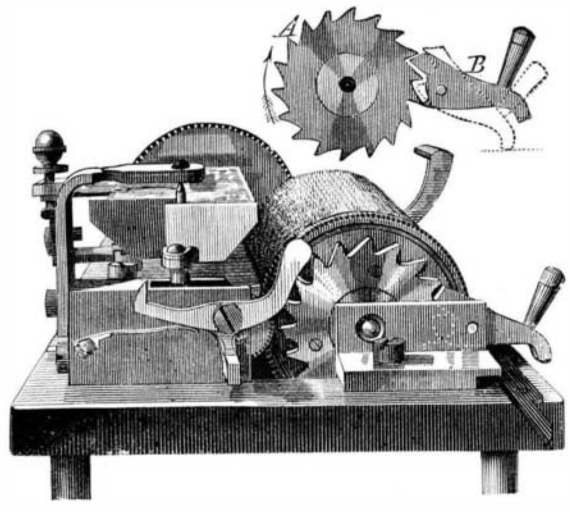
SAFETY CHECK FOR MUSICAL BOXES.

Musical boxes are operated by one or more more powerful springs, the speed being controlled and regulated by a series of wheels and pinions connected with a fly wheel. Now if the fly wheel be broken or removed, or any of the wheels get loose from the pinion when the spring is wound, the cylinder will revolve with lightning rapidity, and bend or break the pins on the cylinder as well as the teeth of the comb in such a manner as to ruin the instrument forever. In order to prevent such accidents (which occur almost daily), Mr. C. H. Jacot, of the firm of Jacot, Juillerat & Co., 37 Maiden Lane, New York city, has invented an attachment,



JACOT'S SAFETY CHECK FOR MUSICAL BOXES.

herewith illustrated, by which these accidents will be impossible, for as soon as the cylinder revolves too fast a pawl will engage in the ratchet wheel and hold it firmly. The action of the pawl is positive, and it has no chance to fail in working.

Secured rigidly to one end of the shaft of the cylinder is a ratchet wheel, A, formed as clearly shown in the engraving. Pivoted so as to engage with the teeth of this wheel is a pawl, B, having a weighted outer end; the upper part of the inner end of the pawl is formed to fit the recesses of the teeth, and the lower part is so formed that each tooth, as it moves by, will raise the outer or weighted end. This movement brings the upper inner end of the pawl into one of the recesses, but before the tooth touches it the lower part is freed from its tooth, allowing the weighted end to drop and thereby remove the upper part away from the wheel, as indicated by the dotted lines. This motion is of course made possible by the slow movement of the cylinder. But if, from any cause, the cylinder should move rapidly, the pawl would be brought into engagement with one of the teeth of the wheel, and the motion of the cylinder would be arrested. The device, as will be understood, is positive and absolutely reliable in its action, and can be placed upon any instrument without necessitating a change in the arrangement of the parts.

A New Rubber Supply.

We mentioned some time ago that a new industry was attracting attention at Rio Pardo, Minas Geraes, namely, the production of rubber from the milk of the *mangabeira*, a tree of the family of *Apocyneas* and very common there, as well as in the north of the empire. According to a letter written from the city (Rio Pardo), at first only the fruit was used, but later it was proved that the milk, very abundant in the trees, and which may be extracted in the same manner as is in use with the *Sypho nia elastica*, by incisions, becomes readily converted into excellent rubber, equal if not superior to, as we are assured, that produced in the Amazonas. Further, it is stated that the preparation is very easy, for if 85 grammes of alum dissolved in 3 liters of pure water be added to 3 liters of the milk, coagulation is perfectly secured and rubber obtained, which should be exposed to the sun for a few days. The latter states that a jug (*garrafa*) of this milk sells in Rio Pardo at 200 to 250 reis, and that many people are employed in its extraction; also that the first shipment of rubber had been made to Bahia; it weighed 250 arrobas, and the result is anxiously awaited.—*Rio News.*

PETROLEUM AND ITS APPLICATION TO THE RUNNING OF LOCOMOTIVES.

The petroleum industry is, as well known, daily becoming more and more extensive. The naphthas derived from the country of the ancient Guebers of Baku, and especially from the peninsula of Apcheron in the Caspian Sea, are now being collected industrially, and seem as if they were to come into formidable competition with those of America. In fact, there are at present more than six hundred wells in operation in the Baku region, where, in 1873, there were but a few only. The annual production of naphtha, which in 1832 was 2,500 tons, rose to 28,000 in 1870, reached 410,000 in 1880, and even exceeded this figure in the first half of 1884. The wells are operated by powerful corporations, and notably by the Societe Nobel, which alone extracts half the oil that the Baku region yields, and which has applied some improved apparatus that has permitted it, so to speak, to completely transform this industry.

The naphtha deposits are concentrated around Baku in strata of Miocene marls and limestone that are peculiarly contorted, and exhibit numerous folds, which form so many reservoirs, in which the mineral oils collect. The boring of the wells presents no very great difficulty in these calcareous rocks, and, as a general thing, the wells are not driven to a greater depth than from 260 to 325 feet. The work is thus effected under more advantageous conditions than it is with American petroleums, the deposits of which are met with at a much greater depth. The yield of the wells is very variable by reason of the great irregularity of the folds of the calcareous strata, some wells being found that are perfectly dry right alongside of others from which petroleum spurts in abundance. There is even cited a well recently driven by the Societe Nobel that would have discharged 8,000 tons per 24 hours had not the necessary arrangement been made to shut off the flow and collect the oil only for a few hours during the day.

The extraction of petroleum in the Baku region is concentrated around the village of Balakhani, about nine miles distant from the town of Baku, whither the crude oil is carried in order to be distilled in the refineries situated in the suburbs. At present the carriage is effected upon a small railway constructed for the purpose; but there has also just been laid, as in America, a pipe line, in which the oil will run directly from the wells to the distilleries.

As cast iron allows carburets of hydrogen to ooze through it, the pipes, which are from 7 to 8 inches in diameter, had to be made of forged iron.

The material as it reaches the refineries is in the form of a dark brown liquid, which, upon distillation, gives products that are more or less volatile. The first product disengaged is benzine—a volatile liquid employed mostly for cleaning fabrics. Afterward comes kerosene, which gives off no vapors at the ordinary temperature. Aside from this product, the same distillation gives a yellowish petroleum called "solar oil," which is used for street lamps. The residuum of the distillation forms a heavier liquid, of medium density, called "masoute" or "astatki," which is principally used for heating the generators of the locomotives on the Baku-Tiflis line, and those of the boats on the Caspian Sea.

The use of petroleum for heating boilers presents decided advantages in certain cases, since we thus obtain a fuel which, although it is perhaps of a higher price, possesses twice the calorific power of coal, and allows us to increase the vaporization, while at the same time diminishing the charge. This is a valuable feature, as regards its application to steamboats (especially to torpedo boats), as well as to the locomotives of express trains, upon which, in fact, petroleum furnaces are often used.

Mr. Urquhardt, engineer of the Gratzi-Tsaristsin Railway (southeastern Russia), has made a specialty of

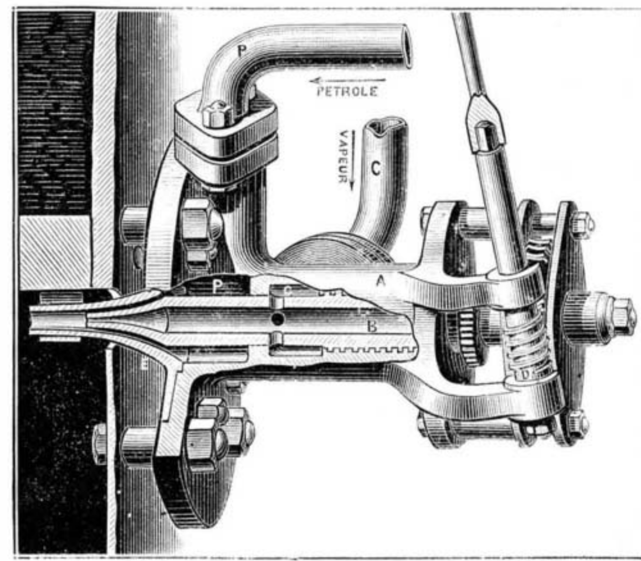


Fig. 2. PETROLEUM INJECTOR.

this question, and has succeeded in constructing furnaces which are peculiarly well adapted for the combustion of petroleum, and by means of which he has been enabled to greatly increase the power of locomotives.

Figs. 1 and 2 show the latest form of the apparatus, and Fig. 1 gives the general arrangement of it upon a locomotive and tender. It will be seen that the furnace is internally provided with brick domes. These are designed to protect the metal, and, at the same time, through a combination of flues, to secure an intimate admixture of the petroleum with the sucked-in air. The petroleum is forced by a current of steam into an injector, which is shown in detail in Fig. 2, and from thence to the bottom of the furnace. Here it becomes lighted in contact with the current of sucked-in air that enters, as shown by the arrows, through a trap in front of the ash box. This air has already been heated on traversing A by coming into contact with the two masonry arches of the furnace. A portion of the flame is directed by the flues, B. to the bottom of the tube plate, which it strikes directly. An inspection of Fig. 1 will show at once how the apparatus operates. The petroleum contained in the front compartment of the tender is heated by a current of steam from the boiler that enters through the pipe, S, and after traversing the worm enters the side of the feed pipe, P.

On making its exit from the latter, the petroleum enters the injector, shown in section in Fig. 2, and flows around a central nozzle, B, which is traversed by steam that is coming from the boiler through the pipe, C. The mixed current that forms is disengaged, as shown in Fig. 1. In former arrangements the injector was adapted to the top of the furnace frame, and had to cover both that and the side of the fire box, thus making it more costly.

It will be seen that it is very easy to regulate the combustion from the engineman's cab by acting upon the injector through a rod, D, that terminates in an endless screw, which gears with the pinion of the nozzle and permits of opening the latter to any degree desired. In this way the combustion is regulated with as absolute certainty as could be done with gas, and all waste of fuel is avoided.

Before entering the reservoir of the tender the petroleum passes through a filter that retains foreign matters, and is again filtered upon making its exit. The arrangement of the nozzle is such, however, as to

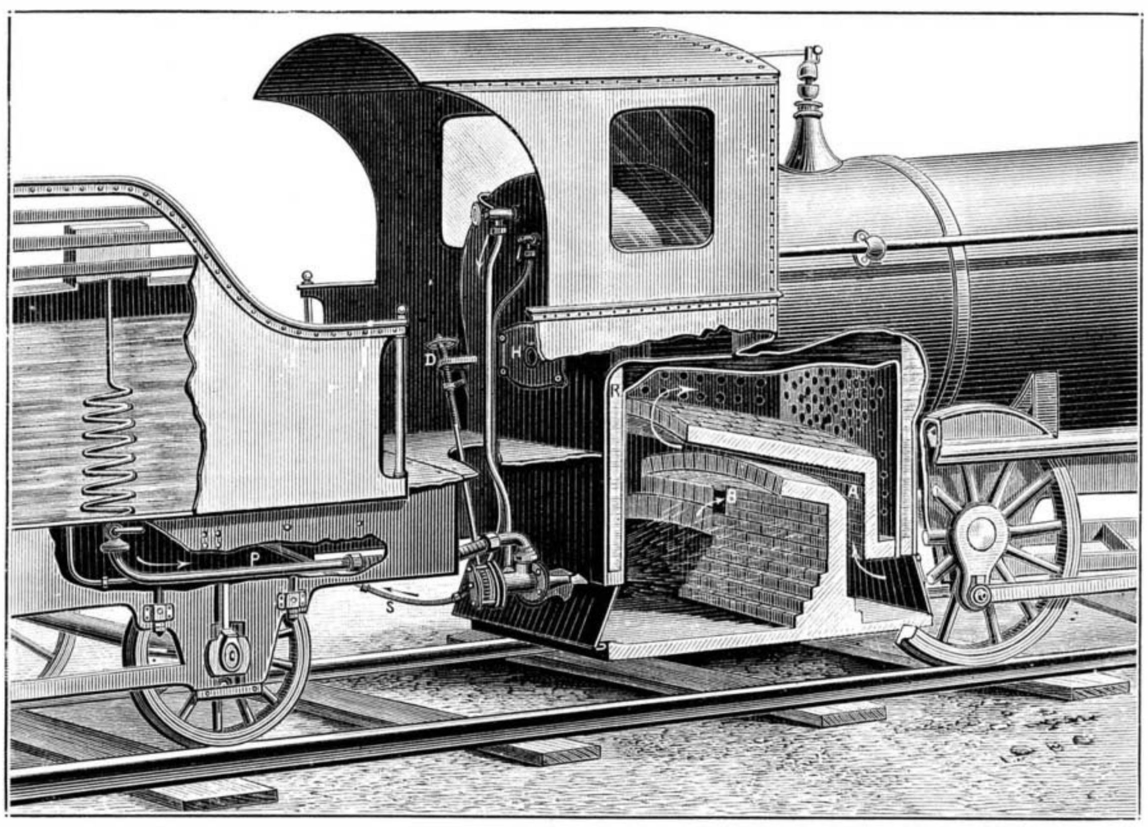


Fig. 1.—ARRANGEMENT OF A LOCOMOTIVE BURNING PETROLEUM.