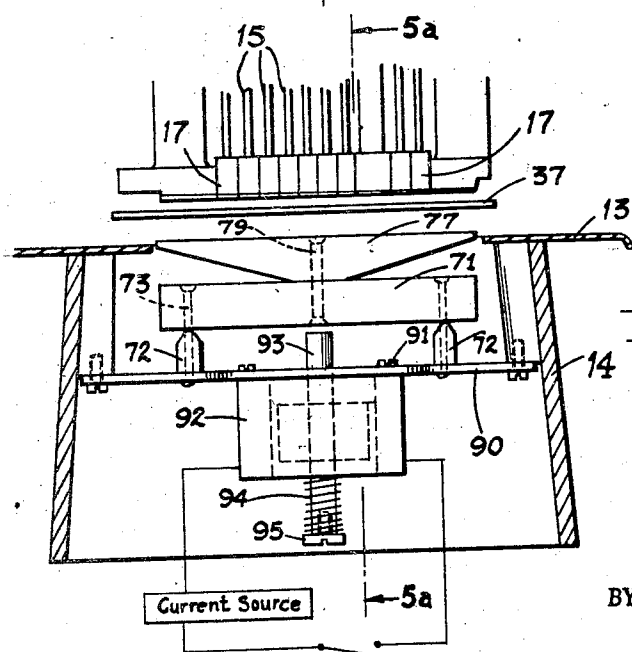


Fig.-6



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UNITED STATES PATENT OFFICE

2,339,199

PRINTING APPARATUS

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Application November 6, 1941, Serial No. 418,056

17 Claims. (Cl. 101—19)

This invention relates to printing apparatus and, more particularly, to apparatus for printing monetary values or other subject matter on checks or other negotiable or valuable papers, in an indelible and protective manner, one object of the invention being to provide an improved apparatus of the above character capable of impressing the paper sheet in such a way as to increase the impregnation of the paper by the printing ink and thereby increase the indelibility and safety of the impression against alteration.

Another object of the invention is to provide an improved apparatus of the character described adapted to afford a more thorough impregnation of the paper by the ink without substantially mutilating or roughening the paper.

A further object is to provide such an apparatus for obtaining a more efficient penetration of the printing ink into the paper by a lower pressure of the members of the printing couple on the paper sheet and in a shorter time.

Still a further object is to provide an apparatus for increasing the penetration of printing impressions into the paper by the use of supersonic or high frequency vibrations of one of the members of the printing couple.

This application is a continuation in part of my copending application, Serial No. 265,876, filed April 4, 1939, Method of and apparatus for printing or otherwise marking on paper.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a sectional elevation of a printing machine, taken substantially on the line 1a—1a in Fig. 2 and showing one embodiment of my invention;

Fig. 2 is a fragmentary sectional elevation of the same substantially on the line 2a—2a in Fig. 1;

Fig. 3 is a fragmentary sectional elevation of parts shown in Fig. 1, but illustrating another embodiment of the invention;

Fig. 4 is a sectional elevation of the lower or platen portion of the machine illustrating a further embodiment;

Fig. 5 is a sectional elevation substantially on the line 5a—5a in Fig. 6 and illustrating still a further embodiment; and

Fig. 6 is a sectional elevation substantially on the line 6a—6a in Fig. 5.

The invention is herein disclosed, by way of

illustration, as embodied in a portable printing apparatus of the type known as a check printing machine. Such machines have been commonly made in various forms, generally comprising a portable frame and casing formed with a throat or slot to receive the check or other work sheet between one or more settable type members in a casing portion above the work and a platen in the casing portion below it, suitable means being provided for moving one of the members of the printing couple toward the other to effect the printing impression.

In the present instance, a printing machine of the above character is disclosed preferably having substantially the construction of that disclosed in the United States patent to Walter B. Payne, No. 2,022,136, dated November 26, 1935, to which reference may be made for a more detailed and complete description. Referring first to Figs. 1 and 2 of the drawings, such a machine comprises a supporting frame and casing indicated generally at 10, with an upper portion 11 arranged over a work receiving throat or slot 12 above a work supporting bed 13 on a lower or base portion 14 of the frame. One or more settable type carrying wheels 15 are mounted for rotation on a shaft 16 to selectively position one or more type characters 17 at the impression point, the type wheels being so positioned by means of settable finger pieces 18 movable along an indicating dial on the frame, as well understood in the art.

The printing wheels 15 are preferably movable toward and from the platen in the frame below an opening in the work bed, for which purpose the ends of shaft 16 are slidably mounted in slots 19 in the side walls of frame portion 11. Such printing movement is produced, in the present instance by a toggle mechanism comprising a link 20 pivotally connected at one end with shaft 16 and having its upper end pivotally connected, at the knee joint 21, with the lower end of the other toggle link 22, the upper end of which is pivotally connected at 23 with an arm 24 having its forward end pivotally mounted as at 25 on the side wall of the frame. Arm 24 has its rear end pulled toward a stop pin 26 on the casing by connection with a tension coil spring 27, the other end of which is secured as at 28 to one end of an anchor clip 29 pivotally mounted at 30 on the frame. Clip 29 is formed with a slot 31 embracing a stud 32 by means of which it is clamped in a suitable position for maintaining the desired tension on spring 27, the arm 24 and the toggle linkage connected therewith.

The means for actuating the toggle mechanism comprises a link 33 pivotally connected at one end with the toggle knee 21 and at its other end with an arm 34 fixed on a shaft 35 rotatably mounted at its ends in the side walls of the frame. A handle 36 is fixed on the shaft outside the frame for oscillating it to actuate the toggle mechanism, to produce the printing impression of the type members 15, with a pressure controlled by the adjustable tension applied to arm 24 by spring 27. It is apparent that in the event of the development of excessive printing pressure due, for example, to variations in the thickness of the work, spring 27 allows arm 24 to rise and limit such pressure to a predetermined desirable amount.

The inking means may be of any known or suitable variety comprising, preferably, in this instance, an inking ribbon 37 wound at its ends on rotary spools 38 in the frame, with any known or suitable means for feeding the same as disclosed, for example, in said Letters Patent and well understood in the art. The ribbon extends above the work protecting plate 39 having an opening or slot 40 to expose the type at the printing point above a similar opening 41 for the platen in the work bed 13. The paper work sheet is indicated at 42.

In the embodiment of my invention disclosed in Figs. 1 and 2 of the drawings, I preferably employ a platen member of relatively small mass capable of being vibrated at supersonic frequencies to augment and intensify periodically or intermittently with high frequency, the force by which the members of the printing couple are held in clamping engagement with the work during the printing impression or cycle. The platen member is preferably associated in a substantially direct way with, or may even be actually part of the vibrating element of one of the known types of supersonic generators hereafter described, and such generator is energized by a source of alternating current of supersonic frequency of any known or suitable type such, for example, as the known vacuum tube oscillator circuit. When employed in combination with a printing machine of the variety described above, in which the type member is the one which is moved to bring about the printing impression of the members of the printing couple against the work sheet, such platen member is preferably mounted in a substantially rigid way on the frame of the machine to support it for cooperation with the type in such printing pressure against the work.

One suitable construction of the above character is illustrated in Figs. 1 and 2 of the drawings, comprising preferably a supersonic generator of the known magnetostrictive variety, such as disclosed in detail, for example, in an article entitled "Magnetostrictive oscillator," by George W. Pierce, published in the Proceedings of the Institute of Radio Engineers, for January, 1929, volume 17, beginning at page 42. In this embodiment the platen member is in the form of one or more relatively thin, flat metal bars 43 having an upper surface 44 of suitable area for printing cooperation with the type to be impressed upon the work. Such platen bars 43 are preferably fixed rigidly on the upper end of a hollow tube or rod 45 of nickel, invar, or nichrome alloy, forming the vibrating element of the magnetostrictive generator or oscillator indicated generally at 46. Tube 45 is rigidly supported on the frame of the machine by the engagement, in suitable sockets formed therein, of pointed studs

47 threadedly engaged in a rigid cross bar 48 fixed at its ends to the side walls of the frame, as by means of the screws 49.

The rod or tube 45 of the vibration generating mechanism is preferably polarized by arranging it, as shown, to bridge the core 50 of a suitable magnetizing coil 51 connected as at 52 with a suitable source of direct current. Rod 45 is energized by a winding 53 connected with any known or suitable source of intermittent current of supersonic frequency, such as the known vacuum tube oscillator circuit indicated generally at 54, as well understood in the art. For this purpose I have found it to be desirable, for best results, to employ frequencies at least as high as fifteen thousand (15,000) cycles per second.

It is apparent from the above described construction that with the rod 45 polarized by the means described, and energized by inclusion in the circuit of the high frequency intermittent current source, rod 45 is subjected to periodic or intermittent elongation and contraction as well understood in the art, such periodic elongation and contraction of the rod 45 causing its upper end and the superposed platen 43 to vibrate so as to periodically or intermittently augment and intensify the printing pressure initially applied by downward movement of the type member by means of the handle 36.

While the amplitude of vibration of the platen so produced is very small, the pressure applied thereby is of high intensity. I have found that the combination with the printing impression of the intensive impact action of such high frequency vibrations of one member of the printing couple produces a substantially deeper and increased impregnation of the paper by the printing ink and that the penetration of the ink into the paper continues to progress for an appreciable period of time after the printing impression is completed. The theory of this result may not now be fully understood. The impacts of the platen upon the paper may effect repeated compression and expansion of the paper in contact with the printing ink, with a tendency to work the ink into the fibrous structure of the paper. It is believed to be possible, also, that the supersonic frequency of the impressed energy tends to break up and reduce the size of the pigment particles of the ink and thus facilitate their penetration into the texture of the paper.

Whatever the precise nature of such action, it has been found to produce a sufficient improvement in the penetration of the work to permit of the employment of a substantially smaller initial or static force or pressure of the members of the printing couple against the work during the printing impression or cycle. I have found for example, that the degree of impregnation of the work by prior methods requiring between 1000 to 1500 pounds of static pressure between the printing couple, may be equaled or surpassed by my method with a pressure of only 40 pounds static pressure between the printing couple, augmented by pressures of between 300 and 400 pounds of dynamic pressure produced by the high frequency vibrations described above. By this method, therefore, an impregnation of the work may be accomplished with substantially reduced pressures, in less time, with less embossing or roughening of the paper surface and less strength and weight in the parts of the printing machine.

The embodiment of my invention shown in Fig. 1 of the drawings preferably comprises automatic means, actuated by the operation of the printing

handle 36, for starting and stopping the operation of the magnetostrictive generator. This is accomplished in the present instance by including in the high frequency circuit a pair of switch contacts 55, one of which is spring actuated to normally open the switch. Such spring contact is engaged by an abutment on an arm 56 pivoted to the frame at 57 and urged by a spring 58 to hold a roller 59 at its other end in contact with a cam 60 fixed on the operating shaft 35.

It is apparent from this construction that when the operating handle 36 is pulled forwardly and downwardly to produce and maintain the continuous static pressure of the printing members against the work, during the printing cycle, cam 60 operates after such engagement of the work, to close the switch contacts 55 and initiate operation of the vibrating mechanism, the action of which is continuous during the printing impression or cycle until handle 36 is released when the action of the mechanism is terminated just prior to release of the work by the printing couple. But the mechanism may be arranged, of course, as by omitting switch contacts 55, so that the operation of the generator is continuous during the use of the machine. In any event the paper sheet is thus clamped and held between the members of the printing couple during the action of the vibrating mechanism so as to prevent any creeping of the sheet relative to the type member.

Fig. 3 of the drawings shows another variety of vibrating mechanism of the supersonic generator type which may be employed in my invention, comprising the known piezoelectric vibrator. This embodiment includes a type member or members 15 of the same character and supported and operated by the same means as described in connection with the modification of Fig. 1. The platen in this embodiment, however, is preferably a thin metal plate 61 fixed on the upper surface of the crystal 62 which, in turn, is fixed on and supported by the upper end of a standard 63 of suitable insulating material, such as glass, porcelain, or the like, which is fixedly mounted upon a metal bar 64 fixed at its ends on the side walls of the frame as at 65 and corresponding generally with the bar 48 of the modification of Fig. 1.

The upper surface of the crystal, as well understood in the art, is covered with metal foil, or a metallic coating to which is connected a conductor 66 grounded on the printing bed forming part of the frame of the machine. If desired, the coated surface of the crystal may itself serve as the platen surface so that the platen may be constituted by a part of the vibratory element of the generator itself. The under surface of the crystal is similarly coated and connected at 67 with any suitable source of alternating current of supersonic frequency such as the known vacuum tube oscillator circuit, the other side of which is grounded at 68 on the frame. The high frequency oscillator circuit is energized in the known way by connection, as shown, with the usual power line, such connection being controlled by a switch 69. In this modification the supersonic generator may operate continuously during the use of the machine, or only during each printing impression or cycle, as controlled by operating the switch 69.

It will be understood that such piezo crystal and platen surface may be employed in a multiple number, as in the case of the modification shown in Figs. 1 and 2 of the drawings and while the platen surfaces herein described in connection

with each modification are smooth surfaces cooperating with smooth-faced type, it will be evident to those skilled in the art that such platen and type faces may, if desired, be grooved, serrated, or otherwise roughened to effect more or less disruption of the paper surface, as commonly a practice in the prior devices in this field.

In the above described embodiments of my invention, while the work is held by the static pressure of the printing couple applied by one means, such pressure is repeatedly augmented and intensified by other and separate means comprising the substantially direct association of a vibrating mechanism to a platen mounted in such a way as to substantially rigidly oppose the pressure of the type members. In the above modifications the platen is of insignificant mass so that it responds in a sensitive way to actuation by the vibrating mechanism. I have further found that this principle of construction may be embodied in a somewhat different form illustrated in Fig. 4 of the drawings in which the lower portion of the machine frame is shown at 70 in substantially the same form as before, the upper portion of the frame, the type member and associated parts remaining the same as in the above modifications. In the form of Fig. 4, however, the platen surface is carried by a vibratory element which has substantial vertical thickness as represented by the bar 71 of steel or other suitable metal. This bar is supported at spaced points adjacent its ends on rigid abutments 72 having, at their tops, relatively thin edges extending transversely of the length of the bar and forming substantially knife edge supports. Small bolts 73 are employed for fixedly mounting the bar on the abutments, the latter being fixed on a bed 74 as by extending the bolts 73 therethrough, as shown. Bed 74 is secured by means of screws 75 to the frame 70. The impression or platen surface 76 is formed on an auxiliary bar 77 of steel or other suitable metal having its under side tapered to a narrow base 78 fixed to the center portion of the bar 71 as by means of a through bolt 79, as shown, so that the auxiliary bar 77 is, in effect, a rigid extension of the central portion of bar 71 and partakes of the vibration imparted to the latter.

The platen surface illustrated in Fig. 4 is vibrated in one form of construction by means of a shaft 80 rotated by any known or suitable means such as an ordinary electrical motor at an ordinary speed of say 1750 R. P. M. Fixed on shaft 80, as by means of a pin 81 is a wrist plate 82 to which are pivoted, as at 83, a series of arms 84 each carrying at its outer end an impact roller 85 arranged to strike and vibrate the bar 71 during the rotation of the shaft, as shown.

Bar 71 has its support points or lugs 72 so spaced from each other longitudinally of the bar, with regard to its vibrational factors of dimensions, materials, or the like, as to afford a desired frequency of vibration of the platen surface corresponding to the frequency of the impacts of the hammers formed by the rollers 85, in either direct or some harmonic relation. It is evident then that the platen surface 76 is so mounted as to substantially rigidly oppose the printing pressure of the type member and yet to vibrate during the printing impression or cycle so as to repeatedly augment and intensify the printing pressure and increase the penetration of the ink, as in the modifications described above. This form of embodiment, however, is better adapted for vibrations of somewhat less rapidity in what is known as the audio-frequency range.

Still a further form of embodiment is shown in Figs. 5 and 6 of the drawings in conjunction with a similar printing mechanism. The upper portion of the machine, type member and associated parts are the same as above, except that the toggle supporting arm 24 is formed at its rear end with a flange 86 into which is threaded a set-screw 87 rotatably carried in a lug 88 on the side wall of the frame. A second set-screw 89 is threadedly engaged with lug 88 and bears at its lower end against flange 86 to lock arm 24 in a desired position of adjustment, instead of the spring and anchor clip arrangement shown in Fig. 1.

The bar 71 of Figs. 5 and 6 and its auxiliary impression portion 77 are the same as described above in connection with Fig. 4 and bar 71 is rigidly mounted adjacent its ends on similar narrow supports or lugs 72. The latter are fixed on a bed 90 rigidly carried by the frame. Fixed to the bed 90 as by means of screws 91 is a vibration generating mechanism comprising a solenoid coil indicated generally at 92 having a vibrating core in the shape of an element or rod 93. Coil 92 is of any known or suitable variety for energization by alternating current of ordinary commercial power line frequency and voltage, and is so located as to position the upper end of its core 93 in close proximity to the under side of the central portion of bar 71. A compression coil spring 94 is preferably provided between a head 95 on the core and the adjacent end of the coil 92 so as to augment the gravity pull when the core is lifted by the action of the coil, the core being provided with any suitable stop means (not shown) for normally holding it in this position to insure rapid retraction of the core from the bar after each impact thereon. The spacing of the support points 72, longitudinally of the bar 71, is so chosen, in relation to the vibrational factors of the bar and the frequency of the impacts of the core rod 93 that the central portion of bar 71 is vibrated, in direct or harmonic relation with the impacts of the solenoid core. This construction thus embodies the same principle of construction and operation as described above in connection with the other modification and is adapted for producing vibrations of lower frequencies where desired.

The operation of the above embodiments of my invention is indicated in the above description of their construction. A check or other paper sheet is inserted into the throat of the machine above the work bed and between the normally separated members of the printing couple. Handle 36 is operated to bring the printing members into engagement with the paper with an initial, continuous, or static pressure of predetermined amount, controlled by the adjusting means associated with the arm 24. The type, inked by the means described, is thus first impressed with predetermined, suitable force upon the paper against the platen member or members located below the work bed and the paper is thus clamped and maintained in fixed position by such initial engagement of the printing members. As such clamping pressure is continuously maintained during the printing cycle, the platen member or members are intensively vibrated against the paper at frequencies of the order indicated so as to intensively augment the static pressure between the members of the printing couple separately applied through the operating handle 36. By this means the paper is securely clamped in place throughout the impression cycle, thereby

avoiding any shifting of its position by the applied vibrations which would otherwise tend to cause the paper to creep and produce a blurred or smeared and indistinct impression.

It is apparent that the members of the printing couple are normally positioned at any convenient distance from one another, to facilitate inking, the insertion of the work, and the like, and they are initially brought together in printing engagement with the work by means independent of the mechanism by which one of the members is vibrated. Such vibrating mechanism is not adapted to serve as the sole means for moving the printing members because, in the absence of other holding means for the paper, such mechanism tends to cause the paper to vibrate and creep, relatively to the type, so as to blur the impression. In the case of vibrations of the supersonic order, at least, such vibrations are too minute in amplitude to effect the necessary range of movement of the members of the printing couple toward and from each other, and it may therefore be said that such initial work engaging movement of the printing members serves to condition them for the application of such supersonic vibrations. The substantially rigid mounting of the platen and the substantially direct engagement with it of the vibrating mechanism, without motion transmitting, energy absorbing, intermediate connections bring about an intensive, penetrative character of impression of the ink on the paper, with lower pressures, less mutilation of the paper and greater rapidity than heretofore attained in the field of this invention.

It will thus be seen that the invention accomplishes its objects and while I have disclosed the same in preferred forms of embodiment, it is to be understood that such disclosure is intended by way of illustration and not by way of limitation, as it is contemplated that various changes and modifications will occur to those skilled in the art, within the scope of the appended claims.

I claim:

1. A machine for protectively printing a paper sheet comprising a type member, a platen member, inking means for said type member, operating means for effecting an initial relative movement of said members into engagement with opposite sides of said sheet and maintaining said members in continuous pressure thereagainst during the printing cycle, to clamp and hold the sheet against displacement relative to said type member, and a vibration generating mechanism in substantially direct engagement with said platen for vibrating the same to intermittently augment and intensify the pressure of said members on said sheet and increase the penetration of the ink into the sheet.
2. A machine for protectively printing a paper sheet comprising a type member, a platen member, inking means for said type member, operating means for effecting an initial relative movement of said members into engagement with opposite sides of said sheet and maintaining said members in continuous pressure thereagainst during the printing cycle, to clamp and hold the sheet against displacement relative to said type member, one of said members being mounted to substantially rigidly oppose the pressure thereagainst of the other of said members, and a vibration generating mechanism in substantially direct engagement with said rigidly mounted member for vibrating the same to intermittently augment and intensify the pressure of said mem-

bers on said sheet and increase the penetration of the ink into the sheet.

3. A machine for protectively printing a paper sheet comprising a type member, a platen member, inking means for said type member, operating means for moving said type member toward said platen member to engage said sheet therebetween and maintain said members in continuous pressure thereagainst during the printing cycle, to clamp and hold the sheet against displacement relative to said type member, and a vibration generating mechanism in substantially direct engagement with said platen member for vibrating the same to intermittently augment and intensify the pressure of said members on said sheet and increase the penetration of the ink into the sheet.

4. A machine for protectively printing a paper sheet comprising a type member, a platen member of relatively light mass adapted to be vibrated at high frequencies, inking means for said type member, operating means for effecting an initial relative movement of said members into engagement with opposite sides of said sheet and maintaining said members in continuous pressure thereagainst during the printing cycle, to clamp and hold said sheet against displacement relative to said type member, and a high frequency vibration generating mechanism in substantially direct engagement with said platen member for vibrating the same with high frequency to intermittently augment and intensify the pressure of said members on said sheet and increase the penetration of the ink into the sheet.

5. A machine for protectively printing a paper sheet comprising a type member, a platen member of relatively light mass adapted to be vibrated at high frequencies, inking means for said type member, operating means for effecting an initial relative movement of said members into engagement with opposite sides of said sheet and maintaining said members in continuous pressure thereagainst during the printing cycle, to clamp and hold said sheet against displacement relative to said type member, said platen member being mounted to substantially rigidly oppose the pressure thereagainst of said type member, and a vibration generating mechanism in substantially direct engagement with said platen member for vibrating the same at high frequency to intermittently augment and intensify the pressure of said members on said sheet and increase the penetration of the ink into the sheet.

6. A machine for protectively printing a paper sheet comprising a type member, a platen member, inking means for said type member, operating means for effecting an initial relative movement of said members into engagement with opposite sides of said sheet and maintaining said members in continuous pressure thereagainst during the printing cycle, to clamp and hold the sheet against displacement relative to said type member, one of said members being of relatively light mass adapted to be vibrated at supersonic frequencies and being mounted to substantially rigidly oppose the pressure thereagainst of the other of said members, and a supersonic generator in substantially direct engagement with said member of light mass for vibrating the same with supersonic frequency to intermittently augment and intensify the pressure of said members on said sheet and increase the penetration of the ink into the sheet.

7. A machine for protectively printing a paper sheet comprising a type member, a platen mem-

ber, inking means for said type member, operating means for effecting an initial relative movement of said members into engagement with opposite sides of said sheet and maintaining said members in continuous pressure thereagainst during the printing cycle, to clamp and hold the sheet against displacement relative to said type member, one of said members being of relatively light mass adapted to be vibrated at supersonic frequencies and being mounted to substantially rigidly oppose the pressure thereagainst of the other of said members, and a magnetostrictive oscillator in substantially direct engagement with said member of light mass for vibrating the same with high frequency to intermittently augment and intensify the pressure of said members on said sheet and increase the penetration of the ink into the sheet.

8. A machine for protectively printing a paper sheet comprising a type member, a platen member, inking means for said type member, operating means for effecting an initial relative movement of said members into engagement with opposite sides of said sheet and maintaining said members in continuous pressure thereagainst during the printing cycle, to clamp and hold the sheet against displacement relative to said type member, one of said members being of relatively light mass adapted to be vibrated at supersonic frequencies and being mounted to substantially rigidly oppose the pressure thereagainst of the other of said members, and a piezo crystal vibrator in substantially direct engagement with said member of light mass for vibrating the same with supersonic frequency to intermittently augment and intensify the pressure of said members on said sheet and increase the penetration of the ink into the sheet.

9. In a machine for protectively printing a paper sheet, the combination of a type member, a vibratory element and means for substantially rigidly supporting the same at spaced nodal points, a platen surface supported by said element at an intermediate anti-nodal point thereof, operating means for producing relative movement of said member and platen surface to effect a printing impression on said sheet and a vibration generating mechanism arranged for substantially direct engagement with said element at an intermediate anti-nodal point for vibrating the same and said platen surface to intermittently augment and intensify the printing pressure and increase the penetration of the printing ink.

10. In a machine for protectively printing a paper sheet, the combination of a type member, a bar and means for substantially rigidly supporting the same at spaced nodal points, a platen surface secured to said bar solely at an intermediate anti-nodal point, operating means for producing relative movement of said member and platen surface to effect a printing impression on said sheet, and a vibration generating mechanism arranged for substantially direct engagement with said bar at said anti-nodal point for vibrating the same and said platen surface to intermittently augment and intensify the printing pressure and increase the penetration of the printing ink.

11. In a device of the class described, a printing couple including a type member and a platen member having a surface adapted for cooperation with said type member, inking means for said type member, means for supporting a sheet between said members, operating means for moving

said type member into cooperation with said platen member and other means for vibrating said platen member. said last mentioned means including a supersonic generator having a rigidly mounted vibrating element rigidly secured to said platen member for vibrating the same at supersonic frequencies.

12. In a device of the class described, a printing couple including at least one type element and at least one platen element having a surface adapted for cooperation with said type element, an ink transfer strip extending between the elements of the printing couple, means for supporting a sheet or the like between said transfer strip and said elements, means for moving one of said elements into cooperation with the other of said elements, other means for vibrating said platen element, said last mentioned means including at least one rod rigidly secured to said platen element substantially at right angles to said surface, and means for applying an alternating electromagnetic field directly to said rod for deforming the same longitudinally at frequencies in excess of commercial power frequencies.

13. In a machine for protectively printing a paper sheet, the combination with a printing couple including a platen member and a type member, inking means associated with said printing couple, operating means for initially moving said type member into cooperative engagement with said platen member, an electro-mechanical vibrating mechanism having a substantially direct connection with said platen member for vibrating the same to periodically augment the printing pressure between said type and platen members and increase the penetration of the ink into the sheet, an electric circuit for energizing said mechanism, switch means for controlling said circuit, and means actuated by said operating means for actuating said switch and energizing said mechanism in timed relation with the printing movement of said type member.

14. In a machine for protectively printing paper sheets, the combination with a printing couple including a platen member and a type member, inking means associated with said printing couple, operating means for initially moving said type member of the printing couple into cooperative engagement with said platen mem-

ber to impress a sheet therebetween, electro-mechanical mechanism operatively connected to said platen means for vibrating the same at high frequencies to accentuate the impression marked on the sheet, and switch means for controlling said electro-mechanical mechanism, said switch means being under the control of said operating means so as to energize said electro-mechanical mechanism at a predetermined part of the cycle of operation of said operating means.

15. A machine for protectively printing a work sheet comprising a type member, a platen member, inking means for said type member, operating means for effecting relative movement of said members into printing engagement with opposite sides of said sheet and maintaining said members in continuous pressure thereagainst during the printing cycle, to clamp and hold said sheet against displacement relative to said type member, and a vibration generating mechanism distinct from said operating means and in substantially direct engagement with one of said members for vibrating the same while maintained under continuous pressure against said sheet, to increase the penetration of the printing ink into the sheet.

16. A machine for protectively printing a paper sheet comprising a vibratory element supported at its outer portions only and having an impression surface formed thereon adjacent its unsupported inner portion, and a vibration generating mechanism arranged for substantially direct engagement with said inner portion to vibrate the same and said impression surface to increase the penetration of the printing ink.

17. A machine for protectively printing a paper sheet comprising a type member, a vibratory element supported at its outer portions only and having an impression surface formed thereon adjacent its unsupported inner portion, operating means for producing relative movement of said member and impression surface to effect a printing impression on said sheet, and a vibration generating mechanism arranged for substantially direct engagement with said inner portion to vibrate the same and said impression surface to increase the penetration of the printing ink into the sheet.

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