F. SCHIMMEL.

MACHINE FOR SETTING AND CASTING FROM LINES OF TYPE MATRICES.

APPLICATION FILED DEC. 5, 1908.

1,038,445.

Patented Sept. 10, 1912.

6 SHEETS—SHEET 1.

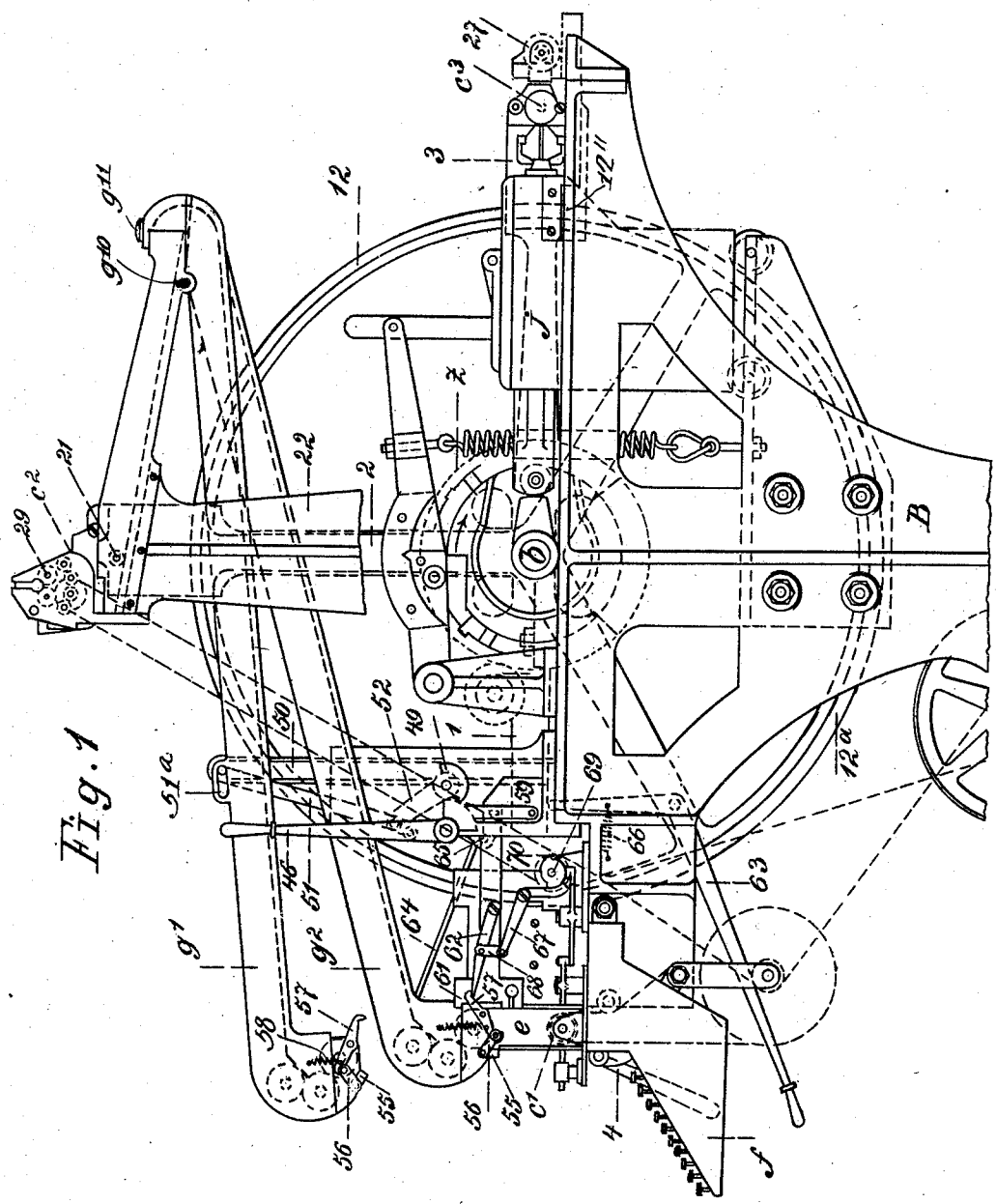


Fig. 1

Witnesses:
H. V. Brown
Walter N. Harris

Inventor:
Franz Schimmel,
By Wilkinson
Attorney.

F. SCHIMMEL.

MACHINE FOR SETTING AND CASTING FROM LINES OF TYPE MATRICES.

APPLICATION FILED DEC. 5, 1908.

1,038,445

Patented Sept. 10, 1912.

6 SHEETS—SHEET 2.

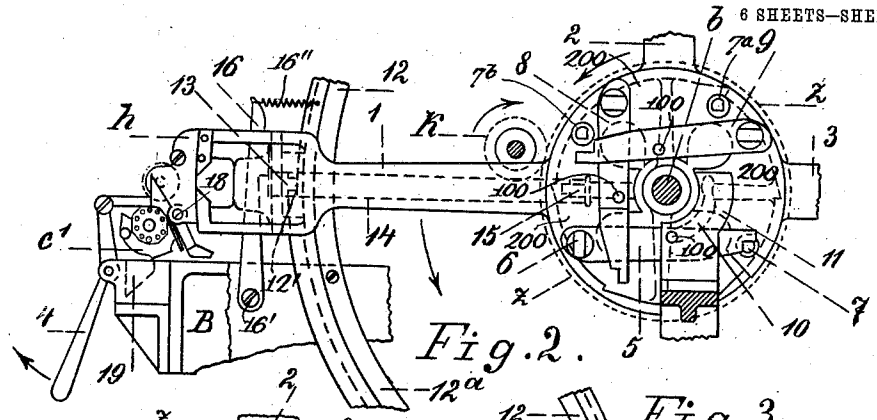


Fig. 2.

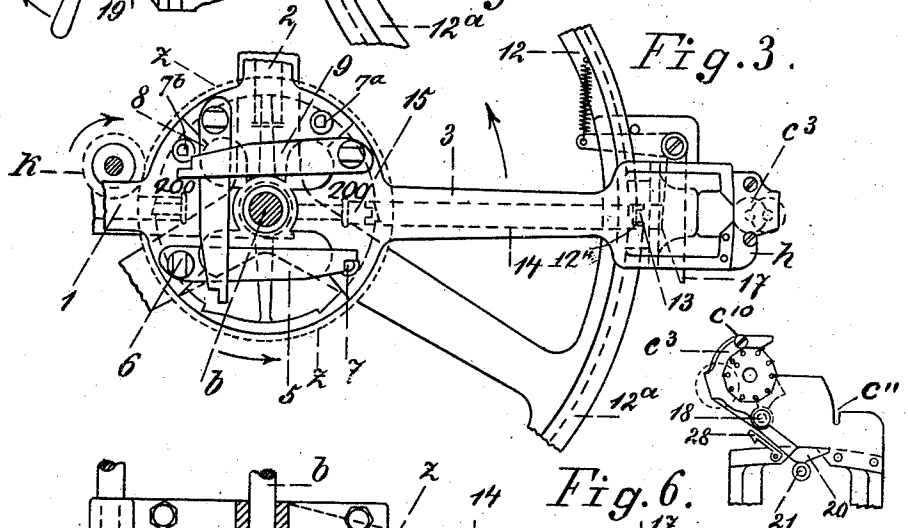


Fig. 3.

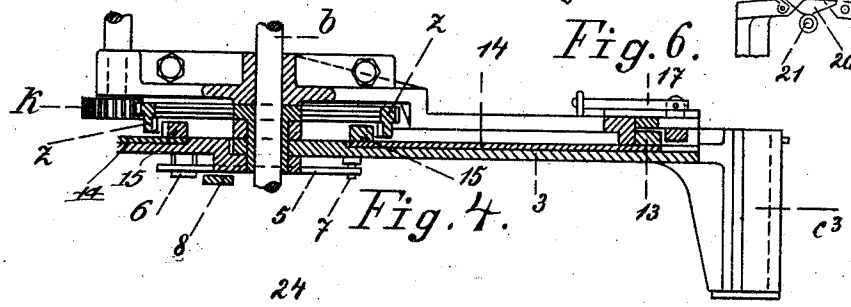


Fig. 6.

Fig. 4.

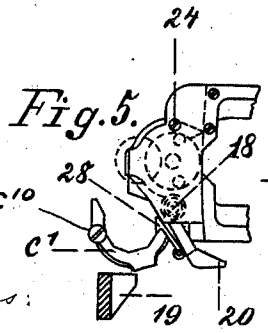


Fig. 5.

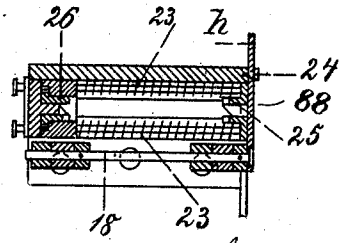


Fig. 7.

Witnesses:

H. W. Brown

Walter N. Harris

Inventor:

Franz Schimmel,

By Wilder & Wilder

Attorneys.

F. SCHIMMEL.

MACHINE FOR SETTING AND CASTING FROM LINES OF TYPE MATRICES.

APPLICATION FILED DEC. 5, 1908.

1,038,445.

Patented Sept. 10, 1912.

6 SHEETS—SHEET 3.

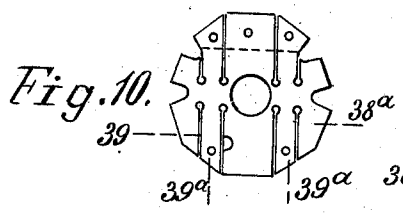


Fig. 10.

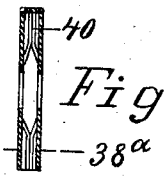


Fig. 11.

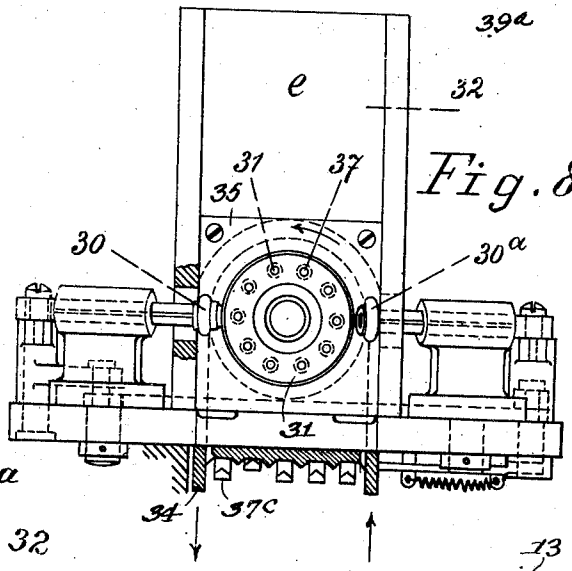


Fig. 8.

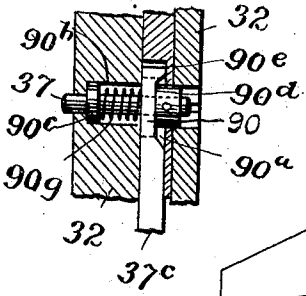


Fig. 9a.

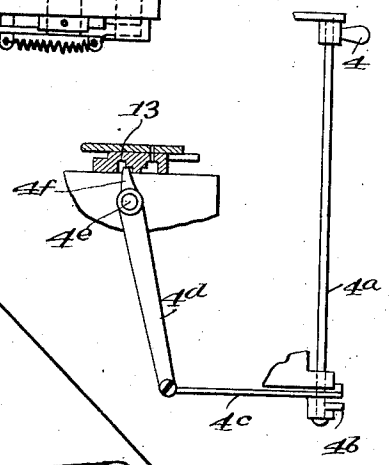


Fig. 10a.

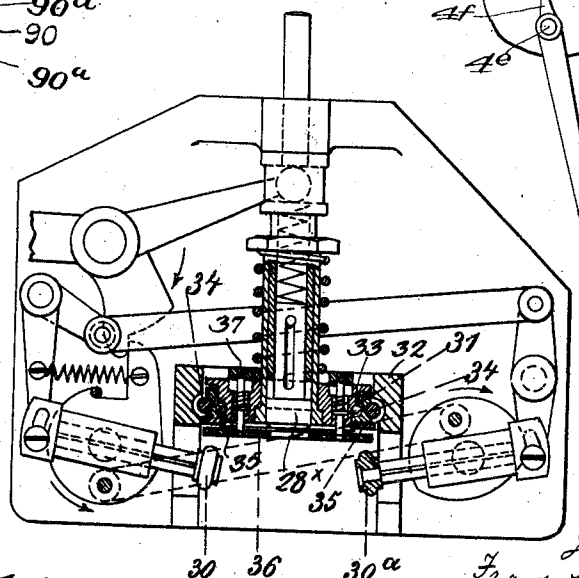


Fig. 9.

Witnesses:
W. Brown
Walter N. Harris

Inventor:
Franz Schimmel,
By Wilkinson Bros.
Attorneys.

F. SCHIMMEL.

MACHINE FOR SETTING AND CASTING FROM LINES OF TYPE MATRICES.

APPLICATION FILED DEC. 5, 1908.

1,038,445.

Patented Sept. 10, 1912.

6 SHEETS—SHEET 4.

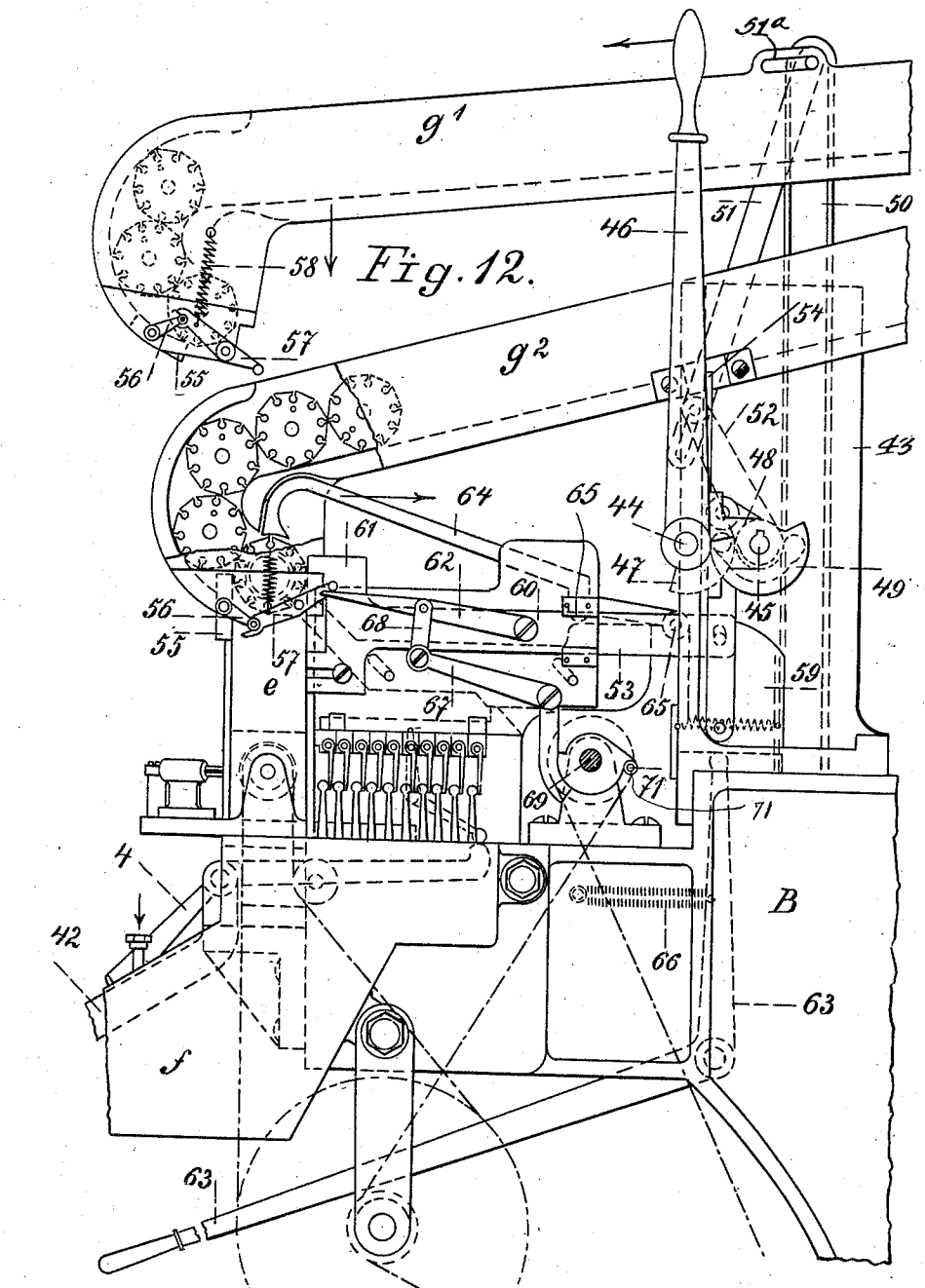


Fig. 12.

Witnesses:

W. Brown

Walter J. Harris

Inventor

Franz Schimmel

By Hdeleas

Attorney.

F. SCHIMMEL.

MACHINE FOR SETTING AND CASTING FROM LINES OF TYPE MATRICES.

APPLICATION FILED DEC. 5, 1908.

1,038,445.

Patented Sept. 10, 1912.

6 SHEETS—SHEET 5.

Fig. 13.

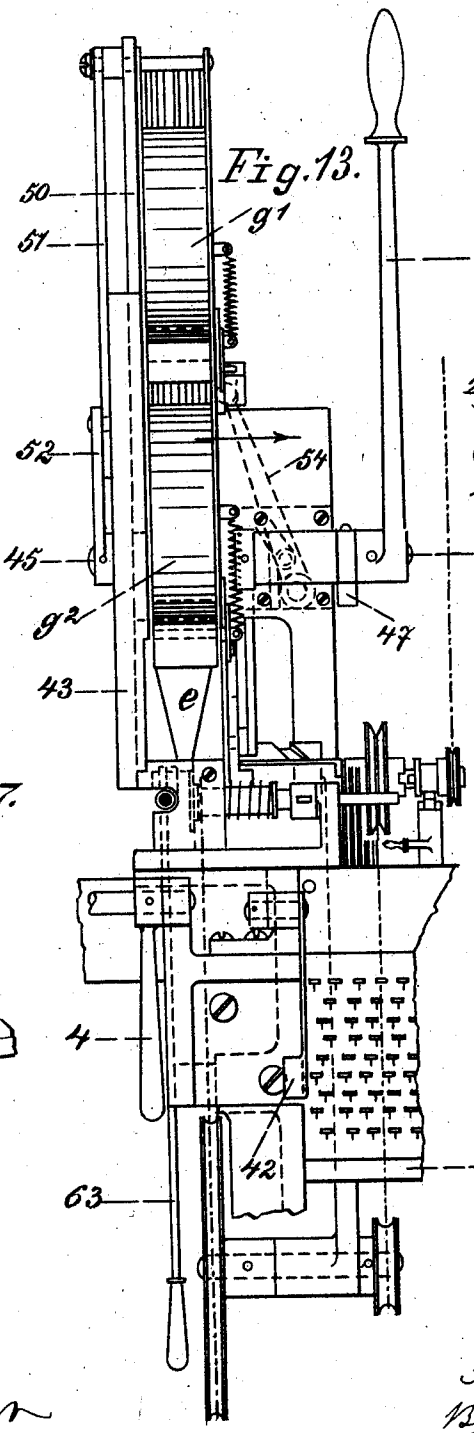


Fig. 18.

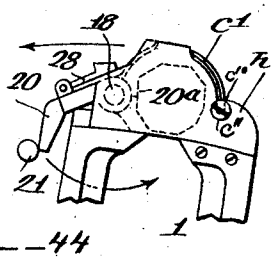
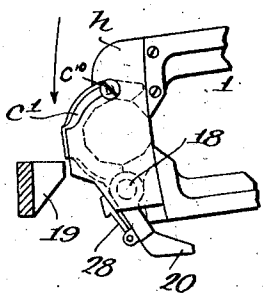


Fig. 17.



Witnesses:
H. B. Brown
Walter N. Harris

Inventor:
Franz Schimmel,
By Hildebrand
Attorney.

F. SCHIMMEL.

MACHINE FOR SETTING AND CASTING FROM LINES OF TYPE MATRICES.

APPLICATION FILED DEC. 5, 1908.

1,038,445.

Patented Sept. 10, 1912.

6 SHEETS—SHEET 6.

Fig. 14.

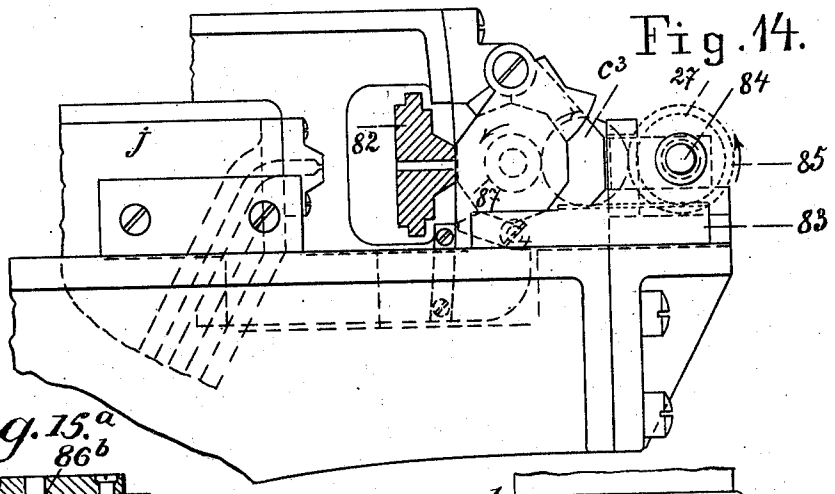


Fig. 15.a

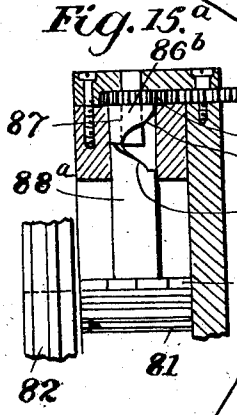
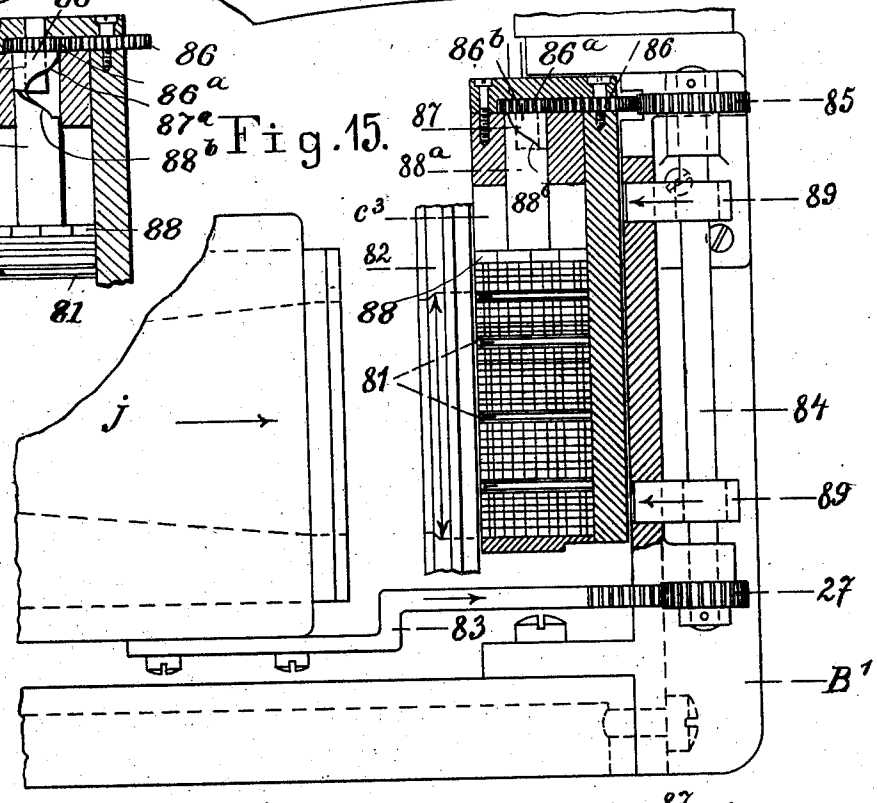


Fig. 15.



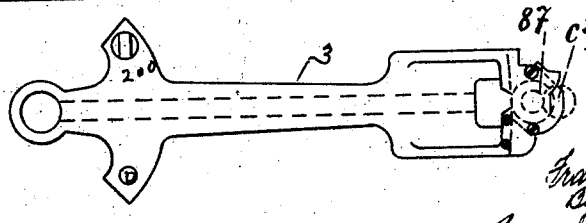


Fig. 16.

Witnesses:
C. B. Franzoni.
C. F. Early.

Inventor.
Franz Schimmel
By his attorneys
Baldwin & Wight

UNITED STATES PATENT OFFICE.

FRANZ SCHIMMEL, OF MONTROUGE, NEAR PARIS, FRANCE.

MACHINE FOR SETTING AND CASTING FROM LINES OF TYPE-MATRICES.

1,038,445. Specification of Letters Patent. Patented Sept. 10, 1912.

Application filed December 5, 1908. Serial No. 466,076.

To all whom it may concern:

Be it known that I, FRANZ SCHIMMEL, a subject of the Emperor of Austria-Hungary, residing at Montrouge, near Paris, France, have invented certain new and useful Improvements in Machines for Setting and Casting from Lines of Type-Matrices, of which the following is a specification.

In my U. S. Letters Patent No. 953,237 of March 29, 1910, I have shown a machine for setting and distributing matrices and for casting lines of type therefrom. In that machine the composing frames containing the set lines of matrices are rotated in the same vertical plane at equal distances from each other so that after the lines of matrices are set, they are first lowered, then raised into position near the casting apparatus and then moved from this position to a distributing position where the matrices are pushed out of their frames. The apparatus is so organized that after the matrices are thus pushed out or distributed from their frames, these frames are again returned to the setting position. In the machine of my prior patent, the composing frames are fixed to the circumference of a wheel, the intermittent rotation of which brings the composing frames successively from the setting to the casting and then to the distributing positions without any other lifting apparatus being required.

While the machine of my prior patent possesses many novel and useful characteristics, I have found that the rapid rotation of the wheel carrying the composing frames is often so great that on stopping the wheel at the setting position, objectionable shocks are produced and very accurate workmanship is required in order to exactly space the several composing frames on the circumference of the carrying wheel, any inaccuracies in this particular occasioning imperfections in the cast lines. According to my present invention these objections are overcome. I now, instead of employing a carrying wheel to which the composing frames are attached, use carrying arms which are adapted to rotate loosely and independently around the same shaft, each arm carrying a composing frame, and each frame being movable independently of the other. The arrangement, however, is such that the arm which is in the setting position is, after the matrices are set, moved through an arc of 180° to the casting position and in so doing, by novel mechanism, moves an arm carrying another composing frame, in which the line of type has been cast, through an arc of 90° to the distributing position, and suitable mechanism is interposed between the last mentioned arm and the third arm of the series whereby the latter is moved from the distributing position to the setting position. Continuously rotating driving mechanism is employed and by means of suitable levers and keys the setting of the matrices and the movements of the composing frames and the casting and distributing apparatus is placed under the control of the attendant.

The accompanying drawings show so much of a machine for carrying out the objects of my invention as is necessary to illustrate the novel subject-matter which is set forth in the claims. Where the mechanism is not novel or is shown in my U. S. patent before mentioned, detail illustration or description of such mechanism is omitted.

Figure 1 of the accompanying drawings shows my improved machine in side elevation. Fig. 2 is a detail view showing one of the arms in setting position, and this figure also shows the connection between this arm and the other two arms by means of which the latter are rotated. Fig. 3 is a detail view showing one of the arms in casting position. Fig. 4 shows a horizontal section through the mechanism shown in Fig. 3. Figs. 5, 6 and 7 are detail views of the improved composing frame, Figs. 5 and 6 being side elevations and Fig. 7 a vertical section thereof. Fig. 8 is a front elevation partly in section of the improved matrix rotating devices. Fig. 9 shows a horizontal section thereof. Fig. 9ª is a detail view of part of the stop mechanism forming part of the devices for rotating the matrices. Figs. 10 and 11 show new forms of spacers. Fig. 10ª is a detail view of certain lever mechanism employed. Figs. 12 and 13 are views on an enlarged scale, Fig. 12 being a side elevation and Fig. 13 a front elevation illustrating particularly the mechanism for shifting the matrix magazines in order to supply different kinds of type to the matrix collector. Figs. 14 and 15 are detail views on an enlarged scale of one of the composing frames and certain parts associated therewith when in casting position; Fig. 14 being a view mainly in side elevation, and Fig. 15 a plan view with the composing frame in horizontal section. Fig. 15ª is a detail view

of part of the devices for compressing the matrices and spacers. Fig. 16 is a detail view of one of the carrying arms. Fig. 17 is a detail view of the composing frame in its closed position just after it is filled with matrices. Fig. 18 is a detail view showing the composing frame in its closed position just before it is opened for distributing purposes.

The shaft *b* is mounted to rotate in suitable bearings in the frame B and it is surrounded by an annular frame 12, the external diameter of which is smaller above the plane of the shaft *b* than below it for a purpose hereinafter described. Three arms, 1, 2, 3, are mounted to turn independently about the axis of the shaft *b* and each of these arms carries a composing frame c', c^2, c^3. In Fig. 1 the arm 1 is shown in the setting position associated with the matrix collector *e*, and its composing frame c' is in condition to receive a line of matrices which may be set in the manner described in my U. S. patent before mentioned. The second arm, 2 with the composing frame c^2, is shown in its highest position where distribution of the matrices takes place and the third arm 3 is in position close to the melting pot where a type bar is cast from the line of matrices. By striking the keys of the key-board *f* one matrix after another is dropped into the composing frame c' and after the line is completed, the arm 1 carrying the frame c' is turned downwardly and then upwardly through an arc of 180° where it arrives before the mouth of the melting pot *j*. This movement of the arm 1 through the connections presently described causes the arm 2 with the composing frame c^2 to be moved an arc of 90° to the setting position, while the arm 3 with the composing frame c^3 is at the same time lifted through an arc of 90° to the distributing position. The mechanism for accomplishing these results is most clearly shown in Figs. 2 and 3. As before stated, the three arms are mounted loosely on the shaft *b* so as to revolve independently of each other and independently of the shaft about the axis thereof. Each arm is formed with a segment 200, as shown in Fig. 16, each segment being equal to an arc of about 90°. At the lower end of the segment of the arm 1, a lever 5 is pivoted, in the manner indicated in Fig. 2, by means of a stud 6. When the arm 1 is in the position of rest, the outer end of the lever 5 engages with a peg 7 fixed to the segment of the arm 3. In like manner the segment of the arm 3 carries a lever 9 engaging a peg 7^a on the arm 2, and the segment of the arm 2 carries a lever 8 adapted to engage a peg 7^b on the segment of the arm 1. When a line of matrices has been set up in the composing frame c', said composing frame may be moved into the diametrically opposite position at the melting pot by operating the lever 4. As the arm 1 moves through this arc of 180°, the lever 5 bearing on the peg 7 connected with the arm 3, causes said arm to be turned upward around the shaft *b*. At the same time the lever 9 engaging the peg 7^a on the arm 2, causes the latter arm to be moved through an arc of 90° to the setting position. As soon as the arm arrives at the distributing position the lever 5 which carries it forward is disengaged from the peg 7 by means of the eccentrically curved slot or groove 10 which is formed in a bracket 11 fixed to one of the side frames of the machine and into which a pin 100 on the lever 5 extends. This causes the arm 3 to stop in the distributing position formerly occupied by the arm 2 and the latter arm, which has been moved forward by the movement of the arm 3 and given a quarter turn stops in the setting position previously occupied by the arm 1. In this way I am enabled to dispense with the heavy wheel formerly employed and now use three composing frames where four were previously employed. Each lever 5, 8, 9, has a pin 100 adapted to engage the groove 10.

As shown in Fig. 1 and also more clearly in Figs. 2 and 3, steps 12′, 12″ are formed on the rim 12. The step 12′ is adapted to support each carrier arm as it is successively brought into setting position while the step 12″ supports each arm successively as it reaches casting position. These steps are in line with a plane passing horizontally through the axis of the shaft *b* and which divides the rim 12 into two semi-circular parts, the upper part being of smaller diameter externally than the lower part. Each carrier arm is provided with a tooth 13 fixed on a slide 14 guided lengthwise in each arm (Figs. 2–4) so that the tooth 13 may be shifted in a radial direction whereby it can be made to engage the steps and also be disengaged therefrom. Each slide also carries at its inner end near to the segment shaped part of the adjacent arm, a second tooth 15. In the setting position shown in Figs. 1 and 2, the tooth 13 rests upon the step 12′ of the guide rim and it is held in this position by a catch 16 pivotally secured to the frame B at 16′ on the composing side of the machine. A spring 16″ tends to close the catch over the tooth. In the position shown in Fig. 2, the tooth 15 is held out of engagement with the toothed wheel *z* surrounding the shaft *b* and provided with internal and external teeth. This wheel is kept in constant rotation by the pinion *k* which engages its external teeth. The lever 4 is attached to a horizontal shaft 4^a carrying an arm 4^b connected by a link 4^c with a lever 4^d pivoted at 4^e and having an arm 4^f which is adapted to engage the teeth 13. When the lever 4 is turned in the direction indicated by the arrow indi-

cated in Fig. 2, it causes the tooth 13 to be disengaged from the step 12′ and the tooth 15 is made to engage with the internal teeth of the wheel *z* (Fig. 4). As this wheel continually turns in the direction indicated by the arrow in Fig. 2, the slide 14 and the arm 1 in which it is guided also move around. While the arm 1 is moving downward, the tooth 13 is made to pass along the lower portion 12^a of the rim 12 which, as before stated, is of larger diameter than the upper portion thereof the tooth 15 being held in engagement with the wheel *z* and the arm 1 thus connected with the wheel *z* is moved in an arc thereby. This movement is continued until the arm 1 has been moved through an arc of 180° to the casting position shown in Fig. 3. As all the arms 1, 2 and 3 are each fitted with a slide 14 having teeth 13 and 15, each one of the arms after arriving at the setting position can be in like manner coupled to the wheel *z* and moved thereby until it arrives at the casting position shown in Fig. 3 which is diametrically opposite the setting position. When an arm reaches the casting position it is pushed off from the lower portion 12^a of the rim onto the upper portion thereof which is of smaller diameter by the spring dog 17. By this movement the tooth 15, which up to this time was engaged with the wheel *z*, is moved out of engagement therewith and the arm thus brought to rest, its tooth 13 resting on the step 12″. The wheel *z*, however, continues to revolve and moves forward the next carrier arm from the setting position to the casting position as soon as it is coupled therewith by means of the lever 4.

The composing frames employed in the present machine are somewhat different from those shown in my U. S. patent above mentioned. In Fig. 2 the composing frame *c′* is shown in the setting position when it is open, as is also shown in Fig. 5. The frame is pivoted to move about the axis of a shaft 18 and when the carrier arm commences to turn, the frame is automatically closed when it strikes against a stop 19 projecting from the main frame on the left hand side thereof where the setting operation takes place. When thus closed, the composing frame is carried to the casting position shown in Figs. 3 and 4 where the type line is cast, which operation takes place while a new line of matrices is being set on the opposite side of the machine. At the same time the composing frame, which was previously in the casting position, is carried into the distributing position. When said frame arrives at the distributing position the lever 20 connected with the shaft 18 of the composing frame strikes against the roller 21 mounted upon the upright 22 (Figs. 1 and 6) extending to the top of the machine. In this way the composing frame is opened (Fig. 6) and the matrices are pushed out upon the distributing rails in well known ways.

The details of the composing frame and parts connected therewith are shown most clearly in Figs. 7, 14 and 15. In Fig. 7, the composing frame is similar to that described in my patent before mentioned, but the watch spring used in the prior construction is replaced by helical springs. As the new composing frame can turn on its shaft and be closed, it does not require a movable cover plate but a plate *h* fixed to the carrier arm may be employed, the composing frame being held in its closed position by means of the plate *h* attached by screws 24. The holding together of the spacers contained in the composing frames is effected by the bushes 25, 26 in Fig. 7 by the aid of the pinion 27 driven by the melting pot *j* (Fig. 1). The shaft of this pinion 27 is provided with eccentrics actuating abutments 89 which, when the melting pot *j*, is pushed against the composing frame c^3 press the latter against the melting pot.

Referring to Figs. 14 and 15, in Fig. 15 the line holder is shown in section and a matrix line is indicated. Between the matrices are located four elastic spacers 81. It will be observed that the matrix line is longer than the opening of the mold 82 which is represented by a line limited at both ends by arrow heads which represents the actual line length. As is well known, the matrix lines with the spacers contained therein must be compressed the right length directly before the casting. This is done in the following manner: When the casting pot *j* moves in the direction of the arrow (Fig. 15) the rack 83 bolted thereto also moves and by means of the pinion 27 on the shaft 84 turns the pinion 85 also secured to the shaft 84. The pinion 85 meshes with a pinion 86 mounted in the line holder each time that a line holder comes into the casting position. The pinion 86 meshes with the pinion 86^a mounted to turn on a stud 86^b secured to the frame of the line holder. Attached to the pinion 86^a is a sleeve 87, provided with an inclined or cam surface 87^a. The piston 88 has attached to it a sleeve 88^a, provided with a cam surface 88^b, engaging the cam surface 87^a. Before the casting pot *j* moves forward the parts just described are in the position shown in Fig. 15, but when the melting pot moves forward through the gearing described the pinion 86^a is rotated and the sleeve 87 is correspondingly rotated and the cam surface 87^a operating on the cam 88^b of the sleeve 88^a causes the piston head 88 to press against the matrices and compress the spacers moving the line of matrices from the position shown in Fig. 15 to a position between the lines on the mold 82, indicated by double arrow heads.

When the spacers are thus compressed the matrices are in proper position to mold the type. Fig. 15[a] shows the position of the parts after the piston head 88 has been moved to compress the spacers and matrices in the manner described. At the moment when the matrix line attains the correct length by this compression of the spacers, the casting pot *j* is moved into the mold 82 and the mold is moved up against the matrix line. At this moment the spurting of the metal into the mold opening takes place, after which the casting pot is withdrawn from the mold and the rotation of the pinions 27, 85 and 86 is reversed whereby the line of matrices is freed from pressure and resumes its original length. To prevent the line holder from yielding rearwardly under the pressure of the casting pot, two abutments 89 are employed. These abutments are movably mounted on the frame table B′ and are actuated by the shaft 84 which is provided with eccentrics at the places where it passes through the abutments so that the latter are moved forward in the direction indicated by the arrows (Fig. 15) until they rest against the line holder and support it against the pressure of the casting pot. When the latter moves backward, the abutments 89 also move back and free the line holder so that the latter can move unhindered.

In order to prevent matrices during the setting of the line from getting out of the composing frame, a pawl 28 is arranged on the lever 20 (Fig. 5) in the setting position. This pawl engages the frame and prevents the matrices pushed into the frame from getting out. In the distributing position the lever 20 is turned through an arc to about 126° and with it the pawl 28 so that said pawl no longer enters the frame and the matrices can therefore freely pass out. The pawl 28 is removed out of the way when the lever 20 strikes the roller 21 in the distributing position and the matrices are released and can be pushed upon the distributer in well known ways.

It will be understood that when receiving matrices from a magazine the lower part of the composing frame is lowered, as shown in Fig. 5, the matrices being prevented from escaping endwise from the frame by the pawl 28 which projects slightly across the end of the frame. As the carrier descends the lower part of the composing frame strikes the abutment 19 and as the frame further moves it turns about the shaft 18 and assumes the position shown in Fig. 17, at which time the matrices are prevented from passing endwise out of the frame by the plate *h*. The composing frame thus remains closed until it passes the casting position and reaches the distributing position. Just before it reaches the distributing position it will appear as shown in Fig. 18, the tail of the lever 20 being close to a fixed pin 21. As the frame moves a little farther the pin 21 will cause the lever 20 to turn on the shaft 18 and its shoulder 20^{a} which engages a corresponding shoulder on the pivoted frame *c′* causing said frame to turn with it, the parts then appearing as shown in Fig. 6, the pawl 28 being out of the way and the springs 23 will so operate the piston 88 as to discharge the matrices. It will be observed, by reference to Figs. 5, 6, 17 and 18, that the composing frame is formed in two parts, *c′* and 20, both pivoted to the shaft 18, although the part 20 may be rigid with the shaft 18 and the part *c′* loose thereon. It will be understood that the two parts of the composing frame are movable on the shaft 18. At times the outer part *c′* of the frame only moves but, as shown, they are both adapted to move about the shaft 18 when opened to the discharge position, as shown in Fig. 6. The part *c′* carries near its outer end a screw c^{10} which is adapted to enter a notch c^{11} in the plate *h*. This construction limits the inward movement of the part *c′* of the frame and this part *c′* may be held closed in any suitable way when passing from composing to distributing position. The relative movements of the two parts of the frame may be regulated in any suitable way.

The distributer and its distributing rail are not inclined in the manner described in my patent above mentioned, but are arranged horizontally parallel with the axis of the composing frame. The matrices are pushed by springs 23 (Fig. 7) out on the distributing rail where they are seized by two screw spindles driven by two pinions 29 (Fig. 1) and conveyed in a longitudinal direction to their appropriate channels. This construction just described is not new and need not be more elaborately shown and described.

As shown in Fig. 7 the piston 88 is pushed toward the fixed end plate *h* by the springs 23. When the composing frame contains matrices and is in closed position the piston will, of course, not bear against the plate *h* but will bear against the matrices, as shown in Figs. 15 and 15^{a} (the springs not being shown in these figures owing to the lines on which the sections are taken), but as soon as the closed frame reaches the discharging positions or distributing position it opens moving away from the plate *h* and then the springs 23 operate the piston 88 to discharge the matrices endwise from the frame.

The matrix collector *e* is similar to that described in my prior patent, but the mechanism for rotating the matrices is somewhat changed as it was found in practice that the india rubber wheels described in

said patent were not sufficiently durable but became rapidly worn when rotating the matrices at the required high speed. I have replaced these rubber wheels by brass rollers 30, 30ª (Figs. 8 and 9) which turn loosely on their shafts and serve to press the matrices against a ring 31 arranged in the collector *e*, which ring is supported in a stationary wall 32 of the matrix collector on balls 33 (Fig. 9) and this ring is driven by a belt 34 connected with suitable driving mechanism. The ring 31 projects from the wall 32 of the collector and is held in place by a cover plate 35. As soon as a matrix is released by the actuation of a key lever on the keyboard *f* and falls into the collector *e*, it is pressed by the brass rollers 30, 30ª against the friction ring 31 and there subjected to a frictional pressure between itself (*i. e.* the matrix 36) and the rotating ring 31. This causes the matrix to be set in rapid rotation. At the same time that the matrix is thus released and received in the collector and while it is being rotated, one of the slides 37ᶜ, which is mounted in the collector body 32, is thrown up whereby one of the ten stop pins 37, which are likewise mounted in the rear wall of the part 32, springs out and stops the matrix in the proper position and the matrix is then moved into the line holder against the piston 28ˣ. In Fig. 9ª one of the slides is indicated at 37ᶜ. This slide moves vertically in the frame 32 and it is formed with a vertical slot 90 and with a recess 90ª. The pin 37 is adapted to move back and forth in the frame 32 which is formed with a recess 90ᵇ. Within this recess the pin carries a collar 90ᵉ near its front end and it also carries near its rear end a collar 90ᵈ arranged in rear of the slide 37ᶜ. A spring 90ᵍ is interposed between the slide 37ᶜ and the collar 90ᵉ. When the slide 37ᶜ is depressed, the part 90ᵉ of the slide 37ᶜ above the stop pin 37 presses against the front face of the collar 90ᵈ and holds the stop in its withdrawn position, but when the slide 37ᶜ is raised to the position shown in Fig. 9ª the stop moves outward or forward to the position shown, the collar 90ᵈ entering the recess 90ª in the slide. When the slide is moved downward the stop is drawn inward. This mechanism is similar to that shown in my patent before referred to and need not be further described. The rollers 30, 30ª are operated in substantially the same manner as that described in my patent before mentioned. The other parts of the mechanism are also similar to that before employed, the novel features only of this part of the machine have been specifically shown and described herein.

The spacers now employed are somewhat different from those heretofore used. Each spacer consists of two thin plates 38, 38ª provided with straight slits 39. The parts 39ª between these slits are bent inward and riveted together so that they connect the two plates and their inwardly bent parts act as springs. The otherwise straight plates press in this condition against each other when the spacers are in the line and the latter is locked, the springing parts 39ª of the spacers have between them a thin T-shaped plate 40, the head of which covers the space between the two side walls 38, 38ª (Fig. 11). These new spacers do not require a special holder separate from the matrix magazine to be ready for use and are not conveyed into the collector by special mechanism as described in my prior patent, but are distributed in a manner similar to that employed for distributing the matrices into a channel of the matrix magazine and are conveyed into the collector *e* by operating the spacer key 42 (Figs. 12 and 13). They are like the matrices rapidly rotated in the collector by the friction ring 31 and thus brought into their correct position.

If two different fonts of types are to be set, two magazines are employed and in my prior U. S. patent I have shown two such magazines which are placed by hand into position above the matrix collector. I have improved this mechanism in the manner indicated in Figs. 12 and 13. On the machine frame B behind the keyboard *f* is an upright 43 which supports two shafts 44 and 45. On the shaft 44 is fixed a hand lever 46 the lower end of which is formed with a toothed segment 47 engaging a pinion 48 fixed on the shaft 45. On this latter shaft a grooved cam 49 is fixed so that when the hand lever is turned the cam is also turned. In the upright 43 is arranged a slide 50 which is guided vertically and which carries the upper matrix magazine g'. This slide can be moved up and down by means of a connecting rod 51 having a slot and pin connection 51^a with the magazine and having a jointed connection to the crank arm 52 fixed to the shaft 45. The magazine g' is hinged to move about a horizontal axis at g^{10} (Fig. 1) while the magazine g^2 is mounted to move about a vertical axis g^{11} (Fig. 1). In the position shown in Fig. 12 the matrix magazine g^2 is in the lowered position associated with the collector *e* and the matrix supporting blades 53 so that the matrices contained in the magazine g^2 can be employed. If the other font contained in the magazine g' is to be used, it is only necessary to turn the lever 46 in the direction indicated by the arrow in Fig. 12 to push the magazine g^2 about its vertical pivot to one side by means of the lever 54 (Fig. 13) which lever is actuated by the grooved cam 49 in the direction indicated by the arrow in Fig. 13. Immediately thereafter the magazine g' is lowered by the action of the crank 52, con-

necting rod 51 and slide 50, and thus said magazine g' takes the position previously occupied by the magazine g^2. In the position shown in Fig. 12 the magazine g^2 is in the lowest position and is in communication with the collector e and the matrix supporting rails so that the matrices in the receptacle g^2 can be set, but when the second style of type, which is in the magazine g', is to be set, it is necessary only to turn the lever 46 downwardly in the direction of the arrow, (Fig. 12) the magazine g^2 being then moved laterally by the lever 54 (shown in dotted lines in Fig. 13) which is actuated by the curved disk 49 (Fig. 12), that is, it is actuated in the direction indicated by the arrow in Fig. 13. In this way the magazine g' is lowered by the action of the crank 52, connecting rod 51, and slide 50, and takes the position previously occupied by the magazine g^2. The lever 54 engages in a block which is secured to the magazine g^2 and which is shown in Fig. 12 and thus takes part in the lateral movement of the magazine when moving in a horizontal plane. The magazine, as before stated, is rotatable about a vertical axis so that its lower end can swing to the right and left when actuated by the lever 54.

In order to prevent the premature running out of the matrices contained in the magazines g', g^2 while shifting or lifting the same, a flap 55 is arranged at the mouth of each magazine which is operated by a crank 56 (Fig. 12) and the lever 57. The flap 55 can turn between the magazine sides and is brought by the action of the spring 58 into a slanting position as soon as the magazine leaves the collector so that it prevents the running out of the matrices. As soon as one of the magazines comes into connection with the collector e, the slide 60 is advanced by the slide 59 and pushes the end of the lever 62 under the two armed lever 57 and by means of the crank 56 turns the flap 55 into the position shown on the magazine g^2 in Fig. 12 so that the lowest matrices are freed and ready for setting. The slide 59 is advanced and retired by means of a bell crank lever 63 which is actuated by hand at the same time that the lever 46 is actuated.

In the machine described in the prior specification matrices were liberated from the magazine by the matrix supporting blades 53 and dropped by their gravity into the collector e, whence they were pushed into the composing frame. In order to assist the descent of the matrices into the collector e in the improved machine, levers 64, Fig. 12 are arranged the object of which is to push down the matrix which is under the downward curved front end of the respective lever with a definite uniform force and thus to render a delay in the drop impossible. For each matrix magazine channel a lever 64 is provided for the matrices contained therein. These levers 64 as shown in Fig. 12 reach into the magazine g' or g^2 which is in its working position above the collector. In order that these levers may not prevent the lateral movement of the magazine, they are mounted on a pivot 65 which being in the slide 59 can be moved forward and backward by the handle 63. If for instance the magazine g^2 is to be shifted laterally, the lever 63 is seized with the left hand and the lever 46 with the right hand. The lever 63 is first raised and the slide 59 moved back thereby, so that the levers 64 are likewise drawn back and out of the magazine g^2. The lever 46 is then pressed down and thereby shifts the magazine g^2 to one side, after which the magazine g' is lowered. After it has dropped on the collector e the lever 63 is released, when the spring 66, which was extended by the upward movement of the lever 63, returns it to its starting position and advances the slide 59 so that the levers 64 enter into the magazine g^1 now resting on the collector. In order to free the matrices in the lowered magazine the little two armed lever 57 has to be moved into the position shown on the magazine g^2 Fig. 12, as has been described above. This movement is likewise effected by the advance of the slide 59 which is connected to the slide 60 and moves the latter forward and backward. On this slide the long lever 62 is mounted, and connected by the link 68 to the bell crank lever 67. In pushing the levers 64 into the magazine g^2, the slide 60 is also advanced and with it the lever 62, which with its outer end seizes under the outer end of the lever 57 and lifts it, thereby turning the small flap 55 and releasing the lowest matrices, which drop upon the matrix supporting blades 53, while the next following row of matrices is held back by the upper part of the flap 55 entering the magazine, as shown in Fig. 12 for the magazine g^2. When one of the lowest matrices is selected by striking a key on the key-board and allowed to drop into the collector e, the second row of matrices must be liberated so that a matrix can drop upon the supporting blades to replace the dropped one, which is done in the following way: If one of the keys of the keyboard is struck, the supporting blade 53 is lowered as described in the said prior patent, a matrix drops into the collector and the matrix supporting blade couples, (by its back end striking on a shifting lever,) the shaft 69 to the driving pulley on it. Thereby this shaft is set into rotation and lifts by means of an eccentrically arranged roller 71 the dropped matrix supporting blade 53 up again. The circularly curved downward arm of the lever 67 then drops again off the cam 70 fixed on the shaft 69 whereby its

other arm is lowered, and by the link 68 moves the long lever 62 mounted on the slide 60 also downward. In consequence the free end of the two armed lever 57 is likewise moved downward by the action of the spring connected to this lever. The other end of the lever 57 engages the crank 56 fixed on the same axis as the flap 55 and the flap is turned, so that the upper end of the flap entering into the magazine is moved outward into the position shown in Fig. 12 for the upper magazine g' and liberates the matrix previously held back by it, which matrix then rolls downward for a short distance and is arrested by the lowered end of the flap 55, which now protrudes into the matrix magazine g^2, on the one side, and by the matrix supporting blade 53 on the other side. In this position the lower end of the flap 55 closes the magazine g^2 but is returned by the further rotation of the shaft 69 and the movement of the lower arm of the lever 67 by the cam 70 to its original position, in which it opens the way to the collector e to the lowest matrix which is then only supported by the matrix supporting blade 53, while the flap with its upper end arrests the matrix next above this. Thus only one matrix can pass into the collector e when a key is struck.

I claim as my invention:

1. In a machine for setting and distributing matrices and for casting lines of type therefrom, the combination of a main frame, three independently movable arms mounted to rotate about a common axis, a composing frame on each arm, a matrix collector through which matrices are supplied to the composing frames, means connecting the arms with each other whereby the movement of one of the arms from setting to casting position, also gives movement to the other arm but through arcs of less extent, means for casting lines of type from the matrices, and means for distributing the type.

2. In a machine for setting and distributing matrices and for casting lines of type therefrom, the combination of a main frame, three independently movable arms mounted to move about a common axis, a composing frame carried by each arm, a matrix collector through which matrices are supplied to the composing frames, means for casting lines of type from the matrices, and connections between the arms whereby the movement of an arm from setting to casting position moves another arm from casting to distributing position, and the third arm from distributing to setting position.

3. In a machine for setting and distributing matrices and for casting lines of type therefrom, the combination of a main frame, a circular guide rim supported by the frame, three independently movable arms mounted to move about a common axis centrally arranged in the annular rim, composing frames carried by the arms, toothed slides mounted in the arms and adapted to move radially therein, teeth carried by the arms and adapted to engage the annular rim, driving mechanism, and teeth carried by the slides adapted to engage the driving mechanism.

4. In a machine for setting and distributing lines of matrices and for casting lines of type therefrom, the combination of a main frame, an annular rim having steps on diametrically opposite sides in the horizontal plane of the axis of the rim, a supporting shaft centrally arranged in the rim, arms mounted to move independently about said shaft, composing frames carried by the arms, slides moving radially in the arms and each carrying a tooth adapted to engage the periphery of the rim and to rest on the steps thereof, driving mechanism for moving the arms, and teeth carried by the slides adapted to engage said driving mechanism.

5. The combination with a matrix collector of a friction ring engaging the matrices near their peripheries, means for rotating this ring rapidly, and metal rollers adapted to press the matrices against the ring.

6. The combination with the composing frame, of a piston for compressing the matrices and spacers therein, a melting pot, means operated by the melting pot for actuating the piston, and abutments also operated by the movement of the melting pot to press against the composing frame and hold it steady while the type is being cast.

7. The combination with a matrix collector, of two matrix magazines, one of which is mounted to move about a horizontal pivot while the other is mounted to move about a vertical pivot, a hand lever and connections between said lever and the two magazines whereby either of said magazines may by the movement of the lever be brought into operative relation with the matrix collector.

8. The combination with a matrix collector of two magazines mounted to be moved into and out of operative relation with said collector, levers 64 for assisting the descent of the matrices from the magazines into the collector, a slide to which they are pivoted, and means for operating said slide.

9. The combination of a supporting frame adapted to rotate, a composing frame pivotally connected therewith, a spring for pressing the matrices against each other when assembled in the frame, means for preventing endwise movement of the matrices from the frame when in setting and casting positions, means for automatically closing the composing frame as it is moved from setting

to casting position, and means for automatically opening said composing frame when it reaches distributing position.

10. The combination with an arm mounted to rotate from setting to casting and distributing positions, of a composing frame carried by said arm and having a portion thereof pivotally connected with said arm, a spring pressed piston within the frame for pressing matrices against the end wall of the frame when the hinged portion thereof is closed, and means for automatically opening and closing the composing frame as said supporting arm rotates.

11. The combination with an arm mounted to rotate from setting to casting and distributing positions, of a composing frame carried by said arm and having a portion pivotally connected therewith, a lever connected with the pivotal portion of the frame, a pawl carried by said lever for preventing endwise movement of the matrices from the composing frame when the latter is in setting position and is open to receive matrices, means for closing the composing frame as the latter passes from setting position, and means operating upon said lever when the frame reaches distributing position and which turns said lever about its pivotal connection with the frame and causes it to open said frame.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

FRANZ SCHIMMEL.

Witnesses:
DEAN B. MASON,
JOHN BAKER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."