3 Sheets—Sheet 1.

J. LANGE & A. EISENBRAUN.

Anti-Friction Bearings for Rotary Shafts and Axles.

No. 198,987. **Patented Jan. 8, 1878.**

FIG. 1.

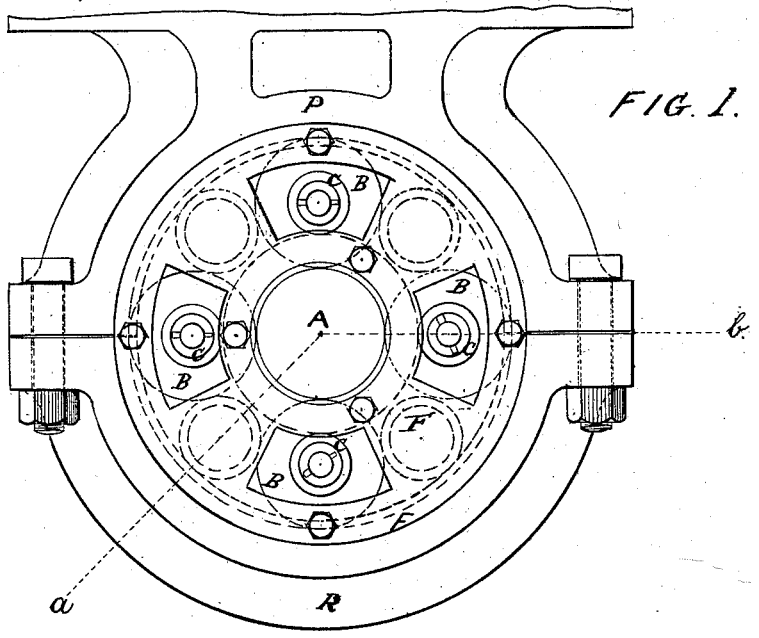
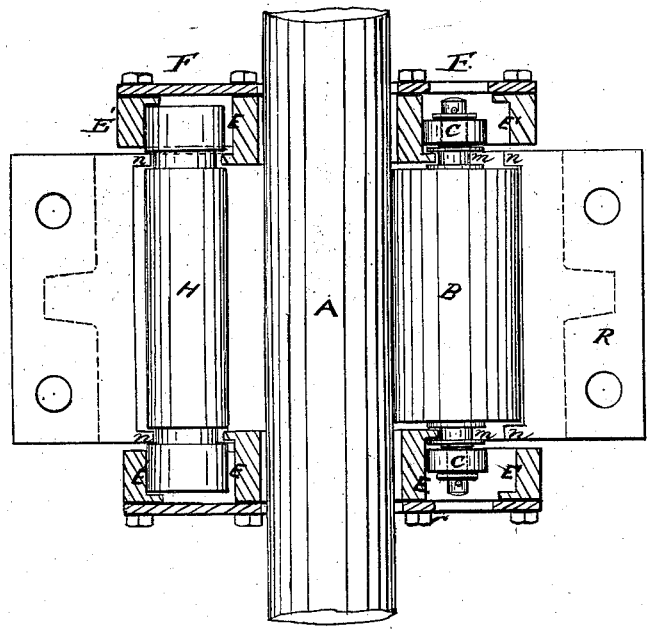


FIG. 2.



WITNESSES

Fritz Wuttke

G. Falkenström

INVENTORS

Julius Lange

Alexander Eisenbraun

Av. Briesen attorney.

3 Sheets—Sheet 2.

J. LANGE & A. EISENBRAUN.

Anti-Friction Bearings for Rotary Shafts and Axles.

No. 198,987. **Patented Jan. 8, 1878.**

FIG. 3.

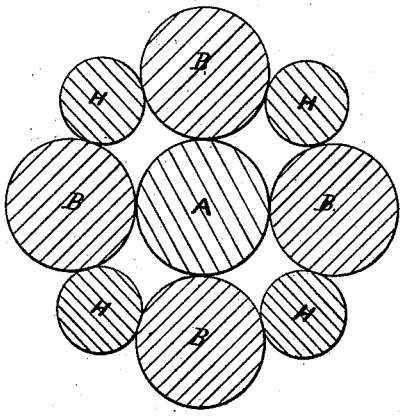


FIG. 4.

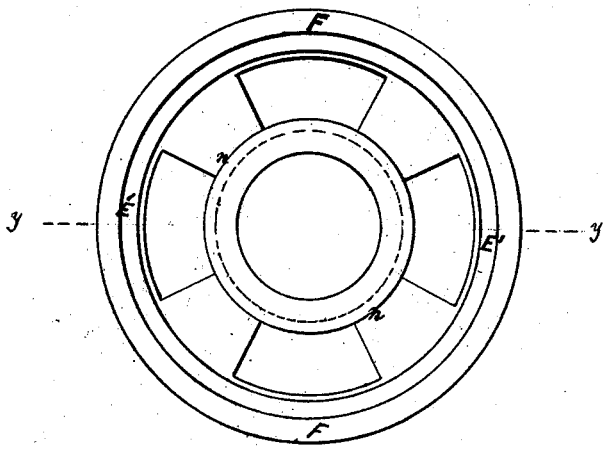
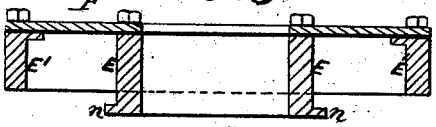


FIG. 5.



WITNESSES

Fridy Wuttke

G. Siderstrom

INVENTORS

Julius Lange

Alwin Eisenbraun

Aug. Briesen

attorney

3 Sheets—Sheet 3.

J. LANGE & A. EISENBRAUN.

Anti-Friction Bearings for Rotary Shafts and Axles.

No. 198,987. Patented Jan. 8, 1878.

FIG. 6.

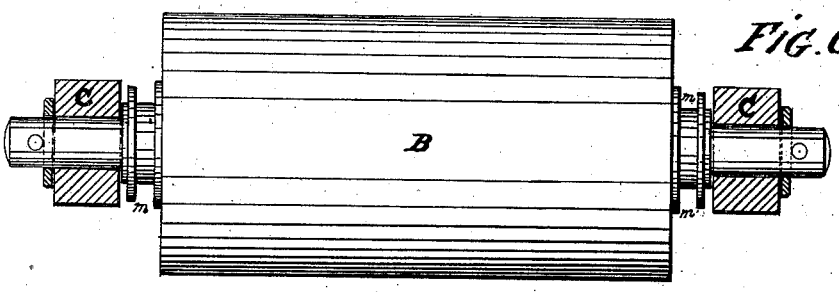


FIG. 7.

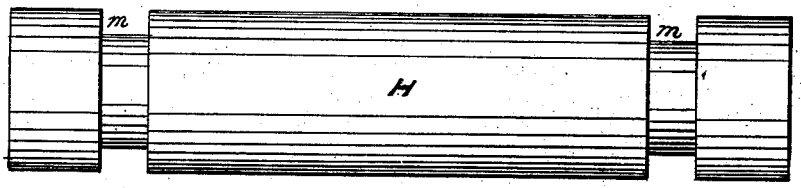
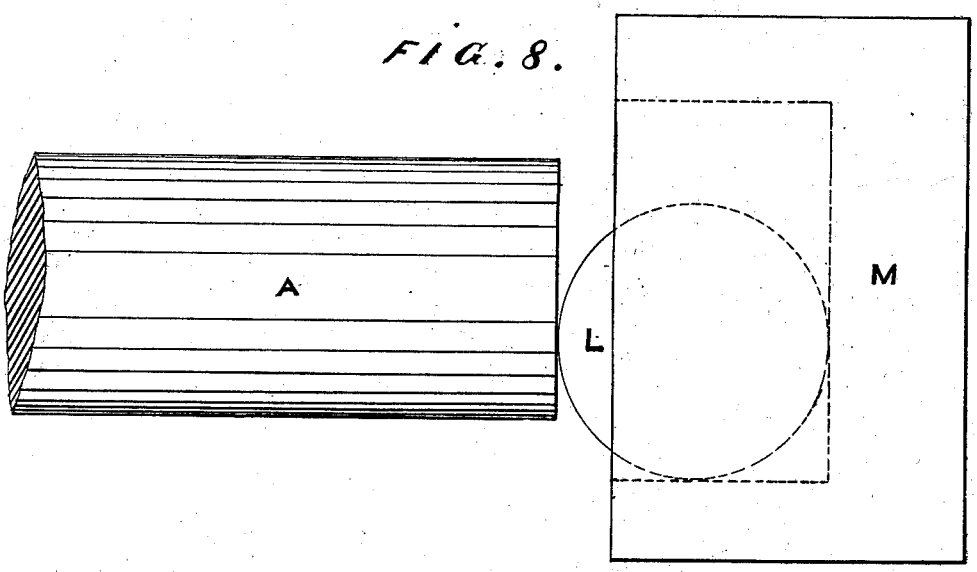


FIG. 8.



WITNESSES
Fritz Wenthe
G. Sidenström

INVENTORS
Julius Lange
Alwin Eisenbraun
A. v. Briesen attorney

UNITED STATES PATENT OFFICE.

JULIUS LANGE AND ALWIN EISENBRAUN, OF LODZ, POLAND, RUSSIA.

IMPROVEMENT IN ANTI-FRICTION BEARINGS FOR ROTARY SHAFTS AND AXLES.

Specification forming part of Letters Patent No. **198,987**, dated January 8, 1878; application filed September 24, 1877.

To all whom it may concern:

Be it known that we, JULIUS LANGE and ALWIN EISENBRAUN, of Lodz, in the Kingdom of Poland, Russia, have invented certain Improvements in Bearings for Rotary Shafts and Axles, of which the following is a specification:

The object of this invention is, by an improved arrangement and combination of rollers, runners, or anti-friction pulleys and supporting-rings, to construct bearings for shafting-axles of railway-carriages, tram-cars, and other rotary axles in such manner as to reduce the friction.

The construction of the apparatus will be fully understood on reference to the accompanying drawings, aided by the description thereof.

Figure 1 is a front elevation of a bearing constructed according to our invention. Fig. 2 is a horizontal section on the line *a b*, Fig. 1. Fig. 3 is a detail transverse section of the shaft or axle and its surrounding rollers. Fig. 4 is a detail elevation of one of the supporting end rings; Fig. 5, a detail central section thereof on the line *y y*, Fig. 4. Figs. 6 and 7 are detail face views of a roller and runner. Fig. 8 shows wall-box for preventing lateral or endwise movement of the shaft or axles.

Similar letters of reference indicate corresponding parts in all the figures.

A is the shaft or axle, supported on and surrounded by the rollers B B B B, to which it communicates rotation.

The rollers B B B B run on the anti-friction runners C C C C, the latter rolling upon the inner flange of two parallel rings, F F, which also rotate with the rollers and axle.

The rollers B B B B are spaced or retained at proper distances apart from each other by the intervening rollers H H H H, the ends of which roll upon the outer flanges E′ of the rings F F. The rollers B B B B and H H H H are pressed or cut to less diameter near each end, as shown at *m* in Figs. 6 and 7, and into these recesses fit projecting lips *n*, formed on the cap R and neck P of the journal-box, and on the inner flanges E of the rings F, in order to prevent lateral or endwise motion of the rollers B B B B and H H H H, and to retain the rings F F in position.

At Fig. 8 we have shown an attachment to be used in connection with our improved bearing, and which is to be placed against the end of the shaft A.

L is a ball partly inclosed within a box, M, which, in case of free end shafts having tendency to lateral or endwise motion, will be fixed in a wall, or carried by brackets, so that the ball L is free to roll along with the motion of the axle or shaft A.

When, from use, one or more of the rollers, B or H, become worn, it will only be necessary to replace one of them by a larger roller, as accuracy of relative diameter is not necessary to efficiency; or larger anti-friction runners C C C C may be applied to the gudgeons in lieu of replacing any of the rollers.

The rings F may be made in parts or sections, as shown by drawings.

It will be understood that the number and diameter of the rollers B and H may be varied.

We make no claim to the supporting and running of an axle or shafts upon rollers, *per se*.

What we claim is—

The combination of shaft A and rollers B H, having grooves *m*, with the runners C C, ring F, having flanges E E′, neck P, and cap R, having lips *n*, substantially as specified.

JULIUS LANGE.
ALWIN EISENBRAUN.

Witnesses:
FRITZ NUTTKE,
G. SÖDERSTRÖM.