

quite as readily designed for battleships, cruisers, Atlantic liners, and all fast passenger vessels, and in such vessels will, in my opinion, give results as regards coal consumption at all speeds superior to those at present obtained with reciprocating engines.

As the turbine, when installed on land, as in England and at Elberfeld has surpassed in economy of steam the best triple-expansion reciprocating engines, and the turbine of 4,000 horse power for Frankfort is guaranteed to still further improve the lead; so in marine work the steam turbine is destined to replace the reciprocating engine in all fast vessels from moderate up to the largest tonnage.

CHARLES A. PARSONS.

Turbinia Works, Wallsend-on-Tyne, December 18, 1900.

THREE RECENTLY PATENTED NOVELTIES

One of the most interesting inventions for which letters patent have been granted within the last few weeks is a process of coating one metal with another, devised by Samuel H. Thurston, of Long Branch, N. J. The metal to be coated (usually iron or steel) is first so thoroughly cleaned that all foreign matter is entirely removed. After this thorough cleansing the metal is ready to receive its covering. The coating metal is systematically beaten against the metal to be coated. This beating process is produced by vibratory beating-rods, pivoted to bars secured on a rapidly revolving drum. The drum is located above a bed plate arranged to move beneath or over the radius of action of the beating-rods. On the bed-plate the metal plate to be coated is firmly secured, so that by rapidly rotating the drum the beating-rods strike the surface of the metal. The particles from the beating-rods are hammered into the pores of the plate, and are incorporated with its surface to form an adherent film of metal. So perfect is the cohesion of the two surfaces that the film can not be mechanically removed without removing particles of the plate.

In order to reduce the friction of worm-gearing, Charles M. Jones, of Philadelphia, Pa., has invented the novel device illustrated in the second of our engravings. The driving or pitch faces of the worm are formed with a continuous groove, which receives a series of balls. During the rotation of the worm the balls travel freely along the usual pitch-line and bear against the teeth of the meshing wheel. Thus Mr.

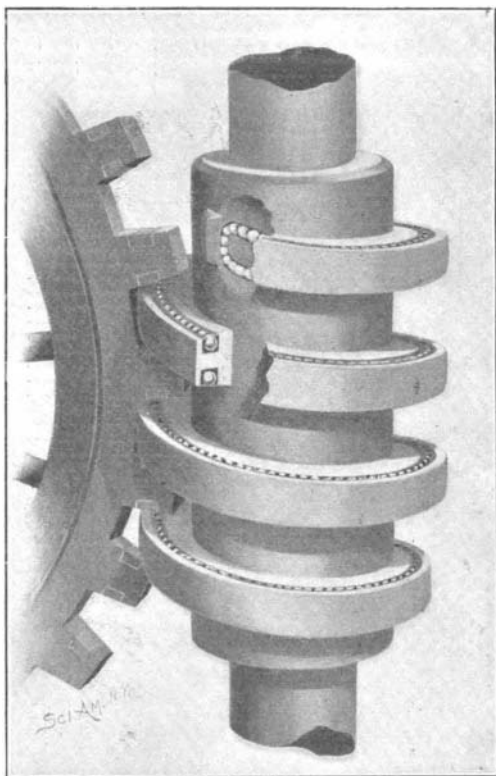


Fig. 2.—A BALL-BEARING WORM GEAR.

Jones substitutes rolling friction for the usual sliding friction.

An odd little mechanical toy which is noteworthy for its simplicity is the subject of the third illustration. The toy is the invention of John J. Reid, of Lyons, Iowa. Upon an upright having on opposite edges cam-like, staggered fulcrum-bearings a seesaw lever is mounted. The lever is provided with opposite fulcrums in the form of tongues, alternately engaging the bearings. At the ends of the lever figures representing a clown and a negro are pivoted. The seesaw being at the upper end of the standard with the lower fulcrum tongue resting in one of the bearings, the upper end of the longer portion of the seesaw will rock down by reason of its greater weight until its fulcrum tongue engages the next lower bearing and the opposite end of the lever moves downwardly. This alternate rocking motion continues until the seesaw has reached the lower end of the standard. The standard is then reversed, and the seesaw retraces its course.

Internal Water-way Improvements About Pittsburg.

The varied manufacturing interests and vast coal trade of Pittsburg are due to cheap water transportation. In 1836 the Monongahela Navigation Company was organized for the purpose of establishing a slack-water system on the Monongahela between Pittsburg and Virginia (now the West Virginia) State line. The company was chartered with a capital of \$300,000, held largely by those interested in the industrial rise of Pittsburg and in the development of the rich coal fields along the Monongahela. The work of establishing dams on the stream was begun in 1838. Instead of the shoaly rippling stream which it was before its improvement, the Monongahela is to-day a noble stream whose traffic amounts to many million tons annually. Until 1897 the slack-water system remained in the hands of the private corporation which had begun the improvement of the stream; but in that year the locks passed into the hands of the United States government, and thus a free system of navigation was begun. In early days both the Allegheny and

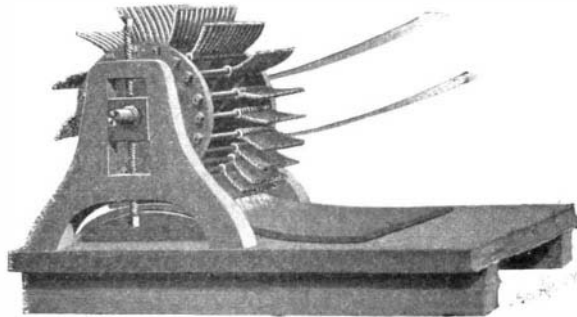


Fig. 1.—THE THURSTON METAL-BEATER.

the Youghiogheny possessed a system of dams, but these were permitted to fall into decay. Of late years several government dams have been constructed on the Ohio, but these are not sufficient to provide the stream with free navigation at all seasons of the year.

The time is not far distant when the rivers adjacent to Pittsburg will have an elaborate slack-water system. Congress has passed bills which provide for six dams on the Ohio, including the Davis Island dam, which was completed in 1885. The new dams, like the Davis Island dam, will be of the movable type, so that they can be lowered at any time, leaving a clear channel. They will be located at Glenfield, Osborn, Legionville, Freedom and Merrill, the dam at the latter point being the lowest one on the Ohio which will be erected at the present time. Surveys have already been made for a government dam at Marietta, Ohio, but the work has not yet been begun. It is believed that the series of dams now under construction can be completed within three years.

The work on the Ohio River dams is now well under way, the locks of all the dams being nearly completed. At Merrill the greater part of the dam is finished. The gate at Merrill will, when completed, be the largest one of the movable type in the world. It is 13 feet high and 112 feet wide. It will be moved by hydraulic power, derived from the river, which it will hold back. All of the Ohio River locks will be of the same type.

The Herra Island dam, on the Allegheny, is already completed, and will be the only Allegheny River dam of the movable type. The other three dams now under construction will render the Allegheny navigable for large river steamers above Tarentum, a distance of 30 miles above Pittsburg. This river improvement will provide a water outlet for the various important industries located in the Allegheny Valley. The Allegheny locks will be 300 feet in the clear, with a width of 60 feet.

Some day a ship canal will connect the Ohio with the Great Lakes. The preliminary survey for this great waterway improvement was made some years ago, when it was proposed to construct a canal which would give vessels of 3,000 tons or more free passage between Lake Erie and Pittsburg at the expense of Pittsburg capital. A detailed description of this great internal improvement will be found in the issue of September 24, 1898, of the SCIENTIFIC AMERICAN. This great canal will solve the problem of cheap transportation of the ore supply for the Pittsburg furnaces, open up an artery for the vast coal-carrying trade, and enable Pittsburg manufacturers to enter foreign markets.

Favoritism to Workmen.

It often happens in factories, says The Superintendent and Foreman, that one workman has a "pull" with other workmen, and by this means is able to make considerable money at the expense of his fellows on the same branch of work, and this all unknown to the foreman. Sometimes man after man will leave the factory, and if asked the reason for quitting, all that can be gotten from them is an indistinct muttering about not getting a square show, and the foreman wonders wherein he did not give the men a square show, and finally sets the men down for cranks.

The men cannot always say positively that it is so; they feel it rather than see it. They see a workman next to them always having the lasts he needs, or always getting the easiest case to set up, buff, or scour, and yet they are not able to see just how it is done. Not seeing, they do not feel like making definite charges or statements, as they do not know how to sustain them; but they are assured in their own minds, for they have encountered the same thing before, that there is a clique running the factory.

Cliques run a great many factories, and generally without the foreman's knowledge. Sometimes a foreman is partner to a clique, and sometimes he believes it is good policy for the firm; and occasionally it is, but very seldom. The best managed factories have systems which make favoritism of one workman to another impossible.

In some factories the firm has a man whose business it is to hunt up all obstacles to good work, including such as this; and it would be a good thing for many manufacturers to use up any spare time they have in asking the more intelligent of their employes—not always the old help, though—what difficulties they meet with. It is not a bad thing to have your factory have the reputation of being a good one to work in, for the time may come when help will be needed, and when not being able to secure the right help at the right time will cause the loss of considerable money.

The Current Supplement.

The current SUPPLEMENT, No. 1306, is of unusual importance, the leading article being entitled "The Steam Turbine: The Steam Engine of Maximum Simplicity and of Highest Thermal Efficiency." This paper is by Dr. Robert H. Thurston, of Cornell University, and may be regarded as one of the most important contributions ever made to the literature of mechanical engineering. It is elaborately illustrated. "The Pollak-Virag Telegraph" is described in detail, showing the ingenious mechanism by which messages can be transmitted and written at high speeds. "The German Colony of New Guinea" is illustrated by many engravings. "The Mechanism of Amphitheaters" is a most interesting article, showing how the cages containing the animals were lifted to the level of the arena by mechanical means and opened automatically, and how the great awnings were warped across the amphitheater in sections. "A New Method of Testing Glass Surfaces" is by Edmund M. Tydeman.

January Building Edition.

The January issue of the BUILDING EDITION worthily begins the new century, and it is one of the handsomest numbers ever issued of this unique periodical. The

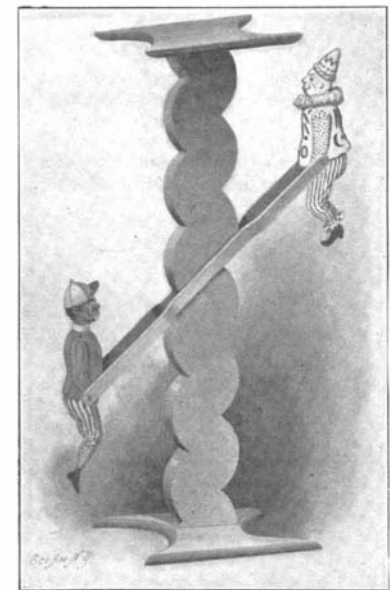


Fig. 3.—AN ODD MECHANICAL TOY.

cover illustrates a half-timbered house at Greenwich, Conn., and is printed in a highly artistic manner. The other houses which are given in this issue are excellent. Among the many interesting features of this edition are the "Spanish National Pavilion at the Paris Exposition," "A Remarkable Wood-Carving," and a "Medieval German City Gate." The literary contents deal with "Mechanical Triumphs of the Ancient Egyptians," "An Architectural Critic in the Year 2000 A. D.," and "Athens in 1900."

Contents.

(Illustrated articles are marked with an asterisk.)

Armstrong, death of Lord.....	19	Inventions recently patented.....	28
Automobile news.....	22	Irrigation, Hawaiian Islands.....	20
Boiler explosion, curious effects of*.....	23	Lathe, large.....	17
Books, new.....	23	Metal beater, Thurston*.....	27
Broaching machine*.....	21	Moving picture litigation.....	19
Building edition, January.....	27	Nicaragua water supply, Lake.....	22
Canal, Sault Ste. Marie.....	19	Notes and queries.....	28
Chimneys, the building and repairing of tall*.....	21	Science notes.....	23
Copals, drainage of Lake.....	21	Ship subsidy bill.....	18
Coupling, flexible*.....	21	Supplement, current.....	27
Dredges, new*.....	25	Toy, mechanical*.....	27
Engineering notes.....	25	Turbine, efficiency of.....	18
Geological society, annual meeting of*.....	19	Turbines, steam*.....	26
Guano, quick-acting*.....	20	Volumes, architectural.....	26
Inventions, index of.....	28	Waterways, improvement about Pittsburg.....	27
		Wood, fossilization of.....	26
		Worm gear, ball bearing*.....	27