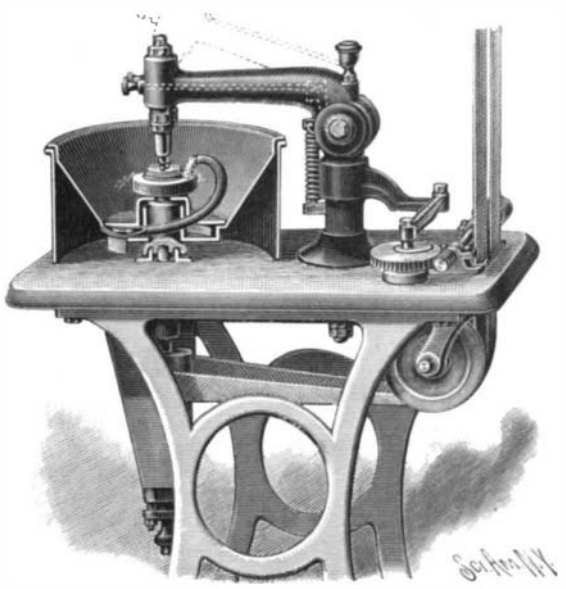
AN IMPROVED LENS-GRINDING MACHINE.

A novel grinding-machine has been invented and patented by Davilla S. Thomson, of Livermore Falls, Me., which is especially designed for the use of manufacturing opticians, and which is characterized by simplicity of construction and automaticity of operation. The machine comprises, essentially, lens-holding devices, a centrifugal pump for the supply of abrading material, and a grinding mechanism, all these parts being driven from a common source of power. The lens-holding devices consist of a vertical shaft carrying at its upper extremity an abrading disk upon which the lens to be ground is placed. The disk is rotated



THOMSON'S LENS-GRINDING MACHINE.

by means of a belt and pulley driven by a power-shaft at one end of the machine. On the shaft which carries the disk the centrifugal pump is arranged, the propeller-wheel of which revolves in a casing formed on the lower end of a pan in which the grinding material is contained. This material, by means of the centrifugal pump, is forced from the pan to the lens through a coiled pipe, as the shaft carrying the disk rotates. The grinding-mechanism consists of a vertical spindle carrying a pivoted yoke at its upper end. Each arm of the yoke is provided at its outer end with a carrier containing a shanked ball, which is held in engagement with the lens by means of a spring. Each arm can be raised, if desired, as shown by dotted lines in the figure, and can be held in this inactive position. In order to grind the lens, the vertical spindle carrying the yoke is rocked by means of a rock-arm actuated by a worm-wheel engaging a worm on the power-shaft previously mentioned. The worm-wheel has an eccentrically-placed hole in which a disk carrying a crank-pin is adjustable. By regulating the position of the disk, the throw of the spindle, and therefore that of the arms and carrier balls, can be increased or decreased. When the power-shaft is in operation, the lens-holding disk will be rotated, the pump will force the abrading material upon the lens, and the carrier-balls will be rocked so as to grind the lens as it rotates.

A Word of Advice.

O'Hoolahan (disgustedly).—The boss's goin' to give me a dom automobile truck to drive instead of the team, Norah.

Norah.—Well, what of it?

O'Hoolahan.—"What of it?" Will, Oi'll have to subscribe to the Scientific American, so's to know how to swear at the dom thing!—From Puck.

POWERFUL FREIGHT LOCOMOTIVE FOR THE PENNSYLVANIA RAILROAD.

The Pennsylvania Railroad has for many years enjoyed the distinction of being considered by European engineers, and by not a few in America, the model railroad of the United States. It is supposed by Englishmen to hold, in respect of its roadbed and equipment, the same representative position accorded to the London and Northwestern in Great Britain.

While it is undoubtedly true that the reputation of these two roads has been well earned, and that twenty or thirty years ago they were easily first in their respective countries, it is probable that there are now other roads which equal them in most, if not all, points of comparison. This fact, however, does not detract from the great credit which is due to them, and particularly to the Pennsylvania Railroad, for having inaugurated many improvements, which other roads, following their lead, subsequently adopted.

To the Pennsylvania system is largely due the vast improvement which has taken place in the past fifteen or twenty years in roadbed and track, and their heavy rail sections and rock-ballasted and thoroughly drained roadbed were for some years the standard for other roads to follow. They were early in the field in the introduction of an adequate system of signals, and they were, we believe, the first company to introduce the old country practice of beautifying the station grounds and sodding and keeping in trim order the slopes of excavations and embankments.

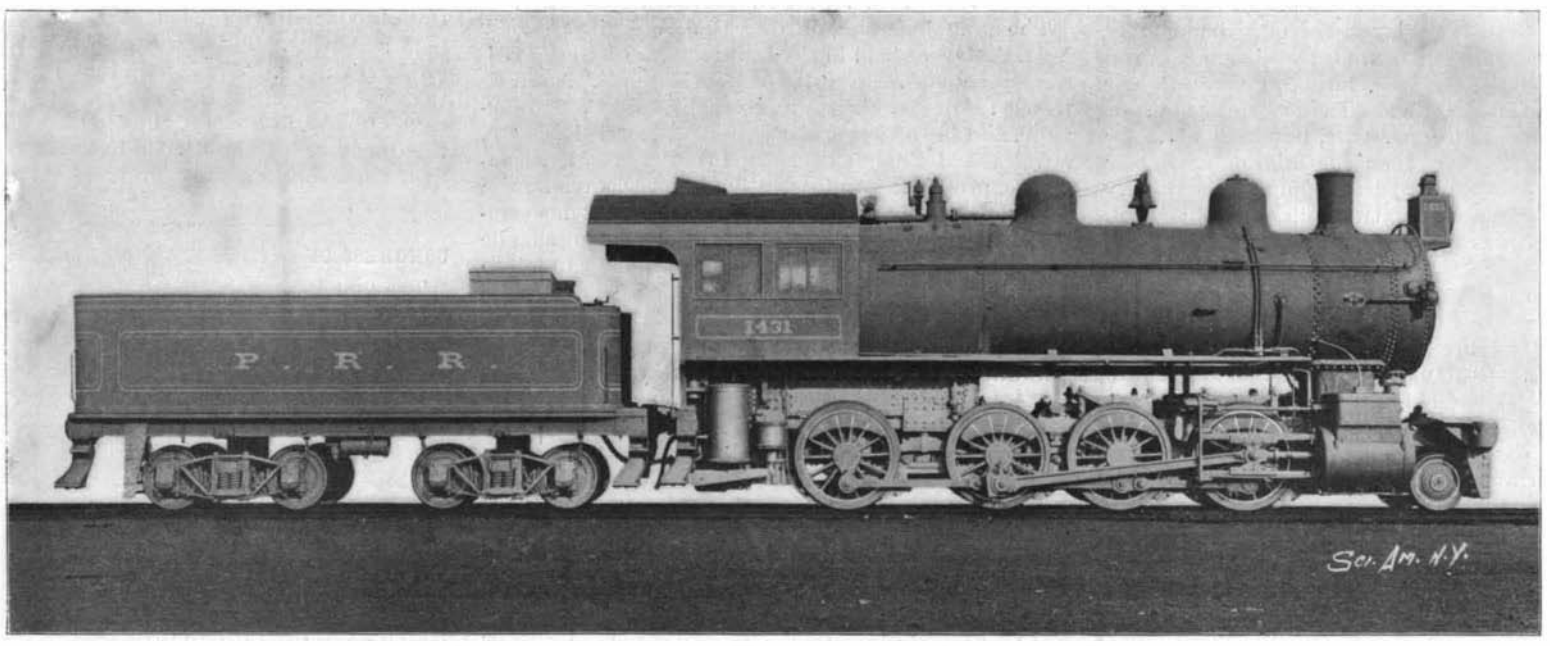
In the matter of motive power and rolling stock the road has always been fully abreast of the best American practice, and in some respects has led the way; the "Chicago Limited" being at the first, perhaps, the most sumptuously appointed train in the world, although to-day its counterpart can be found on more than one of the great systems of the United States.

The motive power of the Pennsylvania Railroad has always been marked by strong individual characteristics, and while the practice has been to adhere to a few fixed types and patterns of engines, a large amount of experimental work has been accomplished. It will be remembered that this company was first in the field in serious and protracted experiments with the compound system, one of Mr. Webb's three-cylinder express engines being imported from the London and Northwestern Railway for this purpose. The compound system, however, does not appear to have favorably impressed the master mechanics of the road, if we may judge from the small number of the type that are to be found in service.

We present an illustration of the most recent and most powerful of the freight locomotives which have been built by the company. Although it is surpassed somewhat in weight or power by two or three of the other big freight engines of recent construction, it is perhaps the most shapely and pleasing to the eye of any of them. It is of the simple, high pressure type, with two cylinders 23·5 inches in diameter by 28 inches stroke, and a steam pressure of 185 pounds to the square inch. The weight on the drivers is 186,000 pounds, which is only exceeded by the great Pittsburg consolidation, illustrated in the Scientific American of December 3, 1898, which has 208,000 pounds on the drivers. The total estimated weight of the locomotive in working order is 208,000 pounds, as against 230,000 pounds for the Pittsburg engine. The weight of the tender, loaded, is 104,600 pounds. The driving wheels are 56 inches in diameter.

These engines, which are known as Class H—5, are giving great satisfaction. On one occasion one of them hauled, from Altoona to Columbia, a distance of 161 miles, against a maximum grade of 12 feet, a coal train of 130 cars. The total length of the train was 3,877 feet; the cars weighed 1,520 tons and the lading 3,692 tons; the total load being 5,212 gross tons.

On another occasion it hauled from Columbia to Morrisville, a distance of 100 miles, against a maximum grade of 29 feet, a train of 60 cars. The weight of the cars was 743 tons; of the lading, 1,819 tons; and the total load 2,562 gross tons.

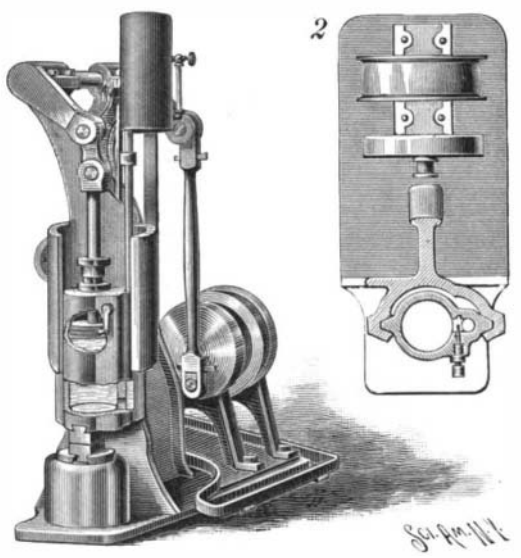


POWERFUL FREIGHT LOCOMOTIVE, PENNSYLVANIA RAILROAD.

Cylinders, 23½ × 28 inches; steam pressure, 185 pounds; weight on drivers, 186,000 pounds; total weight, 208,000 pounds.

A NEW POWER-HAMMER.

In an invention patented by Andrew Dinkel, of Auburn, N. Y., an improved power-hammer or presser is



DINKEL'S POWER-HAMMER.

provided, by means of which a strong yet yielding blow may be given to the billet operated upon.

The accompanying engraving represents this new hammer in perspective and in section.

The hammer-head slides in vertical guides, and is provided with a die which coacts with another die on the anvil. Within the hammer-head are a main liquid-containing chamber and an auxiliary liquid-containing chamber, the two being connected by valved ports. Within the main chamber a piston moves, having a stem projecting from the chamber and connected at its upper end by means of a link with a rock-shaft operated from a driving-pulley through the medium of a rocker-arm and pitman. From the upper end of the auxiliary chamber a pipe projects, which passes in and out of a cylinder partially filled with some liquid, such as oil, a space being left to form an air-cushion. The pressure of this air-cushion may be regulated to the work in hand.

When the hammer-head is in its uppermost position, the work to be operated upon is placed upon the anvil. When the belt upon the driving-pulley has been tightened, the hammer will be forced down, thus causing a strong, yet yielding blow to be struck. After having descended, the hammer will remain stationary; but the piston in the main chamber of the hammer-head will continue to move down against the resistance of the air-cushion in the cylinder connected with the auxiliary chamber. By this means a strong pressure is brought to bear upon the work, in addition to the blow.

It will be observed from our engraving that the driving pulley and connected rotary parts are mounted in the base of the machine, whereby the sway and vibration which would be caused by placing these parts higher, is reduced to a minimum.