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Contents:

(Illustrated articles are marked with an asterisk.)

TO CITY SUBSCRIBERS.

The SCIENTIFIC AMERICAN will hereafter be served to our city subscribers either at their residences or places of business, at $3.50 a year.

Theodore Tasch, a very energetic and reliable young man, and for many years employed in this office, is authorized to deliver the paper, and to collect subscriptions and receive orders for advertisements.

WE propose during the coming year to devote more attention to the illustration and description of leading branches of manufacturing. We are prepared to send our artists, and competent writers to points within reasonable limits to take the necessary sketches, and prepare the descriptions. The advantage of such illustrated articles in a journal so widely circulated as the SCIENTIFIC AMERICAN, must be apparent to every enterprising manufacturer.

ONE of our associate editors has recently visited Pittsburgh, and we are now preparing illustrations of the largest iron works in that city, to be published soon, with an account of the operations and processes carried on at the works.

THE present number closes the volume. We are aiming at a subscription list of at least fifty thousand. This can only be accomplished by the co-operation of our present patrons, who have always generously responded to our appeals. We urge them now to speak a good word for the SCIENTIFIC AMERICAN. By so doing they can induce some of their neighbors to join in making up a club. If ten or more names are sent, the subscription is $2.50 a year. Any one who will send us twenty names and $50, can add his own name to the list.

AGENTS who receive their weekly supply of the SCIENTIFIC AMERICAN through news companies, are urged to canvass their localities. By a little effort among intelligent mechanics and manufacturers, they can add largely to their lists. We will send specimen numbers, when desired, for that purpose.

WHAT more valuable present can be made to young mechanics than a year's subscription to the SCIENTIFIC AMERICAN? Employers will be doing their employés a great service by acting on this hint, and we feel sure that at the end of the year they will consider the investment a good one.

SUBSCRIBERS who wish to have their volumes bound, can send them to this office. The charge for binding is $1.50 per volume. The amount should be remitted in advance, and the volumes will be sent as soon as they are bound.

THE Index, the Patent Claims, and Advertisements occupy so much of the present issue, that we are obliged to defer the publication of several interesting letters and contributions until our next number.

SUBSCRIBERS who forward their subscriptions, may consider the receipt of the paper as evidence of payment, as we cannot undertake to acknowledge such payments by mail.

PERMANENT WAYS versus LIGHT TRAINS.

When houses are properly built the foundation is the first and most important consideration. If the "hard pan" is not reached piles are driven to give a proper foundation. So with all structures built by men and growing out of the earth, the foundation is the first and main object of concern. To secure this foundation, in any particular locality, is possible even under very adverse circumstances; but, although it is intended mainly to support a constant weight, not subject to frequent or extensive variations in amount, it is, not seldom, very costly. Where the imposed weight is liable to sudden and frequent change, either of increase or diminution, it has been found that a rigid structure is not so lasting as one possessing more or less elasticity. Such are bridges, especially those of a large span, and we always hear of the amount of deflection caused by a stationary or a passing load when a bridge is described.

Unyielding sub-structure for the rails of a road, would be very costly. To prevent displacement by atmospheric agencies—frost, heat, snow and rain—the bed or foundation would have to be settled and located below the reach of these disturbances. That this would be hardly possible, at whatever expense, is evident when the nature of the beds of our railroads are considered. They are cut through hills and dense forests, carried through swamps, and over causeways, the material being rock, loose stones, gravel, loam, soil, sand, and even decaying vegetation. Such materials, under such circumstances, cannot make a *permanent* way. A foundation of gravel, stone, mortar, and cement would be altogether too costly, and make railroads an impossible luxury. Substituting stone for wooden sleepers has been tried and failed. A portion, at least, of the Boston and Lowell railroad was laid with granite sleepers. Each sleeper became an anvil and the jar of the successive blows of the wheels was immensely injurious to the rolling stock, while the stone sleepers were broken by the frost or the percussion of the trains. "Shims" or cushions of wood were introduced between the rails and the stone sleepers and thus the difficulty was partially remedied. If a permanent or rigid way is to be attempted it is evident that either the support of the rails must be continuous, or the rails must be made much heavier, or higher, giving a longer vertical section than those at present used.

As at present constructed and used, railroads are costly enough; they are anything but permanent ways, and as making them so would seem to be financially difficult if not physically impossible, we must look to the reduction of the weight the rails are compelled to bear. Between the supports (sleepers) the rail is a stringer like that of a bridge, and subject, like that, to deflection, as anyone may see who notices the movement of a train, a locomotive, or a heavily loaded car. Why not reduce the weight of the locomotive and of trains, running trains oftener and nearer together? Is there any insuperable obstacles to this, and would it not be cheaper than to make a long road, passing over and through all sorts of soils and all descriptions of country, a permanent way? It seems to us that altogether too much attention has been devoted to the introduction if steel rails, steel tires, and improvements in the permanent way, and too little to the proper utilization of our roads as they now exist, or as they may be cheaply made to be. Let the road be properly ballasted, placing the sleepers two instead of three feet apart, and then replace the enormous thirty, forty, and fifty tun locomotives by those better adapted to the road, of course reducing the weight of the trains (and if necessary, of the cars), and we should hear less about accidents from broken and worn out rails, broken axles, and defective sleepers.

CONDITION OF THE PATENT OFFICE.

The Secretary of the Interior, in his annual report to Congress, states that during the year ending September 30, 1868, there were 20,112 applications for patents; 14,153 patents (including reissues and designs) were issued; 1,692 applications allowed on which patents did not issue owing to the non-payment of the final fee; 3,789 caveats filed; 180 applications for the extension of patents received, of which 133 were granted. The receipts were $696,786, being $171 less than the expenditures. The Secretary also renews his former suggestion in favor of repealing so much of the law as allows an appeal from the decisions of the Commissioner on applications for letters patent and in interference cases, and respectfully refers to the views on the subject presented in his former reports.

The Commissioner of Patents reports to the President of the Senate as follows:

By an act of Congress passed July 20, 1868, all the receipts of the Patent Office were directed to be paid into the Treasury, and the sum of $250,000 was appropriated to pay its expenses.

In pursuance of said act, I transmit herewith to Congress a detailed account of the receipts and expenditures of the Patent Office during the period from the passage of said act up to the commencement of the present month.

The payments of salaries and wages at the Patent Office are usually made at the end of each month. Those, therefore, that were paid after the 20th of July were for the services of the whole of that month.

The accounts of expenditures include about $35,000 paid for debts that had accrued before the commencement of the term. Other portions of such past indebtedness, amounting to about $27,000, still remain due and unpaid.

The Agricultural Department, during the past summer, has been removed from the Patent Office building. The fitting up of the rooms thus vacated, and furnishing them for the uses of the Patent Office have involved considerable expenditures beyond the ordinary expenses of the office.

Of the $250,000 appropriated by the act of July 20th, $43,490 remain unexpended. This sum, it is estimated, will about meet the expenditures of the present month.

The receipts of the Patent Office, since the 1st of July last, that have been collected and paid into the Treasury, exceed all its expenditures during the same period, ordinary and extraordinary, by the sum of $29,494 85.

THE VELOCIPEDE MANIA.

The excitement on the subject of velocipedes is on the increase, and improvements are being made every day. But inventors are not confining their genius to velocipedes to be used on land; a number of plans and models have been submitted to us for aquatic use, some of which possess much novelty.

A riding school for giving instruction in the art of riding and driving the two-wheeled velocipede has been opened in the large hall, 932 Broadway, where large numbers of gentlemen congregate every evening to receive instructions.

The sport of velocipede riding is very fascinating, and is becoming quite fashionable. It is likely to take the place of skating to a great extent. Persons may be seen practicing on our streets and avenues every afternoon. One gentleman in the country who does business in the city is said to have sold his horse and wagon and substituted the velocipede, on which he rides back and forth from the railroad station to his house every day. He claims that he goes quicker and without fatigue. He enjoys the exhilarating ride, and is delighted with the change. His oats are for sale and stable to rent. No more harnessing, shoeing, or horse feed required by this gentleman. Other incidents of interest on the new mania are deferred for lack of space this week.

HORSE AND FOOT.

From the above heading it might be inferred that we intend to write a military essay, but such is not the case. Our desire is simply to call attention to a nuisance, and to suggest a remedy. The nuisance to which we refer is this: In all our overcrowded cities, New York, for instance, all streets are free to vehicles of whatever character, and are also pedestrian thoroughfares. It is true the sidewalks are the exclusive prerogative of the pedestrians, but, as they are forced to cross other streets to get from block to block, the nuisance remains, to the peril of life and the utter despoilment of broadcloth and patent leather.

Nine tenths of all the accidents from collisions occur at crossings. This city employs a large number of policemen to assist ladies in fording rivers of filth and preventing them from being run down by reckless drivers. It is no uncommon sight, in the midst of sludge which winter always brings us, to see some shipwrecked daughter of Eve stranded upon some island of frozen filth in the middle of the street holding frantically to her soiled crinoline, her pretty gaiters filled with an ice-cold solution of high fertilizing value, and looking appealingly around to find somebody whose bravery and boots are sufficient for an attempt to rescue her. Meanwhile along come the omnibuses and express wagons, carts and trucks, whose drivers seem to take a malicious pleasure in bespattering her velvet cloak and her snow-white feathers, regardless of the feelings which wring her heart-strings, or the damage which wrings her husband's purse strings.

Now there is but one remedy for this uncivilized state of affairs. The horse must be separated from the foot. In order to effect such a separation we advocate first, the erection of a screen along the edge of the sidewalk next the street, the screen to consist of an iron frame, with a curtain of canvas that can be raised or lowered, to suit circumstances. In fair weather it would of course be unnecessary to keep it up, but in sloppy weather it would add greatly to the comfort of all who are compelled to pass through our principal thoroughfares. Second, the crossings should be tunneled. The experiment of the Fulton Street Bridge has proved that bridges are not the thing wanted. They require to be too high to accommodate the loaded vehicles and omnibuses, and for various other reasons are not tolerated. Tunnels at crossings, on the contrary, need not to be deep, and the steps leading into them can be made of easy grade. They can be lighted day and night with gas, for one-fourth the expense of keeping policemen to guard the principal crossings, and on the score of cleanliness are preferable to bridges. Their expense need not be much greater than bridges, but if it were five times as much we should still advocate them as the only feasible method of correcting the nuisance we have described.

CLEANLINESS IN SHOPS.

In our visits to different manufacturing establishments we are often shocked at the confusion and want of order which seems to prevail. Cleanliness, the virtue which has been said to rank next to godliness, seems to be entirely disregarded in many otherwise well conducted establishments. Now we regard order in the arrangement of tools, the avoidance of confusion attendant upon misplacement, and the frequent and thorough removal of the litter upon floors, as more important in an economical point of view, than with reference to the comfort and health of workmen, although the latter consideration is important enough.

The want of attention to this point is costing many a shop in this country more than is imagined. In one shop we visited lately we saw a workman search for a mislaid tool longer than it took him to use it after he found it. The incident did not seem an unusual one but one of ordinary occurrence, as we inferred from some remarks of the foreman, who saw the whole matter and even suggested some places where the missing tool might probably be found.

The floor of this shop was covered with a mass of useless lumber. The removal of any bulky object from one end of the shop to the other, would have necessitated a previous removal of rubbish to clear a way that would have consumed a considerable time. Such a slovenly state of things must inevitably breed carelessness on the part of employés, and greatly facilitate accidental misplacement of tools, nuts, and other small objects liable to be dropped. The reflexive effect upon hands, of strictly enforced order in the replacing of tools and cleanliness in a shop, is always in the highest degree beneficial and should never be overlooked by an intelligent foreman.

Nothing is more refreshing than to pass from one of these ill-regulated slovenly shops into one where order and cleanliness prevail. Even the workmen seem be more cleanly in their person and tidy in their attire, and to feel the elevating tendency of the discipline which prevails. Everything moves on quietly, rapidly, and surely to its accomplishment. No time or material is wasted. Everything is in its place when wanted and ready for use. A comparison of two such shops is a demonstration that there is no such thing as perfect manu-