PHILLIPS' TRAM-CAR BRAKE.

(See page 324.)

The application of steam power on street tramways, though meeting with much success in the provinces, will probably be deferred for some time in the streets of London, and perhaps in some of the largest cities, such as Manchester, where traffic is very great. Meanwhile horses must be employed to carry on the traffic already obtained on existing tramway lines, and everything which tends to lessen the heaviness of the work and so decrease the expenditure for horses, must command the attention of tramway companies and their managers. For this reason we illustrate on the page 324, a form of brake by which the power required to stop a car is stored up in springs, and by them given out in re-starting the car, thus relieving the horses of the heaviest part of their work.

In our illustrations Fig. 1 is a plan of the arrangement of springs and gearing as applied to a tramway car, the flooring of the car being removed; Fig. 2 is a sectional side view of the same, the section being taken in the line 1, 2, of Fig. 1; and Fig. 3 is an end view, partly in section, showing more clearly the train of gearing. *a* is the frame which is carried by the wheel axles *b*, and is in no way connected with the body of the car. This frame supports a pair of rods *c*, on each of which is mounted a helical spring *d*. The ends of these springs *d* abut against cross heads *e*, which are supported by and capable of sliding on the rods *c*, and are connected to the toothed racks *f*. The cross heads *e* are further supported by a rod *g*, which also acts as a tie rod to hold together and strengthen the upper part of the frame *a*, and which also serves to carry short springs *h* or blocks of India-rubber, which act as cushions to prevent the cross heads from striking against the ends of the frame, should the springs *d* act too suddenly owing to the slipping of the wheels on the rails or through accident. The teeth of the racks *f* take into the teeth of the pinions *i*, *k*, (see Fig. 3) which are mounted loosely on the wheel axles *b*. The pinion *i* is cast with and forms a part of the bevelled wheel 1, which, with the bevelled wheels 2 and 3 and the cone 4, receives motion from the friction clutch 5. This friction clutch 5 is keyed to the wheel axles, but is capable of a slight lateral motion thereon, so that it may be brought into contact with the cone 4, which with the bevelled wheel 3, of which it forms part, is mounted loosely on the wheel axle *b*. This contact of the friction clutch 5 with the cone 4 is caused by the cranked lever *l*, which is connected by the rod l^1 to a hand lever or treadle to be worked by the attendant. The pinion *k* is capable of being put into gear with the toothed clutch 6, which is also keyed on to the wheel axle *b*, and is capable of slight lateral motion thereon, such motion being communicated by the cranked lever *m*, and rod m^1, which are worked by the attendant by hand lever or treadle.

The action of the arrangement in stopping the car is as follows:—The attendant will bring the friction clutch 5 into contact with the cone 4, as above described, and by the impetus of the car motion will be communicated through friction of contact to the train of geer wheels and pinion *i*, and the rack *f* will be forced back, at the same time compressing the springs *d*. The springs *d* will be held in the compressed position by the brake until released by the attendant. By this means the cars will be quickly brought to a standstill, while a power will be created whereby the re-starting of the car will be greatly facilitated. As soon as the car is stopped the friction clutch 5 should be thrown out of contact with the cone 4. When re-starting the car the attendant will first put the toothed clutch 6 into gear with the pinion *k*. He will then take off the brake, and the springs will be free to expand and exert their power on the wheel axles by forcing forward the rack *f*, which in turn will actuate the pinion *k*, and this pinion, through the clutch 6, will communicate motion to the wheel axles. A band brake is applied to the friction clutch as shown in Figs. 1 and 2. This is worked by the cranked lever *n*, rod n^1, and hand lever *n*2, and may be made to act on both wheel axles by prolonging the rods *n*1, and connecting them to the double lever *o*, by which means both brakes may be worked from either end of the car. The brake may also be made automatic, and this is effected by placing at the end of the rack *f* a hinged tappet *p*, which as the rack *f* is forced back will strike against a fixed tappet p^1, on the under side of the lever *q*. The lever *q* is connected to the cross lever *o*, by the rod q^1. Thus it will be seen that as the lever *q* is pushed forward by the tappet *p* from the dotted position Fig. 1, the rods n^1 will be forced forward, and the brakes which are worked by these rods n^1 will be brought to bear on the surfaces of friction clutches 5, and the hand lever *n*2 will be forced from the dotted position, shown in Fig. 2, into the other position, when it will spring into a notch in the rack *r*, and remain there until it is released by the attendant. This arrangement has been patented by Mr. J. Phillips, White Hart-street, Kennington.

NEW HOISTING CLAMP FOR BUILDING STONE.

(See page 328.)

We extract from the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale* the annexed engraving of a new apparatus for hoisting building stones while the same are being hoisted into position. In principle the weight of the stone itself is used to act upon levers so that the block is tightly grasped as it were in pincers. C D and C^1 D^1 are arms pivoted at E in the piece A B. To the lower ends of these arms are attached the clamps F, and to the upper extremities are pivoted short arms which form a V at the point G, in the vertical piece H. To the latter is secured the hook K. J is a screw which serves to elevate the point G.

In using the apparatus the clamps are placed on the sides of the stone, as shown, and the screw J is elevated. By this means the outer ends of the arms C D and C^1 D^1, are forced apart and the clamps pressed against the block. When the whole is lifted by the hook the tendency of the V arms C G and C^1 G^1 is to open, when the weight of the stone itself causes the clamps to be forced the more tightly against it. The holes in the piece A B serve to adjust the pivot points E of the large arms to any size of stone.

ELLIOTT AND BURNETT'S ECCENTRIC VALVE.

(See page 328.)

The accompanying illustrations show the construction of a stop valve made by Messrs. Elliott and Burnett, of Stockton-on-Tees, called by them an eccentric valve. The valve, however, is really mounted upon a short throw-crank, and is guided by a pair of small projections running upon similar projecting strips in the valve case. The opening or closing, as will be seen, may be almost instantaneous, and one advantage is that, in case of accident or any cause making it necessary to close the valve with great promptness, an excited person could not make any mistake by opening in place of closing the valve, as less than one revolution of the hand-wheel, either way, closes it. The makers prefer that the steam should be admitted on the valve seating side of the case opposite to the letter *s*, in order that the steam should, when shut off, be also shut off from the packing on the valve spindle, when made tight in that way, in place of with the cone seating as shown in the illustration. There is one objection, however, to this, namely, that if the packing by wear became loose, the steam might open the valve. The spindle, however, only being turned usually through one, or a half revolution, the packing will last tight for a very long time, and might in some situations never need renewal. In the valve spindles, as shown made tight with a cone seating, sufficient tightness and friction to prevent the undesired movement of the valve, and to make it remain in any position for regulating, is secured by means of the spring washer under the nut on the top of the spindle.

This form seems to us to recommend itself as the better one. The valve is very simple, the screw employed on most valve spindles is avoided, and we understand it works well in practice.

PARISIAN COPYING-INK—HOW TO MAKE IT.—The best kinds of copying inks are, as is well known, prepared by adding a percentage of alum, sugar and glycerine or salt to the extract of logwood. Such inks have a violet tint, and gradually become blacker on paper. The copy is, however, very pale at first, and is often indistinct. The Parisian copying ink is distinguished from the common kinds by its appearance more or less yellow in a liquid state and by producing a distinct bluish black on paper. It has the additional advantage of preserving its fluidity, while the common kinds soon thicken. Professor Gintl recommends the following method of preparing an ink which has all the advantages of the Parisian: A strong solution of logwood extract is treated with one per cent. of alum, and then with as much lime water, so that a permanent precipitate is formed. Some drops of weak chloride of lime are then added so that a perceptible bluish black color is attained, and hydrochloric acid is added by drops till a red solution is obtained. A little gum is then added with 0.5 per cent. of glycerine.—*Paper Trade Journal*, vi, 269.

MAKING SURE.—A very shrewd person wishing to catch a mouse that ate his books, bited, and set a trap, and sat by it to watch.