A. STEINER.

POWER OPERATED TYPE WRITER.

APPLICATION FILED JULY 22, 1914.

1,173,321.

Patented Feb. 29, 1916.

3 SHEETS—SHEET 1.

Fig. 1.

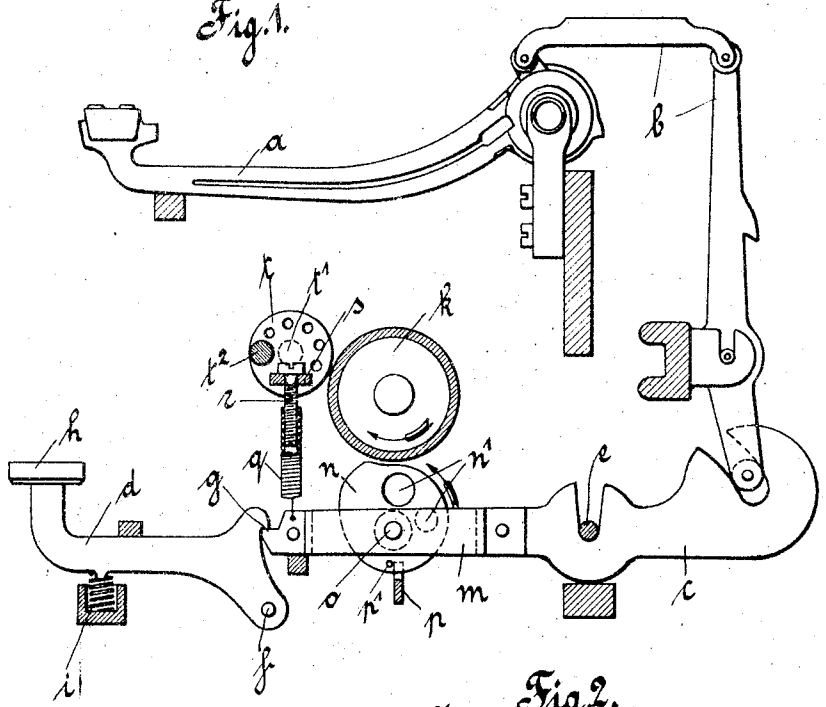


Fig. 2.

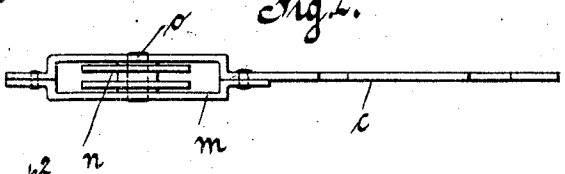


Fig. 3.

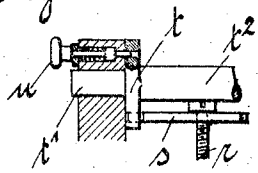
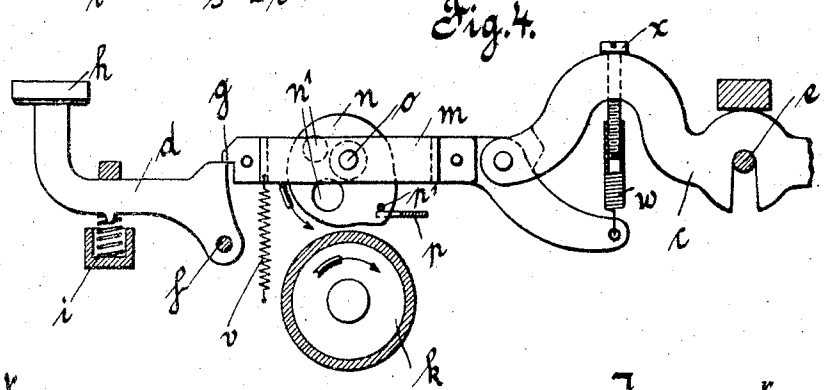


Fig. 4.



Witnesses:

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W. C. Harwood.

Inventor:

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by B. Singer Atty

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3 SHEETS—SHEET 2.

Fig. 5.

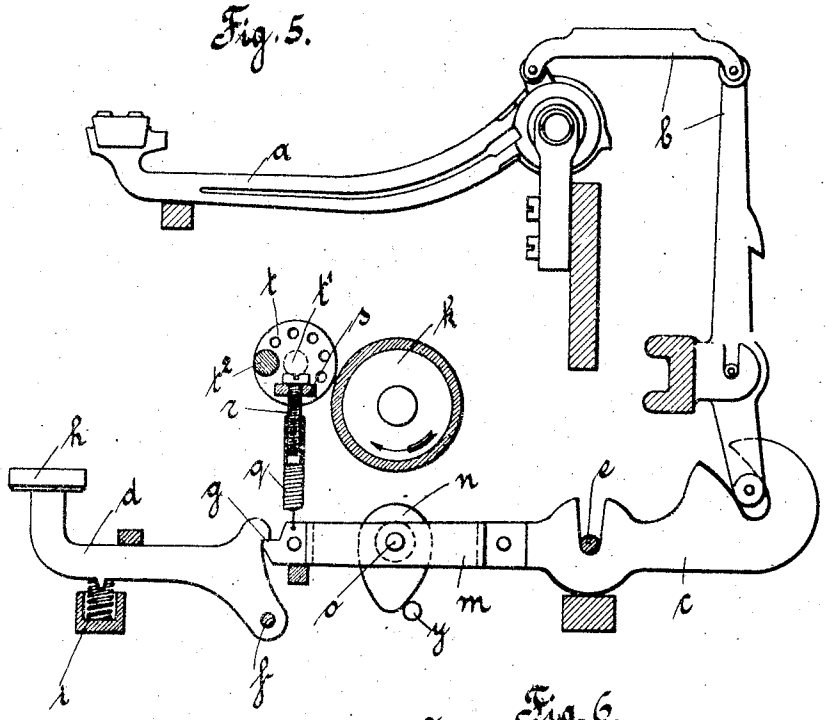


Fig. 6.

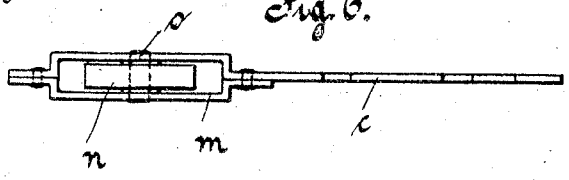
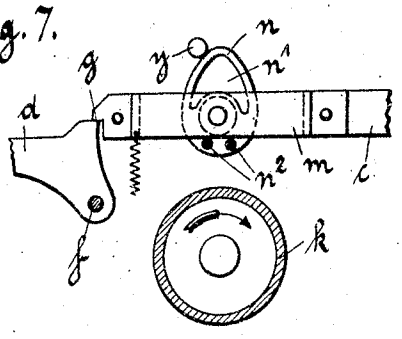


Fig. 7.



Witnesses:

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3 SHEETS—SHEET 3.

Fig. 8.

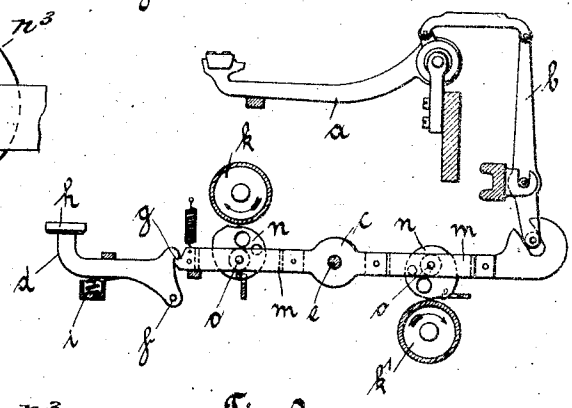


Fig. 12.

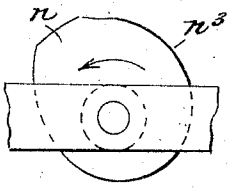


Fig. 9.

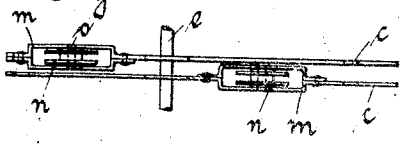


Fig. 13.

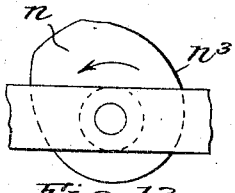


Fig. 10.

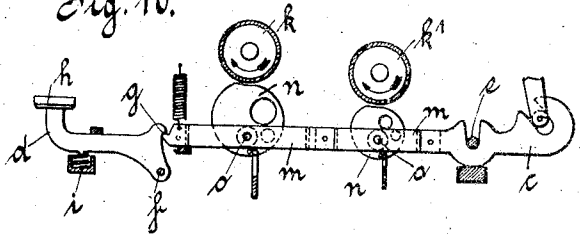


Fig. 11.

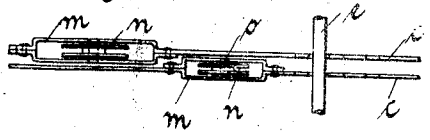
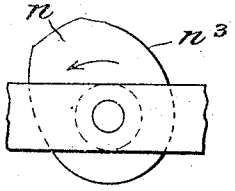


Fig. 14.



Witnesses:

H. A. Kellogg

H. C. Hazlewood

Inventor:

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by B. Singer Atty

UNITED STATES PATENT OFFICE.

ADOLF STEINER, OF BERLIN, GERMANY, ASSIGNOR TO TITANIA SCHREIBMASCHINEN GES. M. B. H., OF BERLIN, GERMANY, A CORPORATION OF GERMANY.

POWER-OPERATED TYPE-WRITER.

1,173,321. Specification of Letters Patent. Patented Feb. 29, 1916.

Application filed July 22, 1914. Serial No. 852,426.

To all whom it may concern:

Be it known that I, ADOLF STEINER, manager, a subject of the German Emperor, and residing at 61 Plan-Ufer, Berlin, State of Prussia, in the German Empire, have invented certain new and useful Improvements in or Relating to Power-Operated Type-Writers, of which the following is a specification.

It has already been attempted to separate the striking of the keys and the movement of the types in typewriters and to make them independent, by causing the writer to release, by striking the key, a device operated by springs, electromagnets or the like, which, in its turn, moved the type onto the paper, so that the strength of the stroke on the keys was independent of the printing pressure.

In order to effect a rapid striking, it has already been suggested also to provide for each type bar, a separate mechanical device operated by striking the corresponding key. This device, however, presents the drawback that the printing pressure of the single types cannot be adjusted independently of each other. Such an adjustment is, however, required in order to adapt the printing pressure to the larger or smaller contact surfaces of the characters, and to regulate the force used for striking, in accordance with the more or less central or lateral position of the levers. This invention removes the disadvantage in question by operating each of the mechanical devices for moving the types, by means of a separate source of power. It is consequently possible to regulate individually the printing pressure of the single types, for instance by inserting adjusting devices into the source of power or by giving to the single moving devices (cam disks, for example) a particular shape.

In the accompanying drawings, a preferred form of construction of applicant's device and several modifications of the same are shown applied to the corresponding parts of the typewriter.

In the drawing Figure 1 shows diagrammatically a key and type lever with the corresponding connecting members and mechanical driving gear; Fig. 2 is a plan of the driving lever shown in Fig. 1; Fig. 3 is a partial front elevation showing an adjustment device for regulating the pressure of the types against the paper; Fig. 4 is a modified construction of the device shown in Fig. 1; Fig. 5 is a modified construction of the driving cam disks; Fig. 6 is a partial plan of Fig. 5; Fig. 7 is a further form of execution in a side view; Fig. 8 is a diagrammatical side view of a modified form of the invention having the yokes arranged in a staggered order; Fig. 9 is a plan of Fig. 8; Fig. 10 is a modified construction of the yoke-arrangement according to Fig. 8, and Fig. 11 is a plan of Fig. 10. Figs. 12 to 14 show different forms of cam disks to be used for the different types for the purpose of regulating the pressure of the types against the paper.

The type lever a as well as the rods b connecting it to the key lever, are made in the known manner. The key-lever itself consists of the mechanically movable driving lever c and the lever d provided with the key button h. The former lever oscillates about the pin e, and the latter about the pin f. The two levers engage over each other by means of projections g so that, by depressing the lever d, by striking the key button h, the driving lever c is released and turned by the mechanical device hereinafter described, about the pin e, first in a clockwise direction, and then in the opposite direction, and in that way brings by means of the rod b the type lever a with its end carrying the type in the known manner against the paper roll. The engagement of the projections g is effected, after returning the driving lever c to its original position, by a spring i arranged under the key lever d. For mechanical operation of the lever c, in the machine is mounted a roller k always rotating in the direction of the arrow and preferably covered with a coating, for instance, rubber or the like. The driving lever c is bifurcated at the portion m situated under the roller k (Fig. 2). In the bifurcated part or yoke m is mounted a cam disk n, the center of gravity of which is shifted, by providing recesses n^1 at such a point that in the position shown in Fig. 1, the disk n has the tendency to turn about its spindle o in an anti-clockwise direction, that is to say, in the direction of the arrow in Fig. 1.

In order to enable the cam disk n to be locked in the position shown in Fig. 1, it is provided in the center with a groove, with

which engages a finger of a cam ledge p. At the same time, the two lateral disks produced by the groove in the cam disk n, are connected together at one point by means of a pin p^1 so that the pin p^1 engages with the cam ledge p, and in the position of the cam disk n shown in Fig. 1, prevents it from rotating in the direction of the arrow.

The operation of the device is as follows: If the key lever d is depressed, the projections g release each other, and the spring q becomes operative. It rotates the driving lever c about its pin e in a clockwise direction, so that the cam disk n engages with the constantly rotating roller k. In that way, the pin p^1 is released from the corresponding finger of the cam ledge p, and the cam disk n engages with the roller k so that, owing to the shape of the cam disk, the lever c can rotate in a clockwise direction, the types being pressed in the known manner. During continued rotation of the cam disk n, the driving lever c is turned back owing to the shape of the cam disk n and comes back to the original position in which the projections g engage with each other, so that the device is ready for the next striking of the keys. The force with which the types strike the paper roll, chiefly depends on the strength of the spring q, but the cam disk n owing to its shape as well as that of the roller k, also regulates the speed of striking as well as the force of the same.

In order to enable the pressure of the types against the paper to be regulated, the spring q producing the said pressure, is made adjustable. It is secured with one end to the driving lever c, while with its other end engages a screw r, the head of which is held by a ledge s. By screwing the screw r, more or less into the spring q, the latter is placed in tension more or less, and its action on the type lever regulated. In that way, it is possible, according to the type which is controlled by the corresponding driving lever c, to adjust the spring to a greater or less strength, and in that way to regulate the pressure with which the single types are pressed against the paper, by adjusting the springs q, independently of the striking of the keys by the writer, in accordance with the size of the printing surface of the different types. Such a regulation of the striking force of the type levers could also be effected by different shapes of the cam disks n, even if all the springs q were placed under the same tension.

Figs. 12 to 14 illustrate different shapes of the cam disks n the part n^3 of these cams engages the roller k while the lever e performs its operating stroke under the influence of the spring q. The cam hereby regulates the speed of the movement of said lever. The flatter the cam face n^3 the quicker the lever e will be able to perform its operation and the more force will be developed by the spring q in hitting the paper.

In other words, if the cam disk has a cam face as indicated in Fig. 14 the type will strike the paper with a greater force than it will strike it if the curve is shaped as according to Figs. 13 or 12. It will therefore, be possible to regulate the force with which the types strike the paper by an appropriate selection of the cam disks.

In order to enable the pressure of the types against the paper to be modified in accordance with the number of the carbons to be written, another device is provided, by means of which all the springs q can be simultaneously placed under tension or slackened without regard to their individual adjustment for the type controlled by the same. To that end, the ledge s through which pass all the screws r, is made adjustable in the axial direction of the springs q. This could be done for instance by mounting the ledge s by means of a pin at each side of the disk t rotatable about a pin t^1. By rotating the disk t in one or in the other direction, the pins of the ledge s are raised or lowered. The two disks t, in order to insure a simultaneous movement, could be preferably connected together by means of a cross-bar t^2. A spring controlled lock u (Fig. 3) which can engage with holes of one of the disks t, is used for locking the disks t in its different positions. Another adjustment device for the ledge could be selected at will and for the purpose of facilitating the adjustment, a scale could be provided, indicating the position of the ledge for the number of carbons in question.

The construction shown in Fig. 4 is substantially similar to that shown in Fig. 1, only in this case the rolling of the cam disk n on the continuously rotating roller k acts in the reverse direction. If in this case the lever d is moved by depressing the key h, so that the projections g are released, the weak spring r or eventually the weight of the driving lever c oscillating about the pin e, brings the cam disk n into engagement with the rotating roller k. During the subsequent rolling, the driving lever c, owing to the shape of the cam disk n, will be moved at first in an anti-clockwise direction and will produce the striking of the type lever. As soon as the spindle o of the cam disk n has reached the smallest distance from the roller k, the driving lever c will be moved back, until the projections g come into engagement with each other. As however the cam disk n has been in the meantime locked by the lock p p^1, it no longer comes into engagement with the roller k, and the device stops.

In order to enable the printing pressure to be regulated, the driving lever c is divided, and between the two parts is inserted

a spring w, the strength of which can be regulated by means of the screw x. In this case also, in place of, or in addition to, the adjustment of the springs w for the single characters, in accordance with their printing surface, cam disks of different shape can be used. This construction is not as efficacious as the first, as the joint adjustment of all the springs w for the purpose of regulating the pressure in a case of a different number of carbons, is very difficult to effect in the said construction.

Another modification of the driving device is shown in Figs. 5–7, according to which the cam disks in the position of rest, face the rotating rollers with their lower portions so that when a key is depressed, the turning of the driving lever required for the writing movement, is effected exclusively by the source of power arranged for producing the printing pressure, that is to say, during the time in which the driving lever with the cam moves toward the roller, only the return of the driving lever to its position of rest being effected by the cam. This arrangement has the advantage that the depression can take place more quickly, and after the highest portion of the cam has passed the roller during the rotation, and the locking has taken place, the cam will fall back into a position of rest in which it is held by its own weight in contact with a stock pin and out of contact with the roller, thus avoiding unnecessary wear of the roller.

The cam disk n is of heart or egg shape and is arranged with the pointed end downward, so that the lowest face of it comes opposite to the rotating roller k. In that position, between the cam n and the roller k there is such a large intermediate space that, after the release of the driving lever c by the depression of the key h, the former can make idly a sufficiently large movement to bring about the impression of the type. For driving the driving lever during the impression a spring g is used the tension of which is adapted to be regulated for instance in the manner stated before, by means of the screw r and the adjustment device s t t^1 t^2, in accordance with the type to be struck and the work to be performed. As soon as the cam n comes into engagement with the roller k, and the striking of the type is completed, the cam begins to rotate owing to the friction produced, and consequently the driving lever c is again brought back to its position of rest in which it is locked by the key lever d. Only one half of the cam therefore becomes operative, and it would be sufficient to use half a cam disk, but nevertheless the cam is preferably made as shown in the drawing, so that it takes up a correct position when it is free. As soon as during the rotation the highest portion of the cam has passed the roller k, and the locking has taken place, the cam falls back again into its position of rest. In order to avoid excessive oscillation during the falling back of the cam, a stop rail y can be provided, which is arranged so low that, after the upward movement of the cam with the driving lever c, it no longer interferes with the rotation of the cam. The pin is preferably arranged in such a manner that the cams are held in contact with the same by the action of their weight.

The roller k can be of course also arranged below the driving lever and it is then merely necessary for the cam n, in its position of rest, to stand with its point upward, that is to say, face the roller with its lowest point. This can be effected for instance by shifting the center of gravity of the cam to its narrower side, by giving it a suitable shape. A construction of this kind, given by way of example, is shown in Fig. 7. In this case, the cam is provided at the pointed side with recesses n^1 so that it becomes lighter at this side. If this is still insufficient to insure the adjustment in the position shown in Fig. 7, recesses n^2 could be provided on the narrow side of the cam also facing downward, and the said recesses filled with a heavier metal. In such case the whole cam is preferably made of a light metal, for instance aluminium, and the recesses n^2 are filled with a heavy metal such as for instance lead or the like.

The arrangement described has the advantage that the stop pins engaging with the cams, can be done away with, that is to say, the cam disks made with full contact surfaces, with which they engage with the roller k, so that the latter does not wear out so quickly. At the same time, the printing pressure is independent of the shape of the curves, and its strength is therefore regulated merely by the tension of the spring q. In that way, there is a greater precision in the adjustment, and a quicker working is insured. In most of the cases, namely if the keys are arranged close together, there are difficulties as there is not sufficient room for the arrangement of the bifurcated parts or yokes. In such cases I preferably arrange the driving device as shown in Figs. 8–11, in which the yokes are arranged on the driving levers in staggered order, and more than one rotating rollers are used, so that the consecutive yokes alternately engage with the different driving rollers. In the Figs. 8–11 two modified forms of the invention are illustrated having two rotating rollers, marked with the reference letters k and k^1 and the yokes m on the driving levers are arranged in staggered order. The arrangement can be, as shown in Figs. 8 and 9, either such that the yoke m is alternately arranged on one or on the other side of the

pivot pin *e* on the driving levers *c*. Two rotating rollers are then required, one of which must be arranged above, and the other below the driving lever *c*, as the cams must operate in opposite direction.

In the constructions shown in Fig. 10, both rollers are arranged on one side of the lever. Owing to the different leverages which become operative, the eccentricity of the cams *n* in this arrangement must be different. Owing to the staggered arrangement of the yokes *m*, there will be approximately a double space available for each of them in the direction of width. The yokes as well as the cams, can be therefore made wider, and their wear as well as the wear of the rollers *k* and *k*¹ preferably covered with rubber, becomes smaller, or the machine can be made more compact in width.

I claim:—

1. In a power operated typewriter in combination, type levers, a key for each type lever, a separate driving lever for each of the type levers, means controlled by the keys for locking the driving levers in the position of rest, a separate source of power for each of the driving levers operating it when the said means are released, and automatic means for restoring the said sources of power into their working position after the operation of the driving levers, substantially as described.

2. In a power operated typewriter in combination type levers, a key for each of the type levers, a separate driving lever for each of the type levers, means controlled by the keys for locking the driving levers in the position of rest, a separate source of power for each of the driving levers, operating it when the said means are released, cam disks mounted on said driving levers and continuously rotating rollers coöperating with the said cam disks.

3. In a power operated typewriter in combination type levers, a key for each of the type levers, a separate driving lever for each of the type levers, means controlled by the keys for locking the driving levers in the position of rest, a separate source of power for each of the driving levers operating it when the said means are released, cam disks mounted on said driving levers and continuously rotating rollers coöperating with the said cam disks, each of the said sources of power coöperating with the corresponding cam disk and moving the driving lever so that it first makes the rotation required for striking the types and is then brought back to its original position.

4. In a power operated typewriter in combination, type levers, a key for each of the type levers, a separate driving lever for each of said type levers, means controlled by the keys for locking the driving levers in the position of rest, a separate source of power for each of the driving levers operating it when the said means are released, cam disks mounted on said driving levers, and continuously rotating rollers coöperating with said cam disks, said cam disks having different shapes for the purpose of adjusting the effect of said sources of power to suit the size of the printing surface of the corresponding types.

5. In a power operated typewriter in combination type levers, a key for each of the type levers, a separate driving lever for each of the type levers, a separate source of power for each of the driving levers, cam disks mounted on said driving levers and continuously rotating rollers coöperating with the said cam disks, said cam disks being staggered relatively to each other.

6. In a power operated typewriter in combination type levers, a key for each of the type levers, a separate driving lever for each of the type levers, a separate source of power for each of the driving levers, cam disks mounted on said driving levers and continuously rotating rollers coöperating with said cam disks, said cam disks being staggered relatively to each other and having different eccentricities to suit the different positions of the cams.

7. In a power operated typewriter in combination type levers, a key for each of the type levers, a separate driving lever for each of the type levers, a separate source of power for each of the driving levers, cam disks mounted on said driving levers and continuously rotating rollers coöperating with the said cam disks, said cam disks being staggered relatively to each other by being arranged alternately in front of, or behind the pivot point of the driving levers.

8. In a power operated typewriter in combination type levers, a key for each of the type levers, a separate driving lever for each of the type levers, a separate source of power for each of the driving levers, cam disks mounted on said driving levers and two continuously rotating rollers coöperating with the said cam disks, said cam disks being staggered relatively to each other by being arranged alternately in front of, or behind the pivot point of the driving levers and one of said rollers being mounted above, and the other one below the driving levers.

In testimony whereof I have affixed my signature in presence of two witnesses.

ADOLF STEINER.

Witnesses:
WOLDEMAR HAUPT,
HENRY HASPER.