Nov. 6, 1934. S. SAITO 1,979,644

BRAKE APPARATUS FOR A WHEEL.

Filed Dec. 9, 1932

Fig. 1

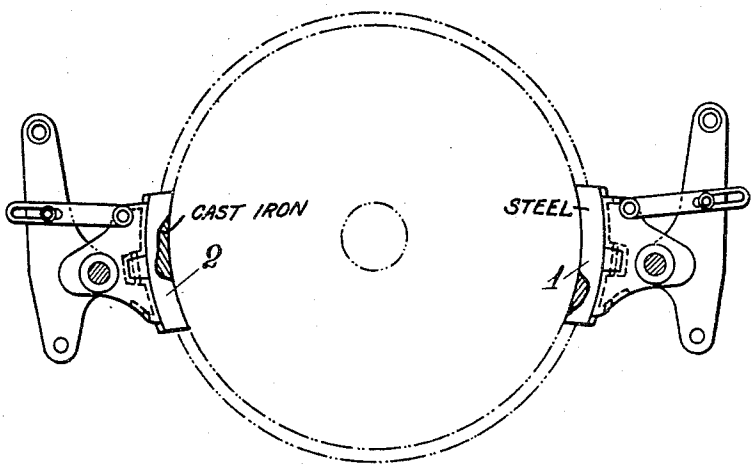


Fig. 2

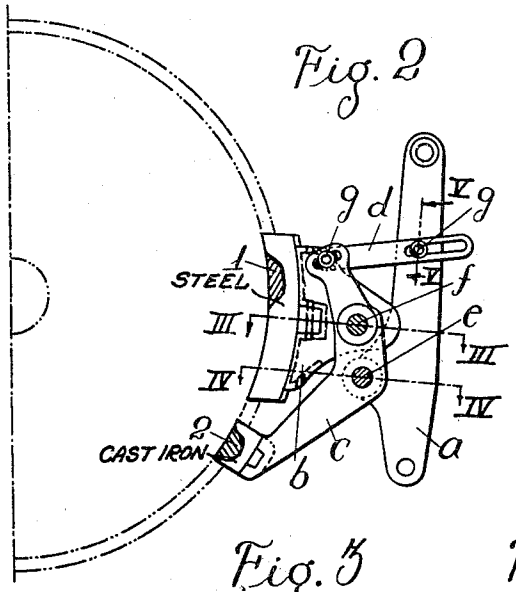


Fig. 5.

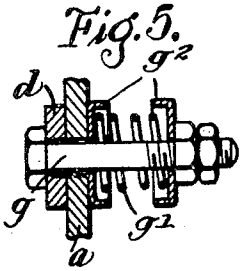


Fig. 3

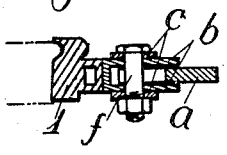
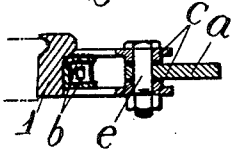


Fig. 4



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BRAKE APPARATUS FOR A WHEEL

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5 Claims. (Cl. 188—33)

This invention relates to improvements in a brake apparatus for a wheel, and especially to the construction of brake shoes.

The brake shoes heretofore used generally consist of two small blocks of cast iron mounted on a wheel at the opposite sides thereof, and a large part of the brake shoes wears off within a comparatively short period of time so that it is necessary to replace them frequently. The same thing holds true relative to the shoes made of steel.

As the result of the inventor's prolonged experiment regarding the relative wear between three different materials, it has been discovered that the wear of the shoes is greatly reduced when a steel shoe and a cast iron shoe are used against the tyre as in the case of ordinary shoes. It has also been ascertained that the resistance of the shoes against wear is greatly increased if the contacting area of the two shoes in use and the pressure imparted to them are different in a proper proportion.

However, the best result was obtained, according to the inventor's experiment, when a shoe made of carbon steel containing carbon from 0.5 to 0.8% or alloy steel such as chromium steel and tungsten steel was employed on one side, and a shoe made of cast iron was employed on the other side.

The following figures are the results of experiments actually made by the inventor.

When two cast iron shoes of the same size were used on a wheel of an electric tram car at the opposite sides thereof, and an equal pressure was imparted to them, the average quantity of the worn-off material of each shoe per 10,000 kilometers' run was 8.39 kilograms.

When an alloy steel shoe containing 13% of chromium, 0.5% of carbon and others, and a cast iron shoe of the same size were used on a wheel as usual, and the pressure imparted to them was equal, the average wear of the alloy steel shoe per 10,000 kilometers' run was 0.324 kilogram, while that of the cast iron shoe was 8.087 kilograms, the total travelled distance being 65,000 kilometers.

From the foregoing experiments, it becomes evident that the wear of a cast iron shoe is about the same whether it is used together with a cast iron shoe or a steel one as its complement, but that of a steel shoe is approximately one twenty-fifth of that of the cast iron shoe. This means that if one of the two cast iron shoes mounted on a wheel is replaced by a steel shoe, great savings will be made in the cost of the shoe and the outlay for replacing it because the life of the steel shoe is twenty-five times as long as that of the cast iron shoe.

If the contacting area of the cast iron shoe and the pressure imparted to it are smaller in degree than the area of the steel shoe and the pressure imparted to it, the wear of the shoes as a whole can be greatly lessened.

In applying the results of the above experiments into practice, there are several effective ways of mounting the shoes; a carbon steel or alloy steel shoe on the one side and a shoe of cast iron on the other side of a wheel may be mounted, and the contacting area and the pressure of the shoes may be equal or otherwise. Two shoes made of different materials as above mentioned and put in adjacent position, may be mounted on one side alone or on both sides of a wheel at an opposing position.

Two typical examples of the brake apparatus according to the invention are shown in the attached drawing.

Referring to the attached drawing, Fig. 1 is a front elevation of a brake apparatus, Fig. 2 shows the same view with some modifications and Figs. 3 and 4 indicate sectional plan views of Fig. 2 on the lines III—III and IV—IV, respectively. Fig. 5 shows a sectional view of the spring washer on the section line V—V of Figure 2 on an enlarged scale.

In the drawing, 1 is a shoe made of steel and 2 is another one made of cast iron. In Fig. 1, the shoes are held by holders of ordinary type. In Fig. 2, the steel shoe is held by a holder *b* and the cast iron shoe is held by a holder *c*. These holders are pivotally jointed with a pin *f*, and the holder *c* and a brake lever *a*, are connected with a pin *e*.

When the brake lever is operated in a known manner, the braking force is transmitted from *a* to *c* through the pin *e*, and a part of this force is applied to the shoe 1 through the pin *f* while the remaining force is applied to the other shoe 2 so as to brake the wheel.

In this apparatus, if the relative positions of the pins *e* and *f* are properly determined, the ratio of the two forces that works on the two holders may vary greatly with the result that the force applied to 2 may be made a fraction of that applied to 1.

The function of a small length *d* is to have the shoes resume their proper positions clear the wheel when the braking force is removed, and the frictional force at the spring washer *g* at each end of the length *d* keeps the holders *b*

and c in proper positions relative to the lever a. The grooves on the lever d and the holder c, are provided for adjusting the relative positions of these members. As shown in Figure 5, the spring for the washer g is shown at g_1 and the washers at g_2.

An example of the experiments made by the above mentioned apparatus may be stated as follows: If the contacting area of a steel shoe is three times as large and the pressure imparted to it is eight times as large as that of a cast iron shoe, a very good result is obtained, that is, the total wear of both shoes is less than ten percent, and that of the steel shoe proper is about two or three percent, of the wear of a steel shoe when used alone in the same condition.

Since malleable cast iron possesses similar properties to steel, a steel shoe can be replaced by a malleable cast iron shoe.

What I claim is:

1. A brake apparatus for a wheel which comprises a pair of shoes made respectively of steel and of cast iron.

2. A brake apparatus for a wheel which comprises a pair of shoes made respectively of steel and of cast iron put in adjacent position, and mounted on the same side of a wheel.

3. A brake apparatus for a wheel which comprises a pair of shoes made respectively of steel and of cast iron having different contacting areas.

4. A brake apparatus for a wheel which comprises a pair of shoes made respectively of steel and of cast iron, and a means to impart braking pressure dividedly to each shoe.

5. A brake apparatus for a wheel which comprises a pair of shoes made respectively of steel and of cast iron, having different contacting area, and a means to impart braking pressure dividedly to each shoe.

SEIZO SAITO.