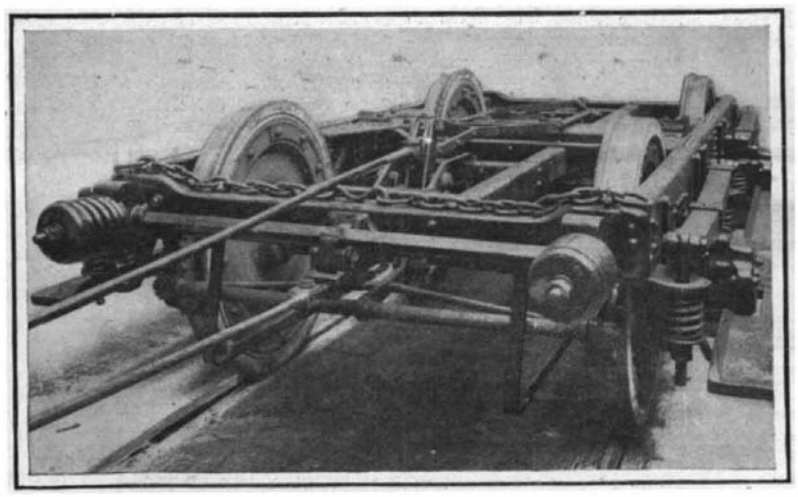
VARIABLE PRESSURE MECHANISM FOR AIR BRAKES.

About thirty years ago, during some experiments with air brakes, conducted by the Institute of Mechanical Engineers of London, it was discovered that the friction between the brake shoe and the wheel is dependent not only upon the pressure applied to the shoe, but upon the speed of the wheel as well, because the same pressure at high speeds will not develop as much friction as it will at low speeds. It is on this account that the engineer must ease off the brakes as his train slows down, else a pressure which could safely be applied to the wheels when traveling at high speed would, as the speed slackens, develop sufficient friction to lock the wheels and produce injurious skidding. With a view to overcoming this defect of the common air brake, a valve mechanism has been devised, which automatically acts upon the air pipe to reduce the pressure gradually.

Our attention has recently been directed to a new solution of the problem, consisting of a mechanism that is operated and controlled directly by the frictional engagement of the shoe with the wheel, varying the shoe pressure without reducing or wasting the air pressure. The coefficient of friction between the wheel and shoe is held at a predetermined constant, regardless of speed or slippery conditions of the wheel. In this way a maximum retardation of the train is obtained at the outset, and the same uniform retardation is maintained until the train comes to a stop. The new brake is called the "Maximus," and details of the mechanism are shown in the accompanying drawings. Each truck wheel is provided with a pair of brake shoes *A* and *B*, respectively operating on opposite sides of the wheel. The shoes *B* are suspended from the truck frame by means of hangers *C*, while the opposite shoes *A* are supported by links *D*, which connect them with the pressure-regulating mechanism, as will be presently explained. The brake beam, which carries the shoes *A*, is formed at its center with a yoke *E*, that extends under the axle and finds support in a pair of hangers *F*. A cam groove *G* is formed in the yoke *E*, which is adapted to receive a roller mounted on the lower end of a lever *H*. The lever is supported at this end in hangers *I*, while its upper end is connected to the brake rod *J*, which runs to the usual brake cylinder. The brake beam *K*, carrying the brake shoes *B*, is connected to the lever *H* by means of links *L*, and to the end of yoke *E* by means of links *M*. It will be evident that when the brake cylinder is operated to move the rod *J* toward the left, the lever *H*, by pressing against the cam *G* and by pulling the link *L*, will draw the opposite shoes, *A* and *B*, against the peripheries of the wheels.

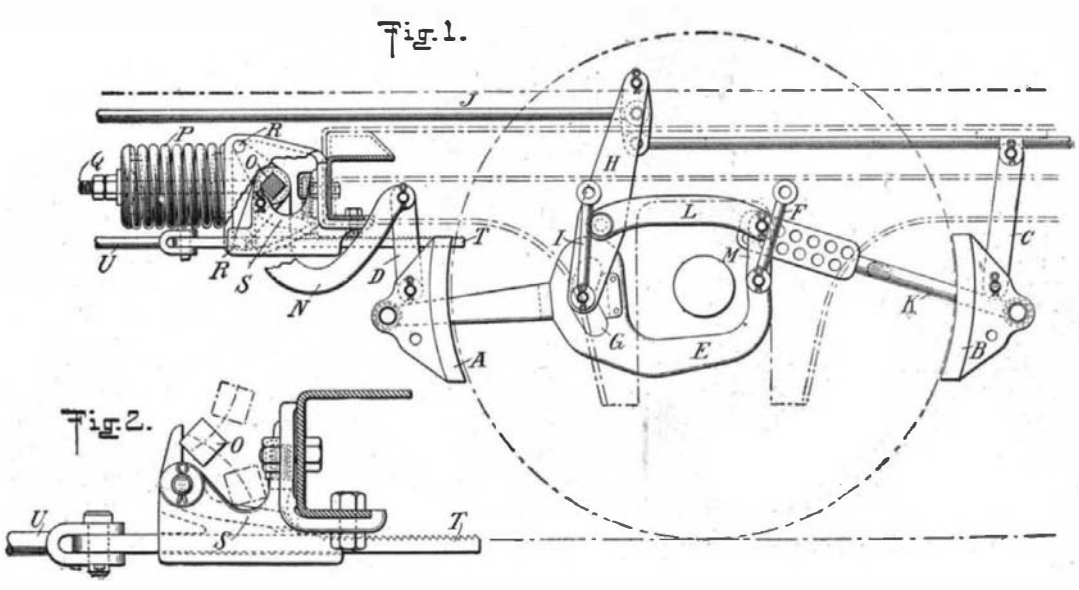
When the brakes are set, the hangers *C* resist the frictional drag exerted on the shoes *B* by the wheels. The links *D* perform a similar office for the shoes *A*, but are not attached to a rigid body as are the hangers *C*, and will yield when the frictional drag exceeds a predetermined limit. It will be observed that the links *D* are connected to arms *N* affixed to a square shaft *O*. The ends of the shaft *O* are inclosed in a pair of boxes carried by the truck frame. A pair of springs *P*, held in compression between the boxes and adjustable heads on a pair of studs *Q* projecting from opposite ends of the shaft *O*, exert a tension on this shaft, which is sustained by the legs *R* formed on the shaft and bearing against the end walls of the boxes. It is these springs *P* which govern the amount of pressure that shall be exerted by the brake shoes on the wheels. If the truck be traveling toward the right, there will be a tendency for the shoes *A* to ride up on the wheels when the brakes are set, thus lifting the arms *N* and swinging the shaft *O* upward on the upper legs *R* as a fulcrum. Should the truck be traveling in the opposite direction, there would be a downward drag on the shoes *A*, tending to swing the shaft *O* downward on the lower legs *R* as a fulcrum. However, any displacement of the shaft *O*, whether upward or downward, is resisted by the springs *P*. By adjusting the heads on the studs *Q*, the spring tension on the shaft *O* may be regulated to any desired degree. Not until the coefficient of friction at the shoes *A* overpowers the resistance of the springs *P* will the shoes *A* be displaced; but with them the shoes carry the brake beam and yoke *E*, and by altering the point of contact of the lever *H* in the cam groove *G*, the pressure of the shoes on the wheel is eased up.



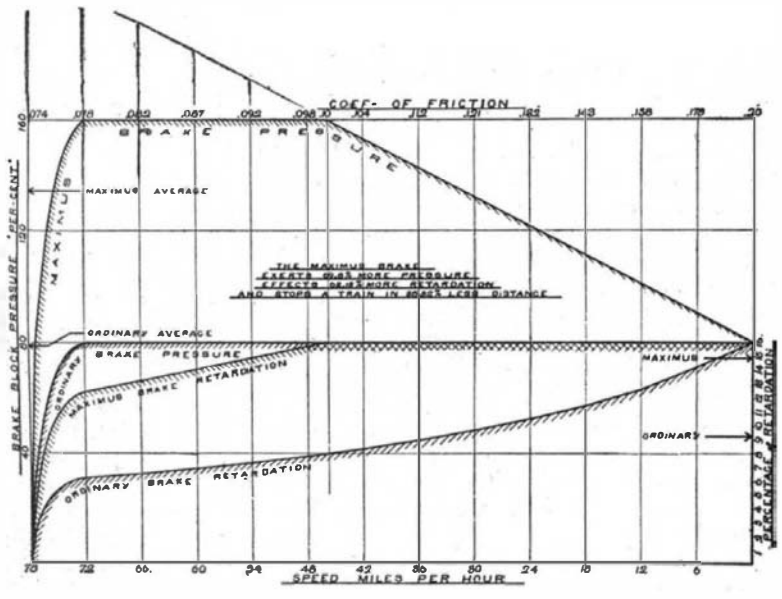
Truck Equipped with Variable Pressure Brake Mechanism.

When this occurs, the brake cylinder is prevented from exerting a higher pressure by the action of a bell-crank lever *S*, as best shown in Fig. 2. One arm of this lever bears against the square shaft *O*, and the arm is adapted to engage the teeth of a rack *T*. The latter is connected by means of a rod *U* with the piston of the brake cylinder. Normally, the lever *S* is held out of engagement with the rack, but when the shaft *O* is swung bodily upward or downward by excessive friction on the brake shoes *A*, the lever is pressed by a spring into engagement with the rack *T*, thereby locking the piston of the brake cylinder.

It will be evident that this mechanism may be made to give any desired minimum or maximum pressure, by adjusting the normal compression of the springs *P*. When the brakes are applied at any speed, they adjust themselves at once to the friction existing at that speed, and reduce the pressure at the shoes as the speed reduces. Skidding is impossible, and there is no danger of injurious shocks. A uniform retardation is automatically effected without imposing any responsibility on the engineer. The brake has been put into actual service on one of the principal railroads of England, and has thoroughly proved its efficiency. It applies a varying force, which is 160 per cent or more of the weight of the vehicle at the commencement of application, and gradually eases off to 80 per cent. A comparison of the improved brake with the ordinary air brake is shown in the accompanying diagram, and it is found that the former exerts nearly 70 per cent more pressure, that it effects 62 per cent more retardation, and that it stops a train in 38 per cent less distance than the ordinary brake.



Details of the Variable Pressure Brake Mechanism.



Efficiency of Improved Brake As Compared With Ordinary Brake.

Soft solder deteriorates. If kept for a long time in a damp atmosphere the metal does not flow readily.

Investigation of Steel-Hardening Metals.

So many investigations have been carried on in connection with the manufacture of crucible steel and of high-speed tool steels that further advance in this direction would seem most improbable, but the combination of other metals with steel has now fully shown that they give it specific properties that adapt it especially to particular uses. The known steel-hardening metals, in the order of importance of production and use, are nickel, chromium, manganese, tungsten, molybdenum, vanadium, titanium, cobalt, and uranium. The value of these metals produced in the United States in 1906 amounted to $458,327, of which $393,667 was for tungsten. The price of tungsten, which has been increasing for a number of years, was quoted at $5 to $6 per unit (1 per cent of a ton) in 1905, and at $12 per unit in the spring of 1907. Only small quantities are at present imported into the United States, as European markets utilize practically all that is produced in foreign localities, mostly in Peru and Australia. Large deposits of tungsten are found in Australia, and it is not improbable that sufficient may be obtained there to permit a certain portion of it to be shipped to the United States, but for the present this country will have to look within its own borders for sources of supply.

The increased demand for the steel-hardening metals has stimulated prospecting for the ores in the United States, and information concerning them is eagerly sought. So many inquiries have reached the United States Geological Survey that a special investigation of the subject has been planned, which has been assigned to Frank L. Hess. In the course of this work, which will extend throughout the summer and into the fall, Mr. Hess will visit South Dakota, Idaho, Colorado, Montana, Washington, Oregon, California, Nevada, Utah, and Arizona. The results of Mr. Hess's work will be reported in a bulletin on the steel-hardening metal deposits other than manganese.

Right to Use the Name "Chartreuse."

After a long litigation in the English courts the Carthusian monks have lost their case in an action which they brought to restrain the use of the name "Chartreuse" in connection with the sale of liqueurs in England. The monks were expelled from France in 1903 and their business of La Grand Chartreuse was continued by a French government sequestrator, against whom the action was brought. Justice Sir William Joyce, in the High Court of Justice, in delivering judgment said that after the expulsion the sequestrator became entitled to the business of La Grand Chartreuse, including the distillery and its assets and good will. The business now conducted by the monks at Tarragona, in Spain, was not legally the old business or a continuation of it. The defendant had not made any misrepresentations regarding the liqueurs he manufactured. The monks' action was therefore dismissed, with costs.

An effective bactericide is announced by Messrs. Paterno and Cingolani, who have found that one-half grain of silver fluoride in a quart of water effects complete sterilization. Experiments were made with complete success on sewage water infected with various injurious micro-organisms, including those of typhoid, diphtheria and cholera. In each case sterilization was complete and permanent. Fluorides are reputedly very poisonous, but dogs given food containing a small quantity of the preservative showed no ill effect.