No. 841,223. PATENTED JAN. 15, 1907.

E. BRONNER.

DRAWING APPARATUS.

APPLICATION FILED MAR. 17, 1906.

Fig. 1.

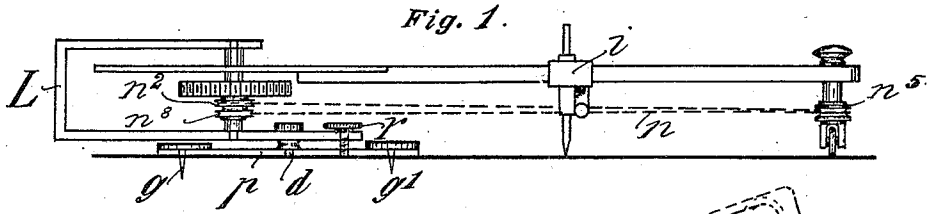



Fig. 2.

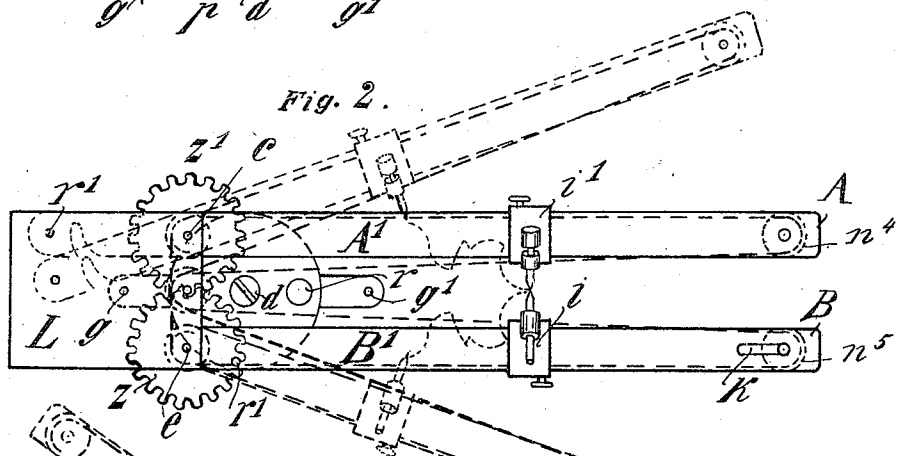



Fig. 3.

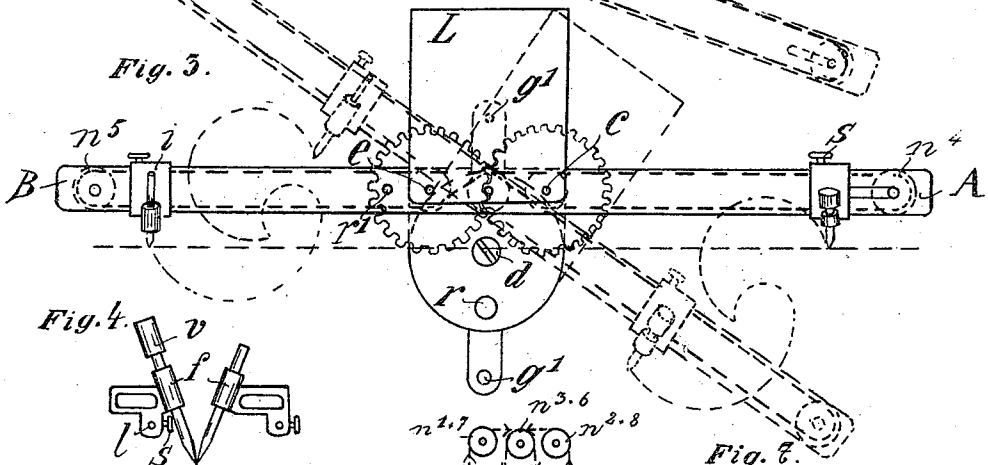



Fig. 4.




Fig. 5.

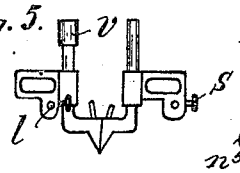



Fig. 6.

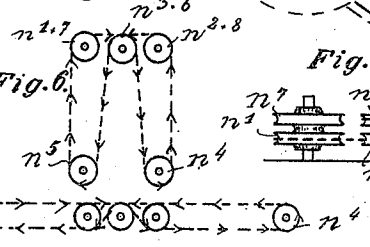



Fig. 7.

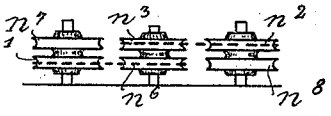



Fig. 8.

Witnesses.

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# UNITED STATES PATENT OFFICE.

EMIL BRONNER, OF EBERBACH-ON-THE-NECKAR, GERMANY.

## DRAWING APPARATUS.

No. 841,223. Specification of Letters Patent. Patented Jan. 15, 1907.

Application filed March 17, 1906. Serial No. 306,519.

*To all whom it may concern:*

Be it known that I, EMIL BRONNER, a subject of the German Emperor, and a resident of Eberbach-on-the-Neckar, Germany, have invented certain new and useful Improvements in Drawing Apparatus, of which the following is a specification.

The invention deals with a drawing apparatus by means of which the positive as well as the negative representation of a drawing can be obtained.

In the accompanying drawings the object of the invention is shown.

Figure 1 gives a side view; Fig. 2, a ground plan of the apparatus with the block attached to the plate; Fig. 3, a ground plan of the same with rectilineal-coupled rails; Figs. 4 and 5, two different varieties of sliders to carry the tracing-pin and crayons or pencil, and Figs. 6, 7, and 8 the orbit of the cord. A plate P, which is attached to a drawing-board by pins $g$ $g'$, carries a block L, which revolves on an axle $d$, but can, however, be immovably fastened to the plate P by the aid of a screw $r$. This block L has two axles $c$ and $e$, on which the rails A A′ B B′, which are shown in any cross-section desired, revolve. The rails are connected with each other by cogged wheels $z$ $z'$. On each axle $c$ and $e$ of the rails are mounted two revolving grooved reels $n'$ $n^7$ and $n^2$ $n^8$, while two more reels $n^3$ $n^6$ are mounted on a pivot-pin on the block L between the two rail-axles $c$ and $e$. On the ends A and B of the rails A A′ B B′ are mounted reels $n^4$ $n^5$, around which a joined cord $n$ is passed, which is represented in the drawings by a dotted line. The axle of the reel $n^5$ runs in a groove $k$ on the rail in order that the cord $n$ may be tightened or loosened, as desired. When the apparatus is in use, the portion of the cord which unwinds from the lower reel on the axle of one rail winds itself around the upper reel on the axle of the other rail, and vice versa, which renders a lengthening and shortening of the cord when in use impossible. Two sliders $i$ $i'$, which can be pushed to and fro, are attached to the rails A A′ B B′, one of which carries a tracing-pin and the other a colored crayon or pencil. The two sliders $i$ $i'$ are bound to the cord $n$ and situated either both on the inside of the rails A A′ B B′, so that the one slider $i'$ makes exactly the same backward-and-forward movements on the rails as the other.

The manner in which the sliders are attached to the cord can be seen from Figs. 4 and 5. The cord is passed through the holes $l$ and screwed tight. The two—pin and crayon or pencil—either stand in a slanting position, Fig. 4, or they are right-angled, Fig. 5, in order that the points may touch. Both the pin and crayons can be moved up and down in the cases $f$ and are also exchangeable. The drawing-pencil carries a weight $v$, which presses it downward. The block L can immovably be fastened to the plate P by means of a screw $r$. In this case the rails A A′ B B′ revolve on their axles $c$ and $e$. The rails A A′ B B′ can be coupled together in a rectilineal position if they are laid together. The screw $r$ is taken out of the block L and then passed through the holes $r'$ in the rails as well, which now lie one above the other. The block L then revolves on its axis $d$ with the rail A B. The points of the tracing-pin $i'$, the colored crayon or pencil $i$, and the axle $d$ lie in a straight line, Fig. 3.

The apparatus is worked in the following way: In order to procure a negative of a drawing, the block L is attached to the plate. When the tracing-pin $i'$ is passed over a certain drawing, the drawing-pencil $i$ gives the negative of the drawing, as the sliders $i$ $i'$ make exactly the same backward-and-forward movements on the rails A A′ B B′, and these rails revolve on their axles in opposite directions, Fig. 2. In order to produce a positive of a drawing, the rails A A′ B B′ are coupled in a rectilineal position. The slides $i$ $i'$, Fig. 3, then either advance to or recede from each other. When one then passes the tracing-pin $i'$ over a drawing, the drawing-pencil $i$ gives the positive representation of same.

I claim—

1. In a drawing apparatus of the character described, the combination of a plate P attached to a drawing-board, an axle $d$ on this plate P, a block L revolving on said axle $d$, two axles $c$, $e$ on the said block L, rails A, A′, B, B′ revolving on said axles $c$ and $e$, cogged wheels $z$, $z'$ connecting said rails A, A′, B, B′, revolving grooved reels $n'$, $n^7$ and $n^2$, $n^8$ on these axles $c$, $e$ two more reels $n^3$, $n^6$ mounted on a pivot on said block L, and lying between said reels $n'$, $n^7$ and $n^2$, $n^8$, two reels $n^4$, $n^5$ mounted on the ends of the said rails, two sliders $i$, $i'$ on said rails A, A′, B, B′ which can be pushed to and fro, an endless cord $n$ connected with said two slides and running over the said reels, in such a way that a

lengthening and shortening of the cord when in use is impossible and the one slide makes exactly the same backward-and-forward movement on the rails as the other, substantially as set forth.

2. In a drawing apparatus the combination of a plate P attached to a drawing-board, an axle $d$ on this plate P, a block L on said axle $d$, a screw $r$ to fasten the block L to the plate P, two axles $c$, $e$ on said block L, rails A, A′, B, B′ having holes $r'$ and revolving on said axles $c$ and $e$, cogged wheels $z$, $z'$ connecting said rails A, A′, B, B′, revolving grooved reels $n'$, $n^7$ and $n^2$, $n^8$ on these axles $c$, $e$, two more reels $n^3$, $n^6$ mounted in a pivot on said block L and lying between said reels $n'$, $n^7$ and $n^2$, $n^8$, two reels $n^4$, $n^5$ mounted on the ends of the said rails, two sliders $i$, $i'$ on said rails A, A′, B, B′, which can be pushed to and fro, an endless cord $n$ connected with said two slides and running over the said reels, in such a way that a lengthening or shortening of the cord when in use is impossible and the one side makes exactly the same forward-and-backward movement on the rails as the other, a groove $k$ in one of the ends of the rails in which one of the said reels $n^4$, $n^5$ runs, in order that the cord $n$ may be tightened or loosened substantially as set forth.

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Witnesses:
H. W. HARRIS,
JOS. H. LEUTE.