No. 874,262. PATENTED DEC. 17, 1907.

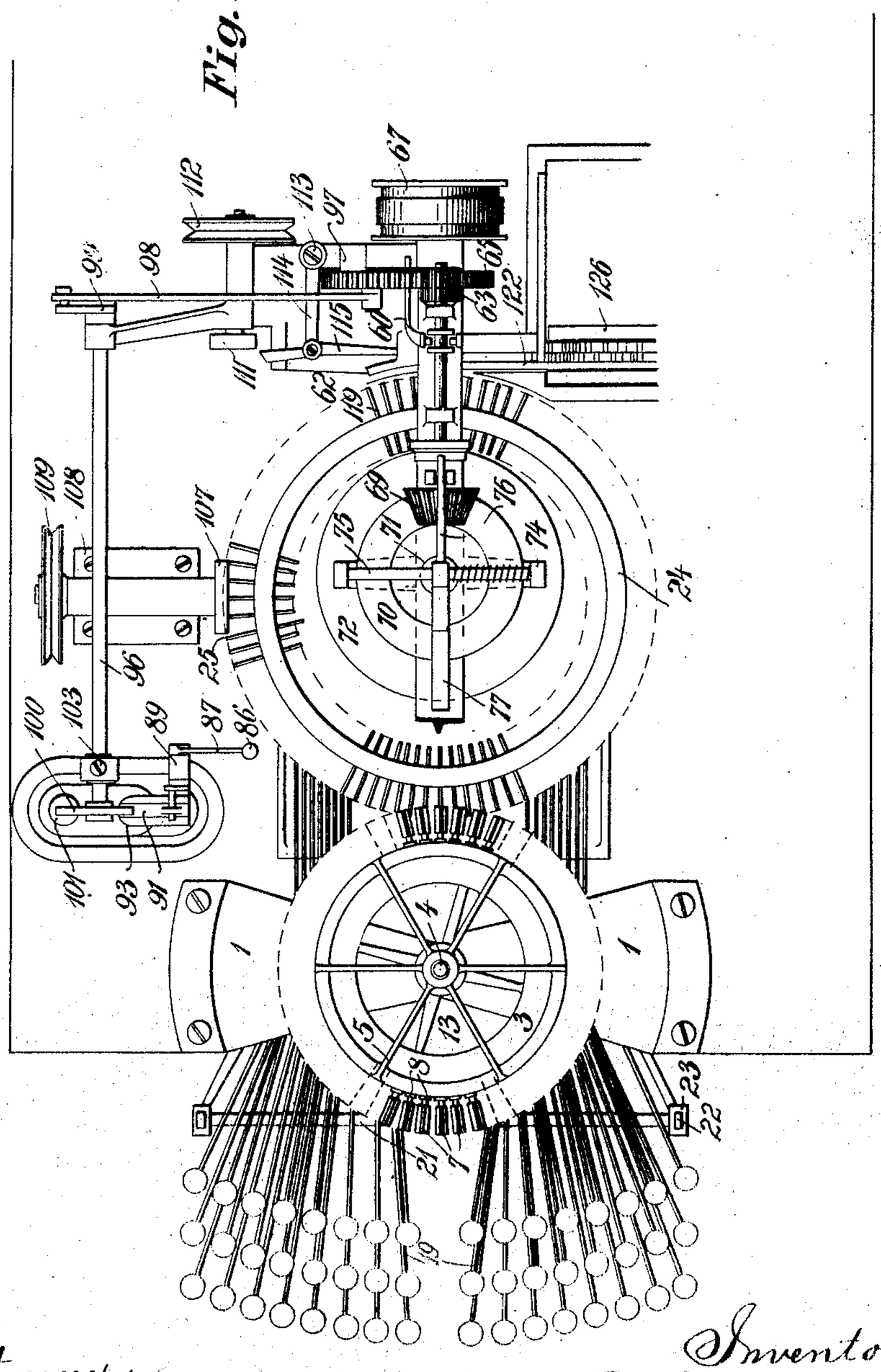
O. UHLWORM.

TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED NOV. 5, 1906.

8 SHEETS—SHEET 1.

Fig. 1.



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8 SHEETS—SHEET 2.

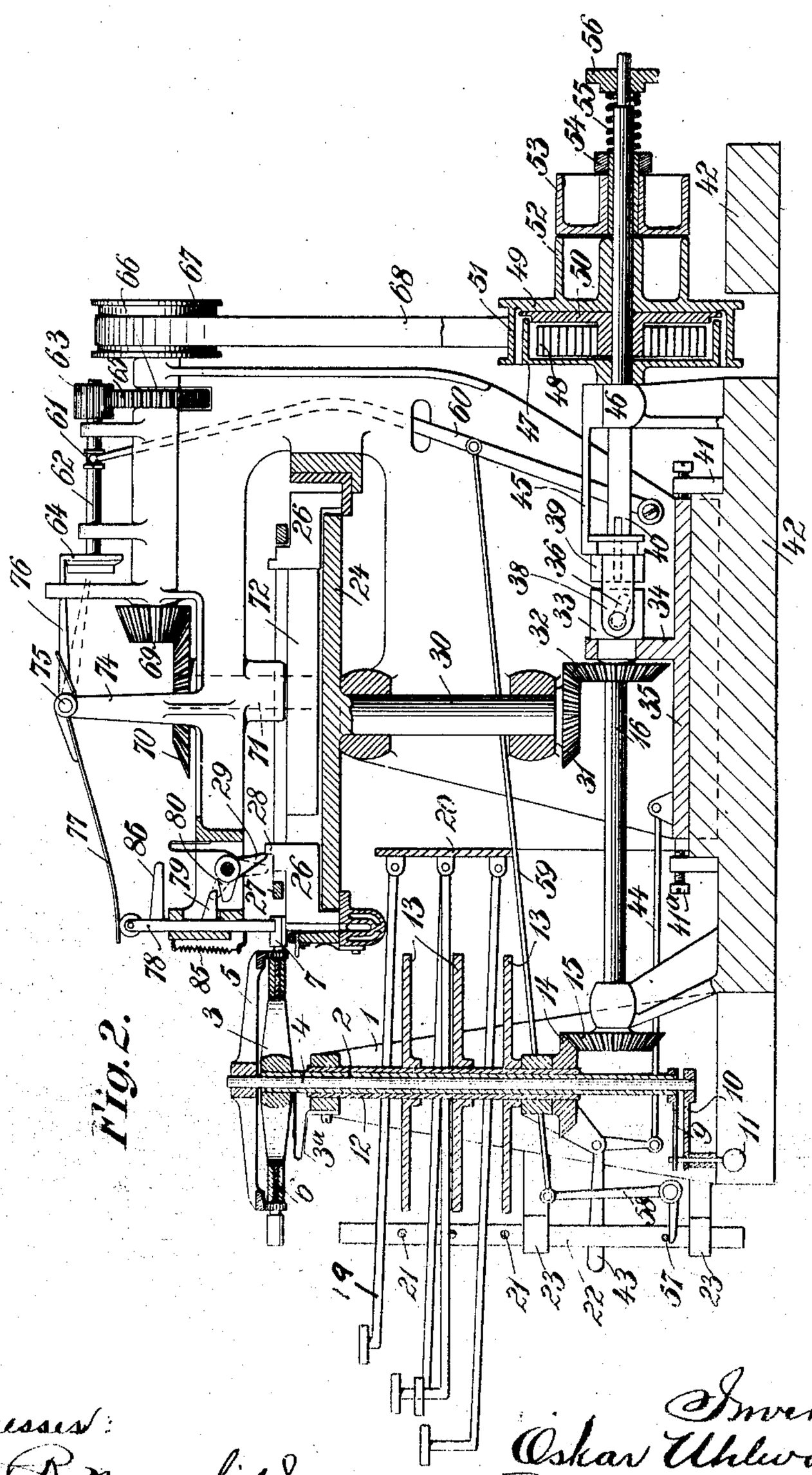

Fig. 2.

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8 SHEETS—SHEET 3.

Fig. 4.

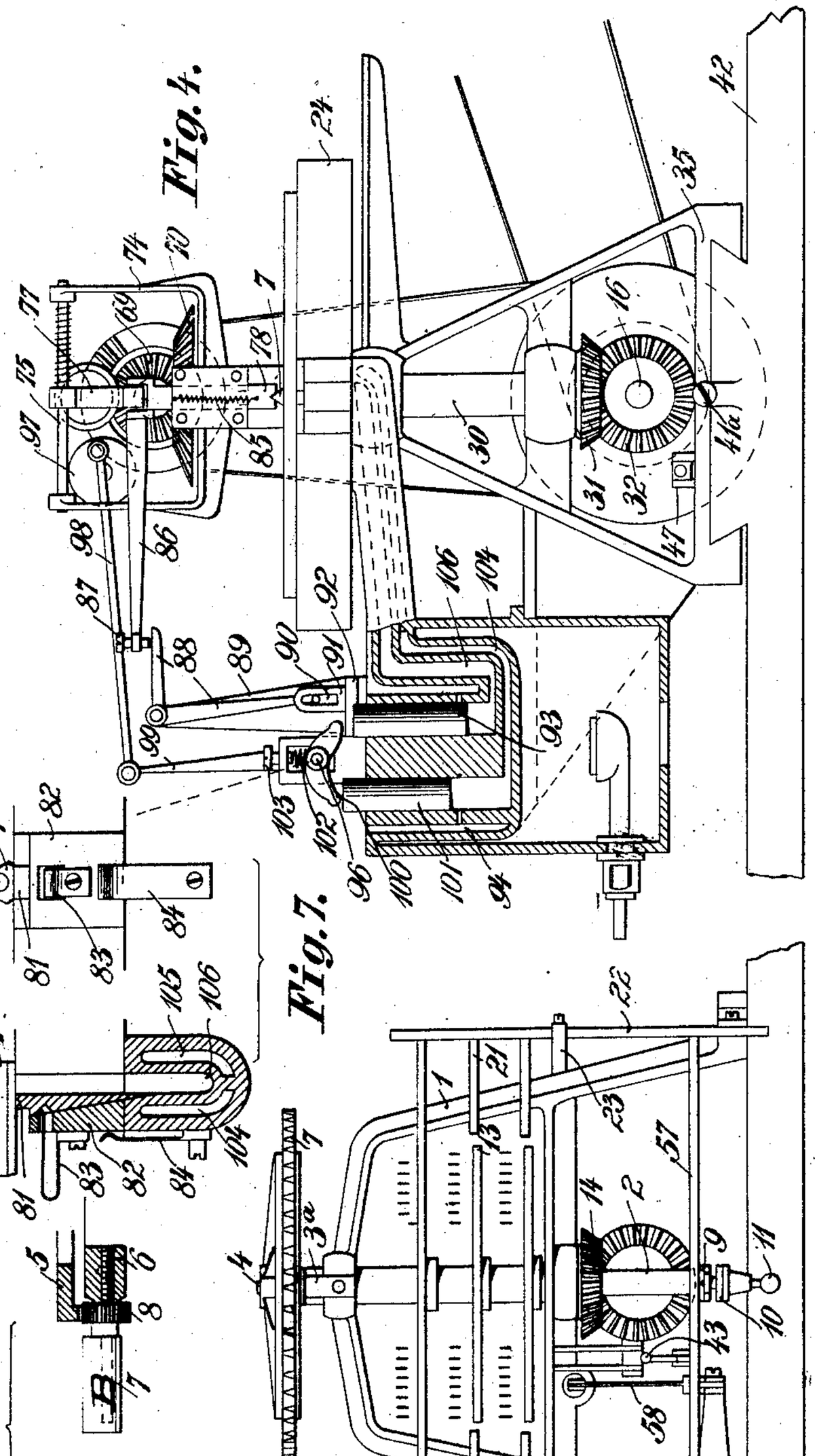

Fig. 7.

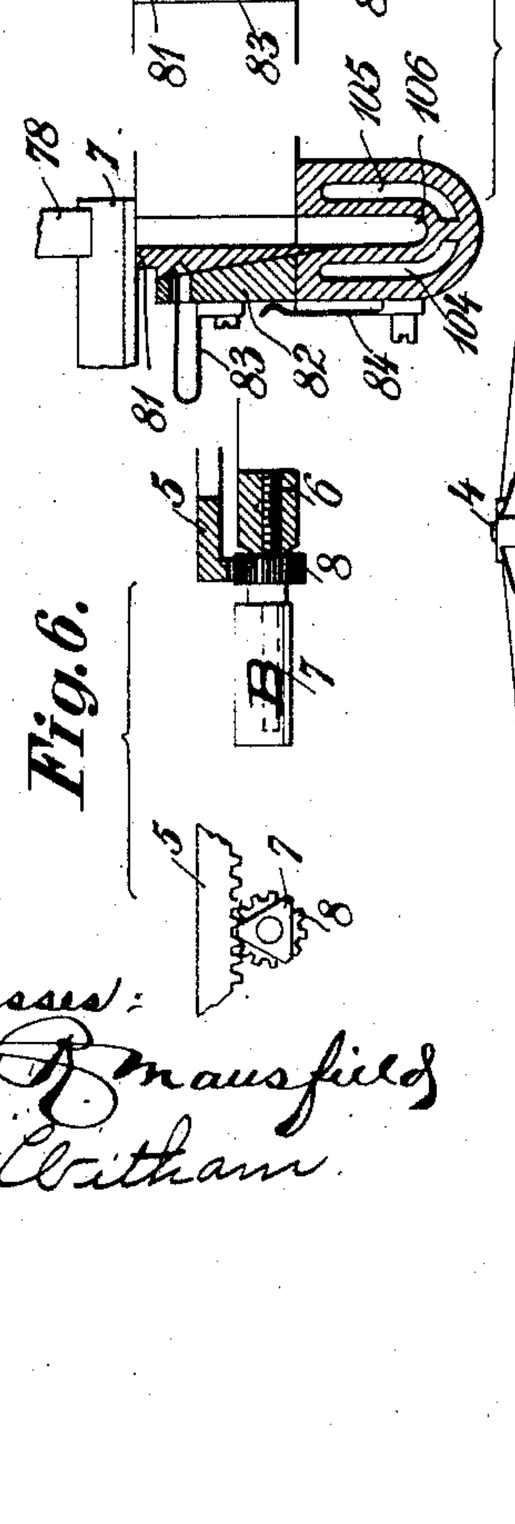

Fig. 6.

Fig. 3.

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TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED NOV. 6, 1906.

8 SHEETS—SHEET 4.

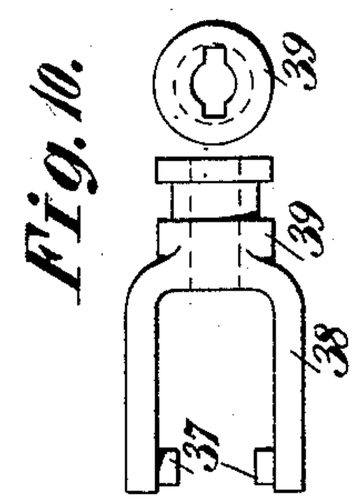
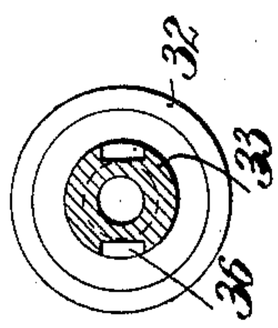


Fig. 10.



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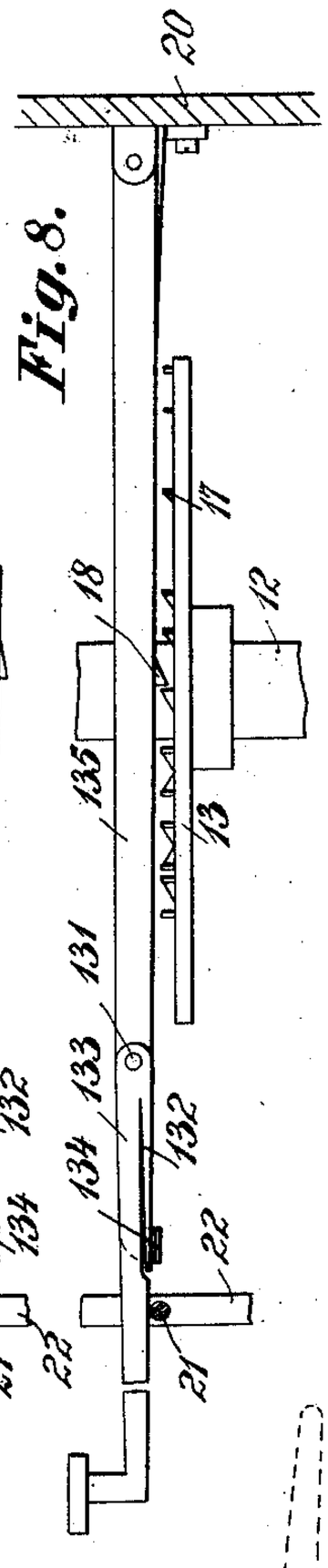

Fig. 8.

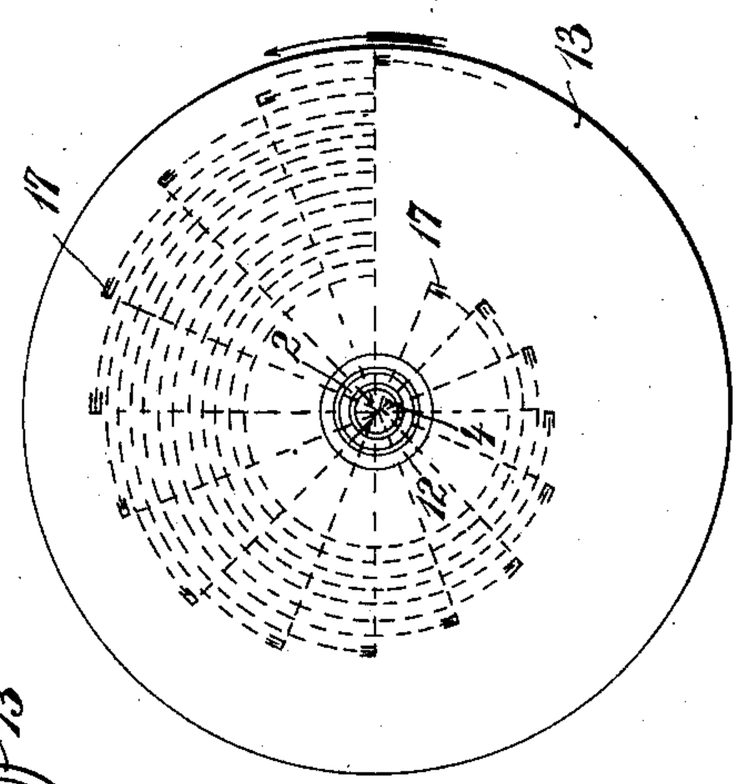

Fig. 5.

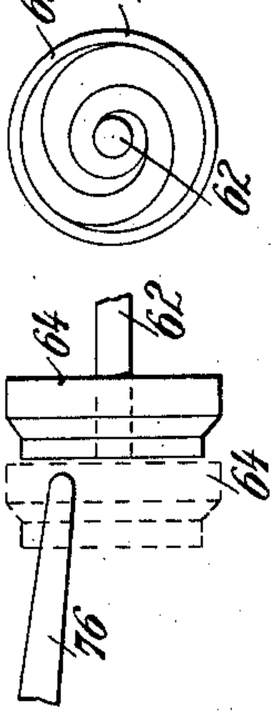

Fig. 11.

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8 SHEETS—SHEET 5.

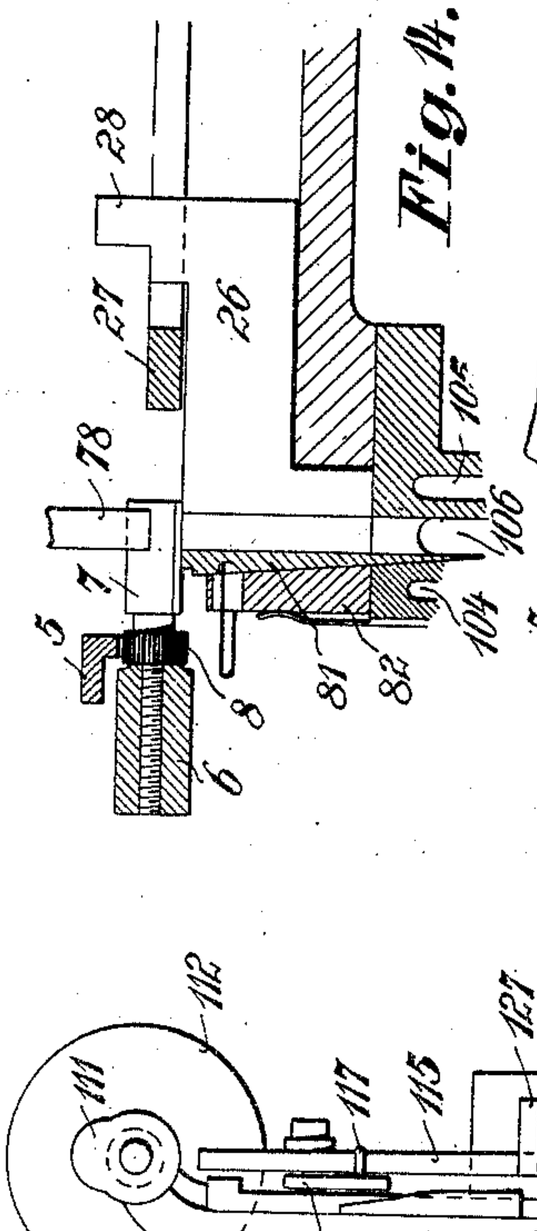

Fig. 14.

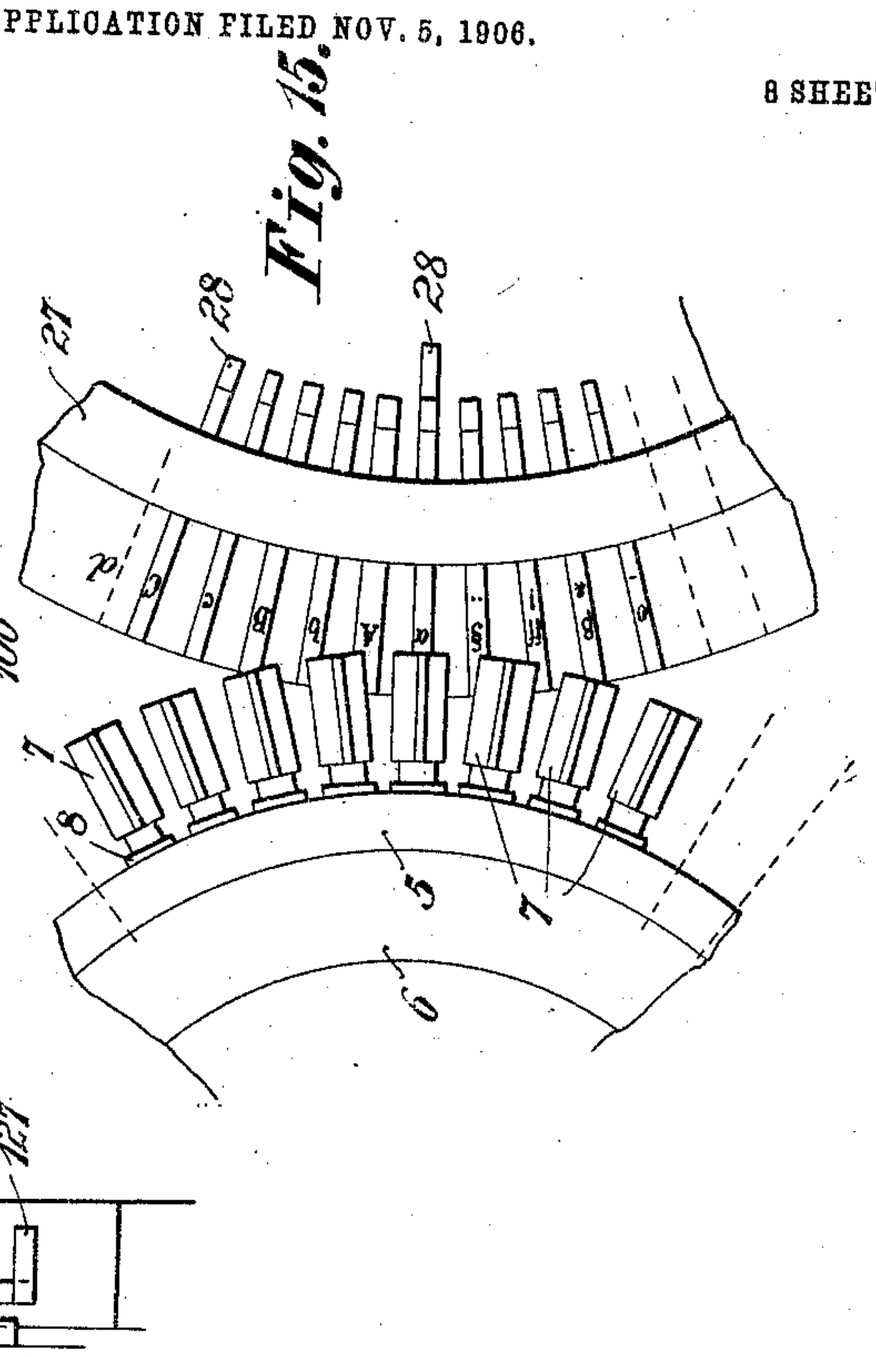

Fig. 15.

Fig. 13.

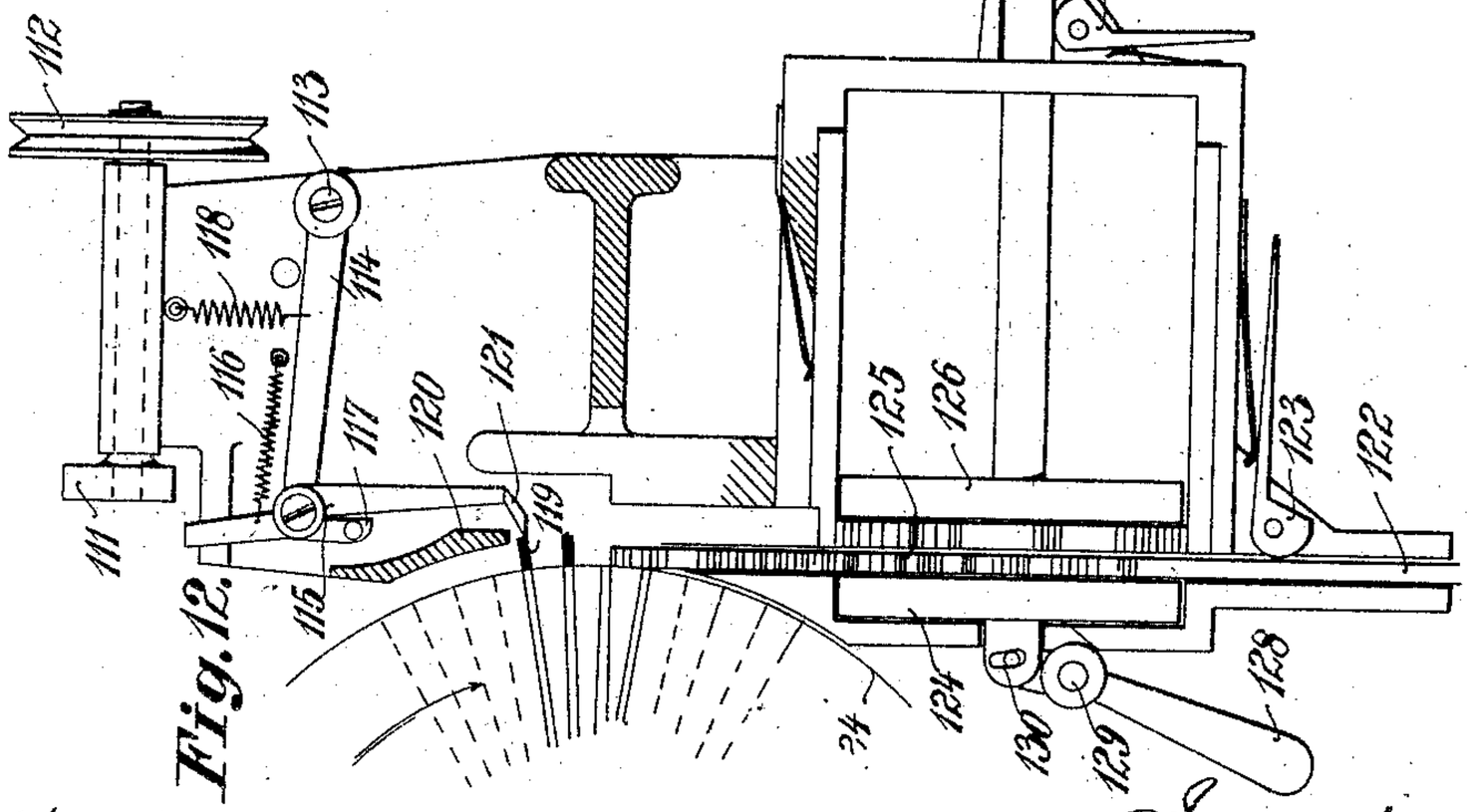

Fig. 12.

Witnesses.
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TYPE CASTING AND SETTING MACHINE.

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8 SHEETS—SHEET 6.

Fig. 16.

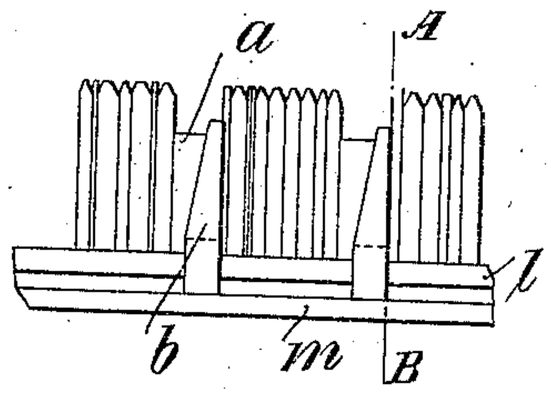


Fig. 17.

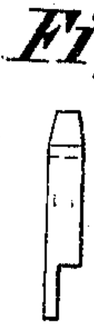


Fig. 18.

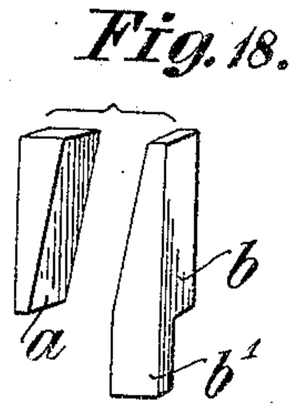


Fig. 19.

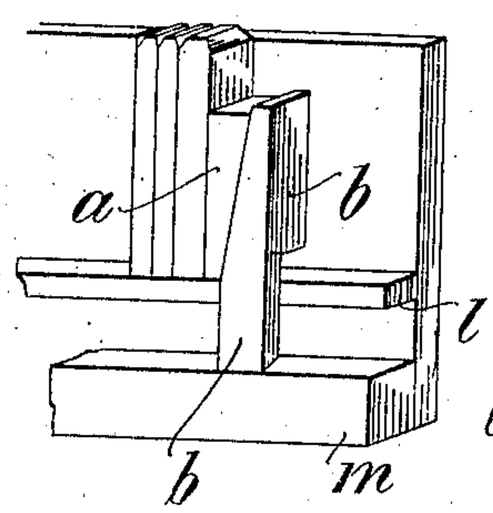
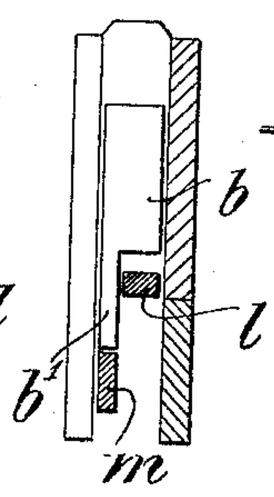


Fig. 20.



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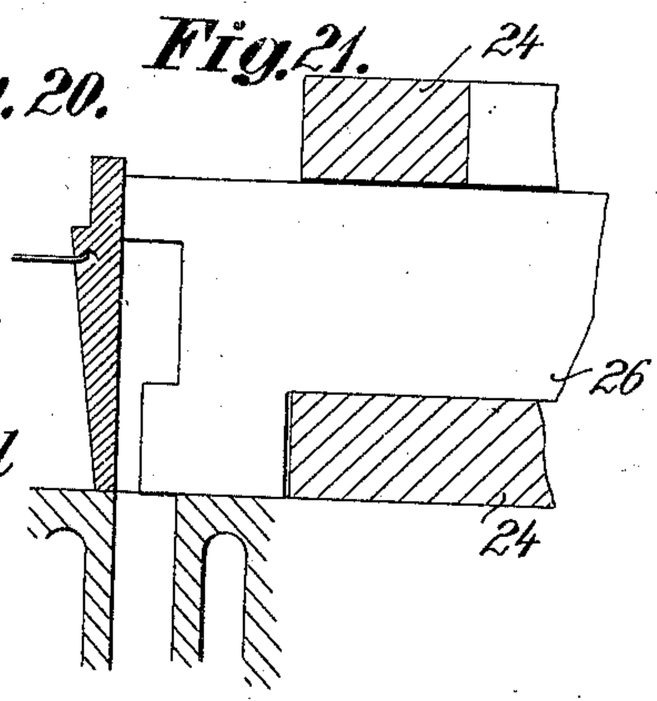


Fig. 22.

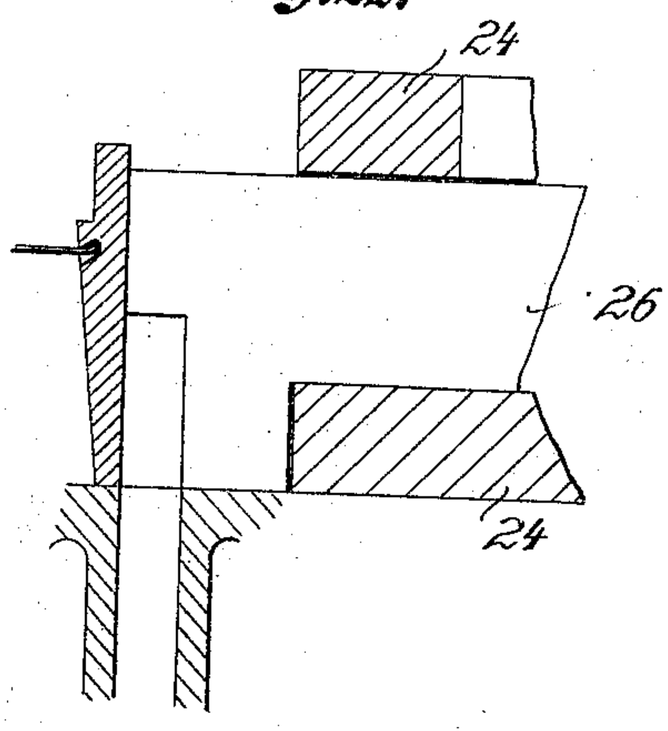


Fig. 23.

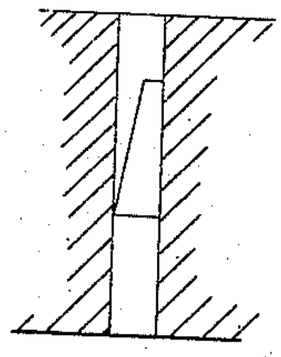
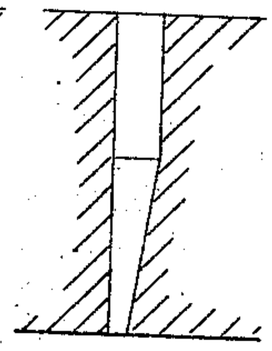


Fig. 24.



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No. 874,262. PATENTED DEC. 17, 1907.

O. UHLWORM.

TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED NOV. 5, 1906.

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Fig. 25.

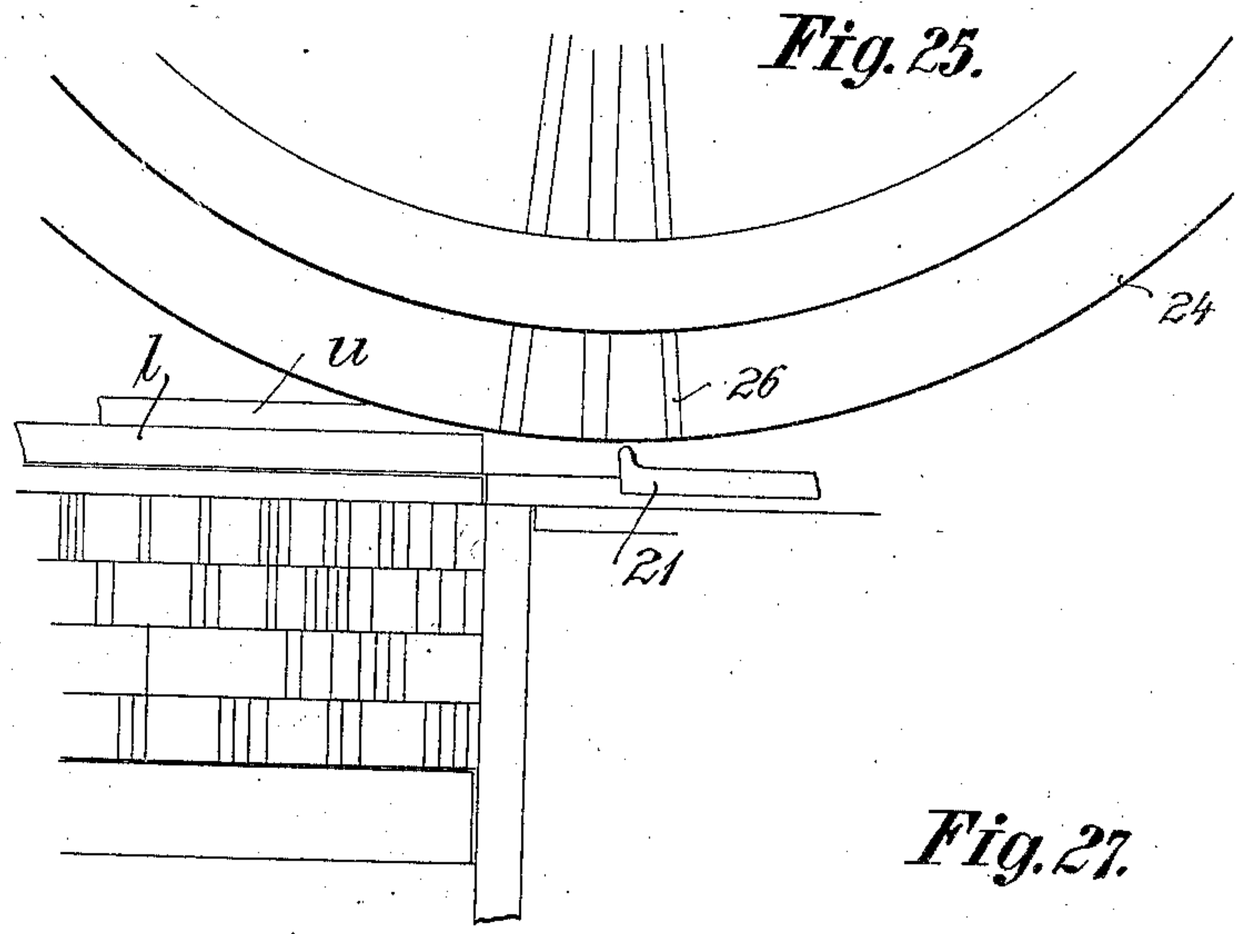


Fig. 27.

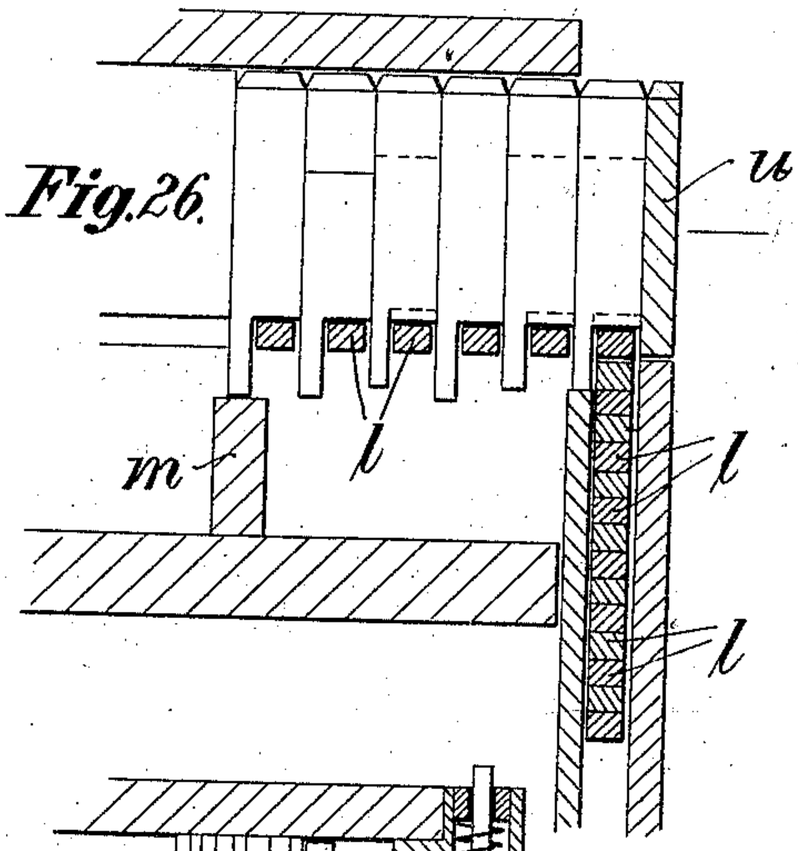


Fig. 26.

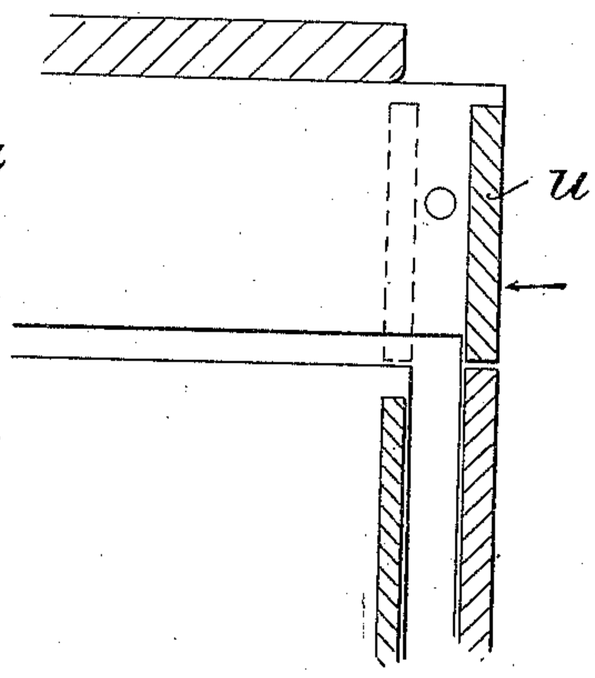
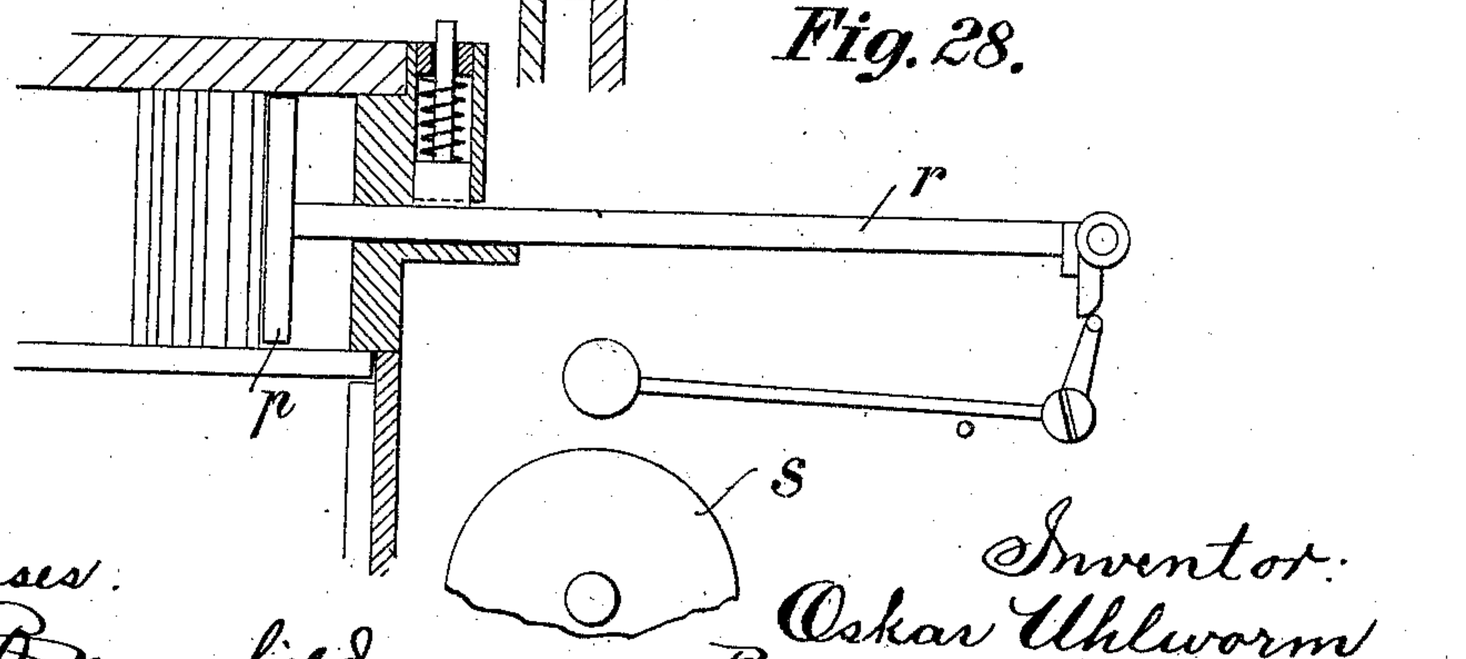


Fig. 28.



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No. 874,262. PATENTED DEC. 17, 1907.

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TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED NOV. 5, 1906.

8 SHEETS—SHEET 8.

Fig. 29.

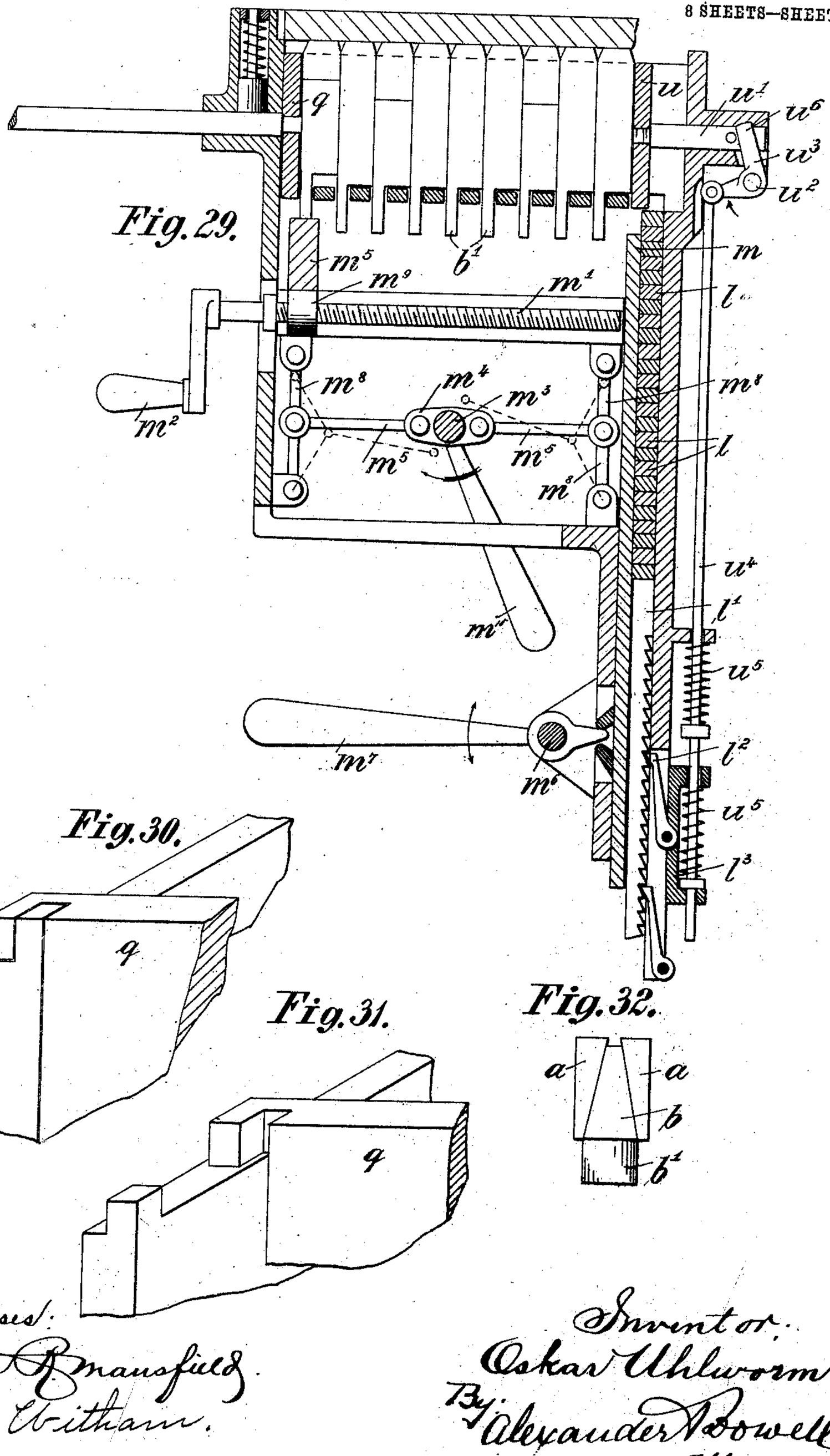

Fig. 30.

Fig. 31.

Fig. 32.

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UNITED STATES PATENT OFFICE.

OSKAR UHLWORM, OF BERLIN, GERMANY.

TYPE CASTING AND SETTING MACHINE.

No. 874,262. Specification of Letters Patent. Patented Dec. 17, 1907.

Application filed November 5, 1906. Serial No. 342,012.

To all whom it may concern:

Be it known that I, OSKAR UHLWORM, a subject of the German Emperor, and a resident at Nachodstrasse 17, Berlin, Germany, have invented an Improved Type Casting and Setting Machine, of which the following is a full, clear, and complete specification.

The present invention has for its object a type-casting and setting machine, in which the separate types are cast with the aid of suitable matrices and a mold. The separate molds are situated on the edge of a rotating disk.

The present invention is more particularly characterized by the different molds being formed by slots, incisions, cuts or the like, provided at the edge of a disk which are able to be closed by a fixed side or wall. A disk of this kind can be produced quickly and at small expense, because the different breadths of the incisions can be simply obtained by milling the edge of the disk.

The molds of different breadths are preferably distributed in several forms over the entire periphery of the disk, so that the same may be always rotated in one direction and the complete revolution of the disk is not necessary in order to pass from the one breadth to the other.

The matrix-stocks are carried by a special disk which is likewise set in continuous rotation. Now if the casting of any type is to be effected, the wheel carrying the matrix-stocks remains stationary with the desired matrix over the place where the casting takes place, while the mold-disk is brought to a standstill at the position for casting with the mold which is suitable for the same.

The axles of the matrix-stocks carry toothed wheels which engage in a common curved rack which is rotated during the working of the machine, and which is controlled by key-mechanism for example, so that different sorts of type can be set during the working of the machine.

A preferable mode of operation is as follows:—The disk carrying the matrix-stocks and the mold-disk are kept continuously rotating by means of a friction coupling until both disks are stopped by pressing a key with the desired matrix over a suitable mold, whereon casting takes place, when the disks are again rotated after the key is released.

In the embodiment of the machine which is represented in the accompanying drawings a spring is extended when a key is depressed, said spring being held stretched during the continuance of the casting of a type, so that when the keys are released the matrix-disk and the mold-disk are able to start running quickly, supported in this by the force of the spring.

In order that the invention may be clearly understood, reference is made to the accompanying drawings in which one embodiment is shown by way of example, and in which:—

Figure 1 is a plan of the machine; Fig. 2 is a vertical elevation of the machine, partly in section and showing the key levers diagrammatically; Fig. 3 is a front elevation of the key locking mechanism and of the parts connected therewith, partly in section; Fig. 4 is a front elevation of the machine, after the removal of the key mechanism, partly in section; Fig. 5 is one of the locking disks which are employed for securing the mold disk and the disk carrying the matrix-stocks when a key is depressed; Fig. 6 shows the arrangement of the matrix carrier in front and side elevation, partly in section; Fig. 7 shows the closing device for the mold in front elevation and in vertical section; Fig. 8 is an elevation of two of the keys, showing one in the position of rest and the other in the working position; Figs. 9 and 10 show elevations and sections of couplings for adjusting the reciprocal position of the wheel carrying the matrix-stocks with regard to that of the mold-disk; Fig. 11 shows a side and end elevation of a cam for pressing the matrix-stock; Figs. 12 and 13 are a plan and a part elevation respectively of the distributing device for the matrices; Fig. 14 is a vertical section through a closed mold with the slider pushed backwards; Fig. 15 is a plan of a part of the disks carrying the matrix-stocks and the mold-disk during the setting of a matrix; Fig. 16 is part of an elevation of a row of matrices in connection with the new kind of wedging arrangement; Fig. 17 is a section on the line A—B of Fig. 16; Fig. 18 is a perspective view of the two shapes of wedges which are employed; Fig. 19 is a perspective view of some types in combination with both wedges; Fig. 20 is a vertical section through a line which has been set up; Fig. 21 is a section through the mold-disk at the place at which a wedge with lower extension piece can be cast; Fig. 22 is a similar section through another place in the mold-disk, in order to show the shape of the bolt for casting simple wedges without extension pieces;

Fig. 23 is an end elevation of Fig. 21; Fig. 24 is an end elevation of Fig. 22; Fig. 25 is a plan of the frame of the galley in combination with a part of the casting-disk; Fig. 26 is a vertical section through a part of a composed line in combination with a composing-stick feeding device; Fig. 27 is a similar section through the groove for guiding the composing-sticks; Fig. 28 is an alarm device which works an acoustic signal before a line is completely set up; Fig. 29 is a vertical section through a device for justifying the separate lines; Figs. 30 and 31 are perspective views of one part of the galley in two different positions, whereas Fig. 32 is an elevation showing another form of wedge.

Similar letters of reference refer to similar parts in all views.

A hollow shaft 2 (Fig. 2) rotates in the pedestal 1 (Fig. 1, 2 and 3), said shaft 2 carrying the disk or wheel 3 which carries the matrix-stocks. This hollow shaft 2 has a solid shaft 4 passing through it, the latter having a toothed-wheel 5 mounted on its upper end. The matrix-wheel 3 carries the matrix-stocks 7 by means of bolts or pins 6 (Figs. 2 and 6), said matrix-stocks being in the present case formed as three-sided prisms and are correspondingly capable of bringing three different sorts of type into the working position.

Each matrix-stock is provided with toothing 8 for driving the same, which engages with its teeth in the common toothed-wheel 5. By displacing the latter all the matrix-stocks may be simultaneously rotated on their axles. As the matrix-stocks have different sorts of type on their different surfaces, it is possible, in so far as a reciprocal displacement takes place between the toothed-wheel 5 and the toothed-wheels 8 of the matrix-stocks, to set an optional sort of the three kinds of type in a simple manner, namely, this may be effected during the working of the machine without interrupting the driving of the same. For this purpose crank arms 9 and 10 (Fig. 2, 3) are situated on the lower end of the hollow shaft 2, and that of the solid shaft 4 respectively, which arms are disengageably connected one with another by an elastic pin 11. The crank-arm 9 has several adjacent holes drilled in it, into any one of which the pin 11 provided on the crank-arm 10 can be inserted as desired. By retracting the pin 11 from the hole of the sector 9 the hollow shaft 2 can be turned with relation to the central shaft 4 and the two shafts can be united by inserting again the pin 11 in the respective hole of the sector arm 9. According to the hole which is used, a definite sort of type is brought into the working position. In the drawing it is taken that the pin is in engagement with the central hole. As the release from and insertion of the pin into another one of the three holes can take place during the rotation of the wheel carrying the matrix-stocks, thus during the working of the machine, an alteration of the sort of type may be effected while the machine is running. A second hollow shaft 12 is arranged round and engaging the hollow shaft 2 on which shaft 12 three locking disks 13 (Fig. 2, 3, 5) are fastened. The shaft 12 carries a bevel-wheel 14 at its lower end, said wheel 14 engaging a bevel-wheel 15 of equal size on the main driving shaft 16. The locking disks 13 are provided with detents or noses 17 (Fig. 5, 8) which, as is shown diagrammatically in Fig. 5, are each arranged separately in a special circle and each nose or stop 17 is adapted to engage the nose or stop 18 on a certain key lever 135 when the latter is depressed as shown in the lower part of Fig. 8. With the aid of these stops 17 and 18, the machine may be stopped at a definite position of the matrix-disk and casting-disk, when one of the keys, which are provided in three groups separated one from another corresponding to the three disks, is depressed.

In the example illustrated, the matrix-wheel possesses forty-eight matrix-stocks and consequently each locking-disk has 16 noses. The forty eight keys 19 are arranged in three groups, one over another, of sixteen keys in each group. The keys 19 fastened to the frame 20 (Fig. 2, 8) are held in their highest position in the usual manner by means of springs which are not represented. A rod 21 (Figs. 1–3, 8) is situated under each group of keys, said rods being fastened in a frame 22. The latter is guided in arms 23 (Fig. 1) of the pedestal 1. The frame 22 is intended to control the operation of parts 58, 59, 60, 61, etc. hereinafter explained. The casting-disk or mold-disk 24 has ninety-six incisions or cuts 25 which correspond to twelve different widths of type arranged according to their breadth. Each cut can be filled by a displaceable slide 26 (Fig. 2, 14, 15). All the slides 26 are surrounded by a ring 27, and each slide has a nose 28 against which a finger 29 (Fig. 2) presses, with the help of which the slide can be pressed backwards when said finger is swung outwards. As it is necessary that the noses 18 of the keys hit the projections 17 of the locking or brake-disks before the frame 22 has concluded its downward stroke, the key-levers 135 are provided with joints 131 (Fig. 8). A spring 132 rests against a shoulder 134 of the rear part 135 of the key. Now if a key is depressed, the rear part provided with the nose 18 will in the first place engage the locking-disk, whereas when the front part 133 is depressed still further the frame 22 is compelled to be displaced still further.

The mold-disk 24 is rotated in common with the shaft 30, the latter having a bevel-wheel 31 (Fig. 1, 4) at its lower end, which

wheel is kept rotating by an equally large bevel-wheel 32 on the main driving shaft 16. The bevel-wheel 32 with the socket 33 rests in a bearing 34 of the carriage 35, and the socket 33 has two helical slots 36 (Figs. 2, 9) situated one opposite the other, in which pins 37 (Fig. 10) of a fork 38 engage. The socket 39 which carries the fork 38 is axially displaceable on the shaft 16 and is driven by means of two keys 40 from the shaft 16. The carriage 35 with parts mounted thereon is made displaceable, or movable to or from the matrix-disk, to enable either capital or lower case characters to be clear from the matrices as hereinafter explained. The displacement of the carriage 35 on the guide 41 of the foundation plate 42 may be effected by hand with the aid of a bell-crank lever 43 and a connecting rod 44. If the arm 43 of the bell-crank lever is moved upwards, which may take place during the working of the machine, the carriage 35 is moved to the left. With this carriage the entire mold-disk and the parts connected with it are also displaced to the left, whereas the socket 39 remains stationary on account of the connecting-bar 45 which is fastened on the bearing 46. The socket 33 is, on the contrary, moved along with the carriage 35, and a rotation of the shaft 30 is effected with regard to the shaft 2 by means of the helical grooves 36.

The transition from small to large letters may be effected by the above mentioned lateral displacement of the mold disk and by its relative rotation with regard to the shaft 2. Namely each of the prism surfaces of the matrix-stocks carries a small and large character. Generally only the small characters situated next to the edge come into action. But if the above mentioned lateral displacement of the mold-disk 24 and of the parts belonging thereto is effected to the left by moving the lever 43, the mold-disk then approaches the shaft 2 so that it comes into agreement as to position with the large characters of the matrix-stocks. As other breadths of the cuts for the molds come into consideration for the large characters, the mold-disk is rotated as mentioned, the purpose of which is that only the cuts which are adapted to large characters come into correspondence with the characters set in the working position at each time.

A flexible coupling is provided on the driving shaft 16, to which coupling a barrel or drum 47 belongs. A spiral spring 48 is fastened on the inside of this drum at one end, the other end of said spring being attached to the hub of a friction disk 50. A second friction disk 49 is placed against this disk 50, the former carrying a belt pulley 51, 52. Both friction disks rotate loosely on the shaft 16, whereas the drum 47 is arranged fixed on said shaft.

The loose pulley 53 is situated on the extended hub of the friction disk 50, said loose pulley 53 being held at its outside end by a nut 54. A spiral spring 55 is placed against this nut, the tension of which spring can be regulated by a nut 56 situated on the screwed end of the main shaft. With an increasing tension of the spring 55, the friction between the two disks 49 and 50 also grows. The machine is driven by a belt running over the belt pulley 52.

If a key is depressed, the matrix-disk and the casting-disk are stopped by the related locking disk 13 being held fast, the belt pulley 52 continuing to run. The spiral spring 48 is thereby extended and on the one hand provides for a jerkless stoppage, whereas on the other hand it assures the machine starting as quickly as possible and without a jerk after the release of the key. The two surfaces of the coupling which rub one on another are preferably moistened with a liquid, for example water, in order to maintain the coefficient of friction of the coupling uniform.

A rod 57 (Fig. 2, 3) carried by the frame 22 rests on one limb of a bell-crank lever 58, the upper end of the latter being jointed to a drawbar 59. The other end of this rod 59 is connected with a pivoted lever 60, the free end of the latter engaging with a socket 61 on a shaft 62. When the frame 22 is moved downwards and when the bell-crank lever 58 is thereby oscillated, the shaft 62 is displaced to the left (Fig. 1) by means of the draw-bar 59 and the lever 60. The shaft 62 carries a toothed-wheel 63 at its one end, said wheel remaining constantly in engagement with its driving wheel 65 when the shaft 62 is displaced.

A friction pulley 67 is situated on the shaft 66 of the toothed-wheel 65, which pulley 67 is always maintained rotating rapidly being driven from the belt pulley 51. The other end of the shaft 66 carries a bevel-wheel 69 which keeps a shaft 71 and the disk 72 connected therewith in rotation through the bevel-wheel 70. Said disk 72 is eccentric to the shaft 30 and moves in such a way in the interior of the mold-disk, that it continuously presses those slides 26 towards the outside of the mold disk at the point situated diametrically opposite to the casting point where such slides had previously been pushed inwards by the finger 29.

The interior end of the shaft 62 carries a cam 64 (Fig. 11), which has a smooth face with a helical groove 73. A shaft 75 is journaled in a fork 74 (Figs. 2, 4), which shaft is provided with an arm 76 and carries a leaf-spring 77. When the shaft 62 is displaced to the left in the manner explained by depressing a key, the groove 73 strikes against the arm 76 and raises it into the position represented by full lines in Fig. 2, whereby a pressure-rod 78 is moved downwards by the leaf-spring 77. The lower end of the rod 78

is cut out corresponding to the shape of the matrix-stock 7, as is seen in Fig. 4.

In the downward motion of the rod 78, the same is placed on the concerned matrix-stock and presses it and at the same time the entire matrix-wheel 3 firmly down on the suitable mold of the mold-disk. Simultaneously a tappet 79 presses on the nose 80 of the finger 29 and pushes the related slide 26 backwards, whereby the mold is opened.

A wedge-shaped piece 81 (Fig. 7, 14) is situated in front of the open side of the mold, said wedge being displaceable in the vertical direction in the plate 82 and held as a rule by a spring 83 in the raised position. The plate 82 is pressed by a powerful spring 84 against the mold-disk. The wedges are necessary so that the molds can be bounded on all sides by plane parallel surfaces during the casting. When the rod 78 is pressed downwards the matrix-stock 7 is placed on the wedge 81 and presses the latter downwards, whereby it is pressed firmly against the open side of the mold under the tension of the spring 83. This mold is then closed in the manner as seen in Fig. 7.

As soon as the leaf-spring 77 (Fig. 2) releases the rod 78, the latter is pulled up by a spring 85. Another arm 86 with a set-screw 87 (Fig. 4) is on the rod 78, said set-screw acting on the one arm of a bell-crank lever 88, which is mounted revolubly in a bearing 89, when said rod 78 goes downwards. The lower free end of the lever 88 engages in a slotted guide 90 of a vertically movable slide 91 which engages a piston 93. The piston 93 can be moved up and down and slide up and down. This piston presses the quantity of liquid metal which is necessary for one cast into the mold during its downward motion. Normally this piston 93 remains at rest and is only pressed downwards when a mold is in position ready for casting when piston 93 is operated by the bell-crank lever 88 in the manner described.

A double tappet 100 (Fig. 4) is fastened at the one end of a shaft 96, which tappet rocks with the shaft 96. The shaft derives its motion from a disk-crank 97 with the aid of a connecting-rod 98 and a lever 99 jointedly connected with it. The disk crank 97 (Figs. 1 and 4) is toothed on its periphery and is driven by a tooth wheel on the same shaft with the bevel gear. The tappet 100 is oscillated all the time, but does not come into direct contact with the piston 93, until the slide or wedge 91 is moved by the bell crank lever 88 between the tappet 100 and the piston 93, then the latter will be forced down by the tappet. At each revolution of the disk-crank the left-hand part of the double tappet presses down a piston 101 which is lifted continually by a spring or the like, which is not shown in the drawing. Liquid metal is continuously pumped by means of this piston 101 in circulation through the channels 104 and 105 (Fig. 7) and as these channels surround the channel 106 connected with the mold, said channel 106 is thereby constantly maintained at the required temperature, and consequently, as soon as the piston 93 is depressed by the action of the wedge 91, the liquid metal brought by the piston to the place of casting has the desired temperature.

A spring 102 is inserted between the shaft 96 and a set-screw 103, so that it is possible to vary the position of the shaft 96 by simply displacing the screw 103 and thereby to vary the speed with which the piston 101 pumps the liquid metal in circulation through the channels 104 and 105. In this manner the temperature of the channels connected with the place of casting may be regulated, because the temperature will be the higher, the quicker the liquid metal moves through the circulating channels 104 and 105.

The displacement of the wedge 81 first takes place, after the rod 78 has been depressed, at that point of time when the mold is closed on all sides, whereon the piston 93 presses the required quantity of liquid metal into the mold by means of the downward movement of the double tappet 100 which at the proper time engages the piston 93 as above explained. As soon as the key which has been previously depressed is released and is elevated again, the shaft 62 (Fig. 2) moves to the right, so that the rod 78 is free again and can rise. Also the piston 93 then moves upwards following the action of a spring. The driving pulley 52 then drives the shaft 16 again, so that the machine is at once set in motion again, the starting being aided by the extended spring 48. The finished cast type which has its head at the upper end now travels under a constantly rotating milling-cutter 107 (Fig. 1) which dresses the face of the type the spindle of cutter 107 rests in a pedestal 108 and is kept in rapid rotation by means of a rope-driven pulley. The separate types must now be pushed out of the mold-disk and laid aside or joined together for the matter. The types are pressed out of the mold-disk by the bolts 26 being gradually pressed outwards by the eccentrically mounted disk 72 which is kept in continuous rotation, during the rotation of the mold-disk. The types attain their outermost position at the point situated diametrically opposite to the place of casting.

The assembling of the separate types in rows and their combination in separate lines situated one beside another may take place in the following manner:—A cam 111 (Fig. 1, 12, 13) is kept rotating rapidly continuously by a rope-driven pulley 112. Below the latter is a lever 114 pivoted on a pin 113 and usually kept in the raised position by means of a spring 118 (Fig. 12). A two-armed lever 115 is fastened revolubly to this

lever 114, the lower arm of said lever 115, which carries a foot 121 being pressed so far by a spring 116 towards the central point of the mold-disk as the type lying in front of it, or a stop 117 of the lever 114, allows. The types 119 are gradually pushed outwards during the rotation of the mold-disk by the bolts 26 and press the foot 121 of the lever 115 backwards in such a way that its upper end cannot arrive in the sphere of action of the cam 111. The foot 121 is free only when a type 119 is pushed entirely outside, and as the spring 116 then swings the lever 115 in such a way that its upper end can be engaged by the quickly rotating cam 111, the foot 121 presses on the type and moves this into the composing channel when the lever 114 is moved downwards. In this manner one type is placed beside the other until a line is completely set up. The letters are supported on the one side by a bar 122 which is held fast in one direction by a friction-lever 123. As the line continually grows in length the straight edge is gradually pressed backwards. The finished line is then pushed by means of the plate 124 to the line 125 which has been previously set, the supporting plate 126 moving backwards, the shaft of the latter being capable of being braked by a clamping lever 127. The finished lines and the supporting plate 126 may be pushed backwards with the aid of a hand lever 128 revoluble round the pivot 129, said lever 128 being jointedly connected at 130 with the plate 124.

As is seen in Figs. 16 and 19, double wedges *a* and *b* are employed for justifying the lines, of which wedges the former press between the types from above downwards, and the latter from below upwards. The two wedges together make up a rectangle. The wedges *b* have the shape which is particularly distinctly visible in Figs. 18 and 19, and a lower extension or projection *b'*. Both wedges *a* and *b* are produced in the mold-disk in the sequence in which they are employed. For this purpose said disk 24 possesses bolts 26 (Figs. 21 and 22) with corresponding incisions. Fig. 22 shows the bolt 26 for casting wedge *a*, whereas the shape of the bolt for casting the wedge *b* is shown in Fig. 21. Fig. 23 shows the front elevation corresponding to Fig. 22, in which the exact position of the bolts employed for casting the wedges *a* and *b* is visible.

Each line of type rests on a bar *l*, just as in the case of the types, and the wedges *a* and *b* are also pushed into the line of types after they are finished by the movement of the foot 121 (Fig. 25) to and fro. But whereas the wedges *a* rest on the bars *l* just like the types, the wedges *b* become placed with their projections *b'* resting on a special rail or rim *m* in such a way that they can be displaced with a certain amount of play both upwards as well as downwards. The projecting edge of the wedges *b* is generally situated somewhat above the stick *l*. If the rim *m* is lowered somewhat the wedges *b* then fall down. If, on the contrary, the rim *m* is raised, the wedges *b* then press the lines apart.

When a line is almost completely set up, a plate *p* and rod *r* are displaced in the manner shown in Fig. 28, the displacement of the same causing a clapper to strike against a bell *s*. In this manner a signal is obtained by which it is known that the line is almost finished. If the composer sees that he can not get any more new types on the line, he then lowers the rim or rail *m*, whereby the wedges *b* are lowered a little, and the whole line can be pressed somewhat together. In the same manner, by raising the rim *m*, the wedges are driven apart and consequently the line of type is also extended. In this manner the composer has it in his power to always effect a reliable justification of the line without difficulty.

The separate sticks *a* for supporting the types and the wedges *a* are arranged one over another in a channel, as may be seen in Figs. 26 and 29. The sticks *l* rest on a rack l', in the teeth of which a pawl l^2 engages, the latter being fastened to a frame l^3. A rod u^4 is generally pressed downwards by springs u^5 and is connected with its upper end to a bell-crank lever u^3 revoluble on the pivot u^2. When a line of type is completely set up, a plate *u* is then pushed against the line, whereby the entire line of type is pressed one step inwards in the composing-galley with the lines of type which have already been composed. Now when the plate *u* comes again into its commencing position, the rod u' effects a movement of the bell-crank lever u^3 by means of the pin u^6 and overpowers the springs u^5, whereby the pawl l^2 raises the rack l' one step. All the sticks *l* are then likewise raised one step and the next upper rod then comes into that position in which a new line of type can be set on it. The lower edge of the projections *b'* of the wedges *b* then rest on the plate *m*. By swinging the lever m^7, which is pivoted at m^6, upwards or downwards, the plate *m* can be raised somewhat or lowered somewhat, and consequently the wedges *b* of the entire line of type are either raised a certain desired amount and then drive the lines apart, or they fall down somewhat and consequently more room is then obtained in the line.

When a sufficient number of lines is in the galley, as is supposed in Fig. 29, each line can be specially justified again. For this purpose a screwed spindle *m'* is provided in a frame which can be raised and lowered below the galley by a lever m^{10}. The latter is on a shaft m^3, and engages a two-armed lever m^4 on said shaft m^3 the lever m^4 being connected through links m^5 with toggle-joints

m^8. By swinging the lever m^{10} the links and toggle-joints may be transposed from the position shown in full lines into the position represented in dotted lines, and thereby the frame, with the nut m^9 which surrounds the spindle m', and consequently also the spindle m' itself, can be lowered. In the lowered position the nut m^9 together with a rail or rim m^5 which is connected therewith may be displaced parallel to the separate lines by turning the crank handle m^2 and in this manner they may be brought under the different projections b' of the separate lines one after the other. If the rim m^5 is situated underneath a line of matrices, then the lever m^{10} is displaced in such a way that the frame and thereby the rim m^5 is raised, which leads to the final justification of the line.

A complete justification of the line is not purposed by the plate m, but solely the preparation for the justification of the line and its regulation within certain limits. The length of the stroke executed by the plate u for pushing onwards the line which has been set up is seen in Fig. 27. The full lines show the outermost position of the plate u and the dotted lines indicate the innermost position of the same. The side q of the galley which is situated opposite to the plate u is represented apart in perspective in Figs. 30 and 31. Instead of employing two wedges a and b, three wedges could be also provided in the manner which is shown in Fig. 32; in that case two wedges a with oblique surfaces directed inwards would act in common with one wedge b which has two correspondingly oblique lateral surfaces and which possesses a projection b'. In this case also the wedge b would not generally rest on the stick l, so that in this case also it is possible to move the line together by lowering the wedge b and to drive the line apart by raising said wedge.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a type casting machine the combination of a revoluble mold-disk provided with a plurality of mold slots, movable means adapted to close such slots successively, and a plurality of revoluble matrix-stocks adapted to co-act with such slots whereby type molds are formed, for the purpose specified.

2. In a type casting machine, the combination of a revoluble mold-disk, provided with a plurality of mold slots in its edge, said slots being of various breadths, means at the side of said disk adapted to close such slots in succession, a plurality of revoluble matrix-stocks adapted to close in succession one end of said mold whereby a mold is formed, for the purpose specified.

3. In a type casting machine, the combination of a revoluble matrix-disk, a plurality of revoluble matrix-stocks thereon, and means whereby the matrix-stocks may be rotated, for the purpose specified.

4. In a type casting and setting machine of the type described, the combination of a revoluble matrix-disk carrying a plurality of matrix-stocks, revoluble means carrying said matrix-disk, locking disks having detents on said revoluble means, keys adapted to engage said detents, a revoluble mold-disk having mold-slots adapted to be brought under said matrix-stocks, and key-controlled driving means whereby when a key is depressed said matrix-disk and said mold-disk are stopped, for the purpose specified.

5. In a type casting and setting machine of the type described, the combination of a revoluble matrix-disk, revoluble means carrying said matrix-disk, locking disks having detents on said revoluble means, keys adapted to engage said detents, a revoluble mold-disk, revoluble means carrying said mold-disk, a friction-coupling, a spring connected therewith, driving means engaging said spring adapted to normally drive the latter, and key-controlled means whereby when a key is depressed said matrix-disk and said mold-disk are stopped, and said spring is extended, for the purpose specified.

6. In a type casting machine, the combination of a pedestal, a hollow shaft revoluble therein, a shaft revoluble in said hollow shaft, a matrix-disk on said hollow shaft, revoluble matrix-stocks on said matrix-disk, and hand-operated means whereby said matrix-stock can be rotated on their axes when said shafts are rotating, for the purpose specified.

7. In a type casting machine, the combination of a revoluble matrix-disk, carrying matrix-stocks, means adapted to rotate said matrix-disk, key-controlled means adapted to arrest said disk, a mold-disk having mold-slots in its edge, means adapted to close the vertical sides of said slots, means for bringing a matrix-stock against one end of the mold-slot, and means for casting a type in such mold-slot when the parts are in such position.

8. In a type casting machine, the combination of a mold-disk having mold-slots in its edge, slides in said slots, means adapted to close the outer sides of said slots and a matrix-stock adapted to close one end of said conduit whereby a mold is formed, with a rod movable vertically over said matrix-stock, a tappet (79) on said rod, a revoluble finger (29) providedwith a nose (80), whereby when said rod is pressed downwards said tappet presses said nose and said finger moves the related slide (26), for the purpose specified.

9. In a type casting machine, the combination of a movable carriage (35), a mold-disk having mold-slots in its edge and mounted revolubly thereon, a revoluble matrix-

disk, carrying matrix-stocks, means adapted to drive said mold-disk and said matrix-disk, and means whereby when said carriage is moved towards said matrix-disk, said mold-slots are moved further under said matrix-stocks and also moved laterally with regard to said matrix-stocks, for the purpose specified.

10. In a type casting machine, the combination of a revoluble mold-disk having mold-slots at its edge, slides in said slots, means adapted to rotate said mold-disk, and a revoluble disk located eccentrically of said mold-disk whereby said slides are displaced in said slots, for the purpose specified.

11. In a type casting machine, the combination of a disk having detents distributed in different circles, and a plurality of key levers having detents adapted to engage the detents on the disk when a key is depressed.

12. In a type casting machine, the combination of a plurality of disks having detents, a plurality of two-part jointed keys having detents adapted to engage the detents in the disks when said keys are depressed, a movable frame adapted to be engaged and moved by said keys after the detents of said keys have engaged the detents of the disk, with type casting mechanism, and means whereby when said frame is moved said type casting mechanism is actuated, substantially as described.

13. In a type casting machine, the combination of a type mold with a metal pump, means adapted to continually operate said pump, a second pump, means adapted to periodically operate said second pump, a channel connecting said second pump with the mold, a channel connected with said first pump and surrounding the first mentioned channel, whereby said former channel can be maintained at a uniform temperature by the continually circulating molten metal, substantially as specified.

14. In a type casting and setting machine of the type described, the combination of a mold-disk, means adapted to eject types from the same after they have been cast therein, a revoluble cam (111), a composing channel, lever mechanism adapted to be actuated by said cam, a foot (121) connected to said mechanism and adapted to engage said type after the same is ejected from said mold-disk and forward the type into said composing channel, substantially as described.

15. In a type casting machine the combination of a matrix-disk, and a plurality of revoluble matrix-stocks thereon, with a curved rack engaging said matrix-stocks, and means for rotating said rack whereby the matrix-stocks may be simultaneously rotated on their axes.

16. In a type casting machine the combination of a revoluble matrix-disk, and a plurality of matrix-stocks revolubly mounted thereon; with a revoluble curved rack engaging said matrix-stocks, and means for moving said rack relatively to the matrix-disk whereby the matrix-stocks may be rotated on their axes while moving with the matrix-disk.

17. In a type casting machine, the combination of a plurality of disks (13), arranged one over another, having detents (17) distributed in different circles on said disks, a plurality of key-levers each having a detent (18) adapted to engage a detent (17) when a key is depressed, a revoluble mold-disk, means adapted to rotate the latter, and means controlled by said key-levers whereby when a key is depressed said matrix-disk and said mold-disk are stopped.

18. In a type casting machine, the combination of a pedestal (1), a hollow shaft (12) round and engaging said shaft (2), a plurality of disks (13), arranged one over another on said shaft and having detents (17), a plurality of key-levers each having a detent (18) adapted to engage a detent (17) when a key is depressed, a revoluble mold-disk, means adapted to rotate the latter and said shaft (12), and key-controlled means whereby when a key-lever is depressed said matrix-disk and said mold-disk are stopped.

19. In a type casting machine, the combination of a pedestal (1), a hollow shaft (2), revoluble therein, a shaft (4) revoluble in said hollow shaft (2), a matrix-disk (3) on said hollow shaft, revoluble matrix-stocks mounted radially on said matrix-disk, means attached to said shaft (2), and means attached to said shaft (4), whereby said matrix-stocks can be shifted, substantially as described.

20. In a type casting machine, the combination of a pedestal (1), a hollow shaft (2), revoluble therein, a shaft (4) revoluble in said hollow shaft (2), a matrix-disk (3) on said hollow shaft, revoluble matrix-stocks mounted radially on said matrix-disk, a matrix-wheel (5) on shaft (4), having teeth engaging said matrix-stocks, means attached to said shaft (2), and means attached to said shaft (4), whereby said wheel can be shifted when said shafts are rotating, for the purpose specified.

21. In a type casting machine, the combination of a revoluble matrix-disk, carrying matrix-stocks, means adapted to rotate said matrix-disk, a mold-disk having mold-slots in its edge, means adapted to close said slots at the side, a shaft (62) movable axially, a helically grooved disk (64) on said shaft, a pivoted two-armed lever (76) adapted to engage said disk (64), a spring (77) on said lever, a spring actuated rod (78) under said spring (77) and vertically over a matrix-stock, and key-controlled means whereby when a key is depressed said rod (78) presses

a matrix-stock against said mold-slot, for the purpose specified.

22. In a type casting machine, the combination of a revoluble matrix-disk, carrying matrix-stocks (7), adapted to rotate said matrix-disk, keys and connections for arresting the rotation of said matrix-disk, a mold-disk having mold-slots in its edge, means adapted to close said slots at the side, a shaft (62) movable axially, a disk (64) on said shaft, a pivoted lever (76) adapted to engage disk (64), a spring (77) on said lever, a spring actuated rod (78) under said spring (77) and means whereby when a key is depressed said rod (78) presses the underlying matrix-stock, for the purpose specified.

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

OSKAR UHLWORM.

Witnesses:

MAURICE LILIENFELD,

ALBERT ELLIOT.