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O. D. MUNN, S. H. WALES, A. E. BEACH.

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Contents:

(Illustrations are indicated by an Asterisk.)

PATENT CLAIMS AND PATENT BUSINESS.

It is our intention, hereafter, to publish the official list of claims of patents one week earlier than usual, and if Commissioner Holloway will but second our wishes in this respect, by a prompt transmission of the copy, we can fully carry out this arrangement. In consequence of thi: change, the present number will include the issue of claims for two weeks; we therefore suspend, for this week, further extracts from the Annual Report of the Commissioner.

In this connection we would also statethat, owing to the large increase in our Patent Office business—which amounts to nearly one half of the entire business of the country in this line—we are obliged to increase our facilities. We have secured valuable and experienced assistants in this department, and are now better prepared than ever before for a large addition of cases, and a correspondingly prompt attention to them.

Through our efficient Branch Office at Washington we have made nearly eight thousand preliminary examinations into the novelty of new inventions. We have efficient assistants constantly at the Patent Office giving personal attention to our cases; and thus, with our additional force, we shall, as heretofore, give every possible facility to all inventors who intrust their cases in our hands.

THE THEORY OF BOILER EXPLOSIONS FROM SUPERHEATED STEAM.

On the inquest into the cause of the *Chenango* disaster, one of the witnesses stated that the generally received theory of boiler explosions is that they result from a mixture of superheated with saturated steam—that the steam by becoming superheated forms a reservoir of heat, which evaporates the minute particles of water carried along by the saturated steam, and thus produces an exploding pressure.

It is probable that a dozen other theories might with as much truth be said to be generally received. At all events, several others have been advanced which cannot be so easily and clearly shown to be unsound.

It is fully proved that the pressure in the boilers of the *Chenango* just before the explosion was 33 to 34 lbs. to the square inch. Now if we suppose a portion of that steam to have been superheated to a temperature equal to red heat, how much heat would that steam have contained, and what would that heat do in evaporating water and producing pressure?

According to the determinations of Fairbairn and Tate, saturated steam formed under a pressure of 33.1 lbs. per square inch has a volume 758 times greater than the water from which it was formed. Consequently a pound of such steam occupies in round numbers 12 cubic feet. Its temperature is 255°, and if we superheat it to 968°, its volume will be doubled; supposing it to expand in the same proportion as air, though Fairbairn found the co-efficient of the expansion of steam to be a trifle greater than that of air. We now have a pound of steam occupying a space in the boiler of 24 cubic feet, and if we introduce a pound of water at a temperature of 255° into this space, what will be the effect? Plainly, the temperature of the steam and water will be equalized; and if there is just enough surplus heat and no more in the steam to evaporate the water, we shall have the space filled with saturated steam at the old pressure of 33.1 lbs. per inch.

But there is not enough surplus heat in the steam to evaporate the water. The specific heat of steam is 0.475, consequently it would take only 339 units to raise the temperature of 1 lb. 713 degrees—from 255° to 968°. The latent heat of steam at a temperature of 255° is 930°, in other words 930 units of heat are required to evaporate 1 lb. of water at a temperature of 255°.

The "great reservoir" of heat in superheated steam, so far from being sufficient to evaporate enough water to produce an explosive pressure, is not sufficient to evaporate enough water to fill its own volume with saturated steam. The introduction of water into superheated steam under the conditions which obtained in the *Chenango* boilers would not have increased the pressure in the least.

WAR AND THE PROGRESS OF INVENTION.

It was very natural that many persons at the outbreak of the war should have prophesied business stagnation and general inactivity of industrial enterprises. "When war wages its wide desolation," said these modern prophets, "the country will be ruined and not one stone left upon another of all that commercial and manufacturing greatness which is our pride and boast." If the reader is curious to see how far these visions have been correct he has only to look at the published list of patent claims in this number of the SCIENTIFIC AMERICAN. There are no less than 218 patents, re-issues, designs, &c., all of which bear date May the 3d and 10th, showing them to be of recent origin. We could not make any comment which would have half the weight of the silent testimony of this long list. It shows convincingly that war, instead of being an evil to the general manufacturing interests, lends increased impetus to all branches of it. Save in the cotton manufacture (which languishes for want of material), there is hardly one other that is not busier than it has been in years gone by. Iron is in such demand that the producers of it command their own price, paper is the same, woolen goods are the same, wearing apparel of every sort is costly, and this in spite of all that inventors are doing to reduce the price by making more of it in less time than was formerly required. The progress of invention during the war has been steadily increasing, and it is difficult to foretell what the consequence would have been to the nation had not the people lent their inventive skill in the hour of trial. Without the *Monitor* we should have been overwhelmed by the *Merrimac;* without the shot and shell of Stafford, Parrott, Sawyer, Shenkl, James, Hotchkiss, and others, we should have suffered many a defeat; without Sharp's rifle, the Burnside breech-loader, the Spencer repeating-rifle, &c., the efficiency of our armies would have been seriously impaired; and we might continue the list indefinitely.

It is not alone in the manufacture of munitions of war that this inventive activity has been so strikingly manifested, but in all the various avenues of traffic and trade, on the farm and in the warehouse, the fact remains the same. There are machines now for every conceivable and inconceivable purpose, but these, so far from supplying the dem, and actually increase it. The sewing machine is a case in point. Let no man cease his exertions to lessen the severity of labor because some other enterprising person has been in the field before him. When this war is ended, the sun will not shine upon a land so blest in all that constitutes true prosperity; it is apparent that those who have new and useful machinery, processes, or materials wherewith to aid manufacturers, will not lose their reward.

GAS ENGINES IN FRANCE.

Le Petit Journal, of Paris, in a long article sparkling with French vivacity, on the uses of the Moteurs Lenoir, states that large numbers of these engines are employed for various purposes in Paris. The writer discourses thus:—

"We have been to the Grand Hotel. It is not far, and we have examined the Moteurs Lenoir laboring for the comfort of the thousand travelers lodged in that caravansera of the great world. There is one which supplies all of the water for the hotel from the cellar to the garret; another raises the dishes from the basement to the fourth story; another turns the machine for breaking the ice and cooling the sillery, the cliquot. Six men were formerly required, half naked and panting, to operate this machine which the little motor turns like a top. Another motor raises to their respective stories the travelers comfortably seated in a saloon disposed for this perpendicular voyage; another raises the baggage, and all this without noise, without fire, without smoke.

"The complaisance of the mechanician charged in the hotel with all of the mechanical service, enables us to see how these motors put themselves in operation, and stop themselves instantaneously.

"What gives to them the movement—origin of their power? It is gas, which an electric spark inflames in the body of the piston. That gas—it is that which the immense *Compagnie parisienne* distributes in all the city. It comes to feed the Lenoir motor as it would feed a burner or a stove."

Le Gaz states that a Lenoir motor consumes about 720 feet of gas in ten hours for each horse-power. This would make, at the New York price of gas, a cost of 1.88 cents per horse-power per day. The fuel for a steam or air engine costs at the present high price of coal, not more than 50 cents per horse-power per day. The bulk and weight of a gas engine are about the same as those of an air engine. Illustrations of these engines can be found on page 32, Vol. IV. (new series), SCIENTIFIC AMERICAN.

IMPROVED SCHOOL GLOBES.

We have heard old gentlemen of the last generation speak of the great improvements which have been made in modes of teaching since they were boys. For instance, they were set to study geography in the letter-press of a book without the aid of any maps! Notwithstanding the great reform that has been effected in modes of education, we believe that the importance of proper apparatus for teaching is not yet fully appreciated. Children are urged through the difficult task of learning long tables of the distances and sizes of the planets, when a single glance at an orrery properly proportioned would give them a far better idea of the structure of the solar system, and one which they would remember for a life time. Of the large sums of money expended for school books we have no doubt that a much larger proportion should be appropriated to apparatus than is now expended for that purpose.

Our attention has been recalledto this important subject by an examination of some globes recently patented through this office, by the Rev. J. R. Agnew. The celestial globe is formed of two hollow hemispheres, with the constellations mapped upon the concave inside, while an orrery revolves within the sphere, thus giving the pupil a correct idea of the relative positions of the heavenly bodies. The outside of the sphere is a terrestrial globe, and by this arrangement the three things—a celestial globe, a terrestrial globe, and an orrery—are combined and furnished for a little more than the usual price of either, or say for one-half of the usual price of all. In this globe the zodiac is vertical, and all of the arrangements give a better representation of astronomical phenomena than globes of the ordinary construction. The merits of this globe ought to secure its general introduction into the common and select schools, and into all families that can afford it. Mr. Agnew may be addressed for further information to the care of the *American Monthly* office, 37 Park Row, New York City.