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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 388,

For the Week ending June 9, 1883.

Price 10 cents. For sale by all newsdealers.

DROP FORGING OF TOOL STEEL.

In the ordinary forging of iron the element of time is an important factor—the material is gradually and by successive blows brought into shape, the anvil work being supplemented by successive reheatings. In drop forging, although the final result is the same, the operations, which in common forging require time, are compressed into an instant, a single blow, or at most two or three, serving instead of the long continued hammering of ordinary anvil work. It is evident, however, that all the changes in the iron that are brought about by the gradual coaxings of the hand hammer must take place under the drop, only the changes are nearly instantaneous. To effect these changes so suddenly the iron must be rendered very pliant and plastic by high heating, approaching that of the welding process. For this reason it has not, until recently, been believed that cast steel—tool steel requiring the retention of all its qualities of being hardened and receiving temper—could be successfully worked under the drop hammer. But this is now done as readily as the working of the toughest and softest of Swedish iron. By means of adjustable drops, which allow of blows from varying heights, the steel may be wrought precisely as though under the hand and trip hammer, without injury to it from overheating.

Cast steel partakes, undoubtedly, of that quality of iron known as "flowing;" that is, the metal may be pressed into forms without destroying or impairing the continuity of its fibers, merely changing their direction to conform to the outlines of the new shape. Usually this "flowing" of the metal is produced by compression—quick compression, but not a sudden blow—the metal, while plastic from heat, being forced into a mould or die. But the steel can be worked in a similar manner under a drop. Lathe-turning tools, planer tools, caliper gauges, and many other small implements requiring hardening and tempering are now made from tool steel by being struck up in dies under the drop-hammer.

Drying Rooms.

The rapid increase in mechanical processes and the demands of growing trade cause annual additions to the number and size of drying rooms in use. Manufacturers, too, say that the surveyors of companies are becoming more critical, and a few years ago made no objection to furnaces, and even to red-hot flue-pipes, but now the seemingly innocent steam-pipe is overhauled, and disparaging remarks are made about its position and its relation to wood or material. It is doubtless true, says the *Insurance World*, that the surveyors and special agents have been educated at the expense of the companies, as shown by the loss-books in the fire hazards of arrangements formerly supposed to be entirely safe. Meantime the drying rooms are becoming drier every year, the wood in their construction is becoming more like tinder, and the factors necessary for a fire are being multiplied. Even brick and iron are not always as innocent as they seem, for one retains heat for a long time and the other conducts it to more combustible material. Well-baked bricks will resist fire, but at least one manufacturer found it was unsafe to place them on boards, since they acted as reservoirs for the heat conveyed through super-heated steam-pipes, altered the texture of wood, and at last set it on fire, causing a loss of $4,000.

The construction of drying rooms and boxes is very important. Perhaps the two worst can be found in a piano factory, where a box-stove outside is fed with shavings trailed along the floor, and a red-hot stove pipe passes directly through the adjacent drying box. The same factory can show a small drying room filled with light wood, with a small cylinder coal stove in the center, having pine blocks for fuel, and being kept at a red heat. The most common device to plague underwriters is the "pot furnace" to heat drying rooms, with the torrent of heated air pouring up through conductors. This has been the common way of vulcanizing rubber goods, and is still used very generally with metallic articles. A wire manufacturer placed his coils of wire, dripping with liquid from the wash room, in drying rooms, and brought them to a red heat, unmindful of his wooden doors and wooden beams to support his metallic ceiling, until two fires forced him to suspend his operations and to substitute brick and iron. Steam pipes are now very generally used, as being cleaner and probably safer. But not once in a hundred times will a thermometer be found within, and many proprietors would be surprised at the degree of heat attained. In the rubber vulcanizer's, 240° to 270° is the general rule, and the number of steam pipes is limited to prevent the workmen bringing the temperature to 350°, and thus injuring the fabrics. Instead of using a thermometer to register the heat, most manufacturers simply trust the engineer to carry a certain number of pounds of pressure in his boilers, and take no account of the accumulation of heat by radiation and reflection, especially when the room is lined with a metallic surface. Then the heat from steam pipes is intensely dry and absorbs from the wood the moisture, fitting it to conduct fire rapidly. It is well known that the motion of long lengths of pipe through contraction and expansion wears considerably upon pipes, but may it not be often true that the electricity developed by friction, especially of upper belts, may be conducted through the piping, and elicit the spark necessary to set wood on fire?

The great hazard in drying rooms is dust, and the feathery lint which gathers everywhere. It is minutely subdivided, and only needs the addition of a drop of oil from machinery to become highly combustible. This was well illustrated in a room used to dry animal hair by superheated steam. The larger coils were carried against the outer walls, while subordinate coils passed through the center of the rooms, raised six inches from the floor, and a like distance below the boards used for shelving. Yet even here the dust accumulated on the pipes, took fire, and the tiny tongue of flame leaped to the shelving, costing the underwriters $2,200, although a live steam jet had been prepared to meet this emergency.

Can these instances give any clew to necessary precautions? 1. Make the drying box and room as safe as is practicable. 2. Procure careful inspection by some one who will recognize the fire hazard. 3. Invite examination by an experienced electrician. 4. Keep the rooms strictly clean at all times, and prevent contact of combustible material with means of heating. 5. Take particular care when the product of manufacture is specially combustible. 6. Give special attention to the means of ventilation.

French Academy Prizes.

The French Academy of Sciences have recently published a list of the prizes offered by them for essays on scientific subjects during this year, and until 1886. In applied mechanics the Fourneyron prize will be given for the best "study, both theoretical and experimental, of the different methods of transporting force to a distance." The papers must be lodged before the 1st of June next. A grand prize will be awarded in 1884 for a mathematical solution of the problem "to perfect in some important point the theory of the application of electricity to the transmission of power." The prize will consist of a medal valued at 3,000 francs. The memoirs must be submitted to the secretary of the Academy before June 1, 1884, and should be anonymous, but accompanied by a sealed envelope with the real name and address of the author. The Bordin prize, which was not awarded this year, is carried on to 1885, and memoirs must be lodged before June 1 of that year. The subject is a "research into the origin of electricity in the atmosphere, and the causes of the great development of electric phenomena in storm-clouds." The prize is a medal worth 3,000 francs.

An Improved Sleeping Car.

Mr. John A. Sleicher, formerly manager of the New York State Associated Press, and more recently one of the editors of the Troy *Times*, at Troy, N. Y., has patented a new sleeping car, with the seats, each six feet long, extending nearly across the width of the car. They are so arranged that each seat at night can, with very little trouble, be changed into an upper and lower berth, extending transversely across the car. At the same time each section, by sliding panels extending to the roof of the car, is converted into a private apartment, entirely cut off from intrusion. Absolute privacy, with an aisle in which to stand and dress, is thus given to each section. Ladies will especially appreciate the advantages of the "Sleicher Stateroom Sleeping Car." Negotiations are already in progress with a leading railroad trunk line, which desires to experimentally use one of the new sleepers. The new car bids fair to revolutionize that branch of the railroad business.

The Brayton Petroleum Engine.

Attention is called to the manufacturers' advertisement in another column. Ten gallons of unrefined petroleum are said to give a constant power equal to five horse power for ten hours. Crude petroleum costs about six or possibly eight cents a gallon, making that the cost of five horse power per hour.

The engine is run by the combustion of the vapor of petroleum united with atmospheric air under pressure. The combustion is not intermittent, or explosive, like that of gas in a gas engine, but is continuous, and the engine is driven by the expansion of the products of combustion, the expansion being about six volumes. The motor, it is stated, has been fairly tried, and appears to be constructed upon reasonable principles. For small powers, and especially for intermittent power requirements this motor appears to be well adapted.

Intensifier for Gelatine Plates.

The chemical now mostly used in intensifying gelatine plates is bichloride of mercury in combination with ammonia, iodide or cyanide of potassium. The main difficulty of such intensification has been that it was not stable; in a short time the image on the plate, if exposed much to the light, would fade out, and spoil the negative. The intensifier given below has been found to work well, and at the same time possesses the quality of being absolutely stable.

A stock solution of sulphate of iron is made as follows:

Sulphate of iron	15 grains.
Citric acid	15 "
Water	1 ounce.

A second solution is made as follows:

Water	1 ounce.
Nitrate of silver	10 grains.
Acetic acid	10 minims.

To intensify, take enough of the iron solution to cover the plate, and add thereto from six to ten drops of the silver solution, flood the plate, and the intensification will proceed in a clear, gradual, and satisfactory manner. To produce a great degree of intensity more of the silver solution should be added, a few drops at a time.