

getting into practice "uniformity in style and construction of drawheads and deadwoods."

The report of the committee caused a most animated debate, from which it was plain that the question of obtaining a satisfactory safety car coupler is still one of the most important that railroad men have to deal with. There is not any particular style of coupling that has yet received more than a sort of negative recommendation, but the lines are pretty clearly laid down that new couplers shall be calculated to couple readily with such other styles as are at present in most general use. The field for further competition is therefore still wide open, and inventors are urgently invited to occupy it until they succeed in working out the difficult problem, and constructing a device which will command approval. The demand for such improvement is now felt to be the more urgent, inasmuch as New York State requires an approved safety coupler on all cars built after July 1, while in Massachusetts and Michigan similar laws are already in operation, and public opinion seems to insist upon such legislation in most of the other States. The master car builders and the railroads would be only too happy to comply with such laws, if they could find a coupler which would adequately answer the practical requirements of the railway business of the country; but until they are satisfied that such a style of coupler has been found, the Association think a waiting policy is the best one for the companies, in the hope that American inventive genius will yet furnish a satisfactory way out of their difficulties.

#### A TRANSCONTINENTAL BALLOON VOYAGE.

The largest balloon in the world, according to the San Francisco *Chronicle*, has recently been built in that city by Mr. A. P. Van Tassel. It has a capacity of 150,000 cubic feet of gas, and has been constructed for the special purpose of enabling the well known aeronaut to undertake a journey across the continent, from ocean to ocean. The height from the floor of the wicker car to the top of the gas reservoir is 119 feet, and of the dilated reservoir alone 68 feet. The envelope is made of finely woven cloth, manufactured expressly for the purpose, and is varnished, as usual, in order to make it gas tight. The car has accommodation for fifteen persons. It is about twenty-one feet in circumference, and the sides are thirty-four inches high. The supporting ropes are kept in place by the usual "concentrics." Hydrogen gas will be used for inflating the balloon. The cost of the structure, is stated to be \$6,000. Mr. Van Tassel has had considerable experience in aerial traveling, having crossed the Wichita Mountains, 15,000 feet above sea level. His present attempt is more ambitious than any he has yet made. A careful study of the aerial currents leads him to believe that by seeking the proper stratum of air he can be carried eastward at high speed, possibly 100 miles an hour. The greatest difficulty will probably be due to the Rocky Mountains, which modify the movements of the air currents over a large area of the continent. It is expected that the voyage will be begun some time about the 1st of July. Should it survive the trip, the giant balloon will be taken back to San Francisco, where it will be placed on exhibition.

#### ELECTRIC LIGHTING AS AN INVESTMENT.

With a view to put at rest the question whether local electric lighting companies are profitable investments, we have recently addressed a circular letter to the general managers of a number of such companies, both East and West, asking for their experience in the matter. We have directed our inquiry in this instance particularly to those operating the Thomson-Houston system.

We have received answers from all parts of the country, and the general tenor of the replies is that many of their local companies are earning better dividends than are yielded by the majority of other new enterprises. The question of profit rests first with the locality, and then, if this be judiciously chosen, with the system employed and the ability displayed in the management.

Of those who have stated the exact profits of their investment, we believe the highest returns came from Omaha, Nebraska, where a company, operating four 30 light dynamos, had earned at the end of the first three months after incorporation  $4\frac{1}{2}$  per cent on the investment, or at the rate of 18 per cent per annum. Two more dynamos of the same capacity have since been added to their plant. The gentlemen connected with this company are so well pleased with these results that they procured a franchise for operating in Des Moines, Iowa. They began by running 65 arc lamps, but have since increased their plant.

Replies have also been received from Washington, St. Louis, Worcester, Terre Haute, Auburn, Me., Salem, Mass., Quincy, Ill., Kansas City, etc., which confirm these results, and state emphatically the belief of the writers in the desirability of electric lighting as an investment.

These conclusions, although derived from the working of the particular lighting system we have named, may be equally valid and reliable for other systems

now before the public, although we are advised that a greater number of local companies are operating their system than any other, and we find these companies uniformly successful so far as our inquiries have extended. There is room for great extensions of these local lighting companies in all parts of this and foreign countries.

#### PHOTOGRAPHIC NOTES.

##### *Chlorophyl and Eosin Orthochromatic Plates.*

In a communication to the Franklin Institute, which we take from the *Brit. Jour. of Photography*, Mr. Fred. E. Ives, of Philadelphia, Pa., relates some interesting experiments recently made on the combination of chlorophyl and eosin, as follows:

The subject of color sensitive photographic processes has received a great deal of attention during the past year or two, but there has been, and is still, a great diversity of opinion in regard to the capabilities of the various color sensitizers. In illustration of this fact I will mention that Becquerel, who first tried chlorophyl, stated that with it he made plates from one-fifth to one-tenth as sensitive to the red of the spectrum as to the blue or violet. Dr. Vogel estimated that eosin-stained plates were eight times more sensitive to the yellow-green of the spectrum than to the blue. I myself stated that plates stained with myrtle-chlorophyl, according to my published method, required even less exposure through a yellow glass than eosin plates. Captain Abney stated that, according to his experience, stained plates were always many times more sensitive to blue and violet than to any other color; and many persons have believed that the color sensitizers acted more by reducing the blue and violet sensitiveness than by actually increasing the sensitiveness to other colors.

For the purpose of proving the capabilities of chlorophyl and eosin, I have made four photographs of the lime light spectrum, one on a plain emulsion plate, one on a chlorophyl-stained plate, one on an eosin-stained plate, and one on a plate stained with both chlorophyl and eosin. The spectrum was projected by means of an optical lantern and a flint glass prism, with a slit measuring one-fiftieth of an inch. It will be understood that the different colors have not exactly the same relative intensity in this spectrum that they have in the solar spectrum, but the difference is insignificant. Short wires were placed so as to cast shadows on the sensitive plate, to aid in the comparison of results. Some of these wires, which I have marked, occupy the position of Fraunhofer lines in the solar spectrum. All plates were prepared with the same collodio-bromide emulsion, and received the same exposure and development.

The plain emulsion plate shows very little action, except in the blue, violet, and ultra-violet; the maximum of sensitiveness is in the middle of the violet. (It should be noted here that with gelatino-bromide dry plates the maximum of sensitiveness is in the indigo blue, about G, and they are also relatively more sensitive to green and yellow.)

The chlorophyl plate shows a very strong action all through the visible spectrum—strongest in the red, orange, and dark green; weaker in the blue and violet; and weakest in the yellow-green. In the red, below C, the plate shows about five times as much sensitiveness as in any part of the violet; in the orange red, twice as much; in the yellow-green, one-half as much; and in the dark green, one and a half times as much. The violet sensitiveness appears to be slightly reduced near H. This experiment proves that my chlorophyl plates are remarkably sensitive to all colors, as I have many times asserted that they were, and that they are twenty-five to fifty times more color sensitive than those which Becquerel employed in his experiments. They are probably 400 or 500 times more sensitive to red than unstained plates.

The eosin plate shows no action in the red and orange, very little in the yellow, a great deal in the yellow-green, and considerable in the dark green. The action of eosin is strongest exactly where the action of chlorophyl is weakest; it gives about the same degree of sensitiveness to yellow-green that chlorophyl gives to red, but in a broader band. The violet sensitiveness appears to be exactly the same as in an unstained plate.

The chlorophyl-eosin plate shows by far the most remarkable result of all. Neither sensitizer appears to have retarded the action of the other, but rather to have aided it, so that *the weakest portion of this photograph below F is stronger than the strongest portion in the blue and violet!* Nearly a year ago I recommended that chlorophyl and eosin be used together in practical isochromatic photography, and this experiment proves that the combination possesses the advantages which I claimed for it.

I have found that, in order to secure the best results with the chlorophyl-eosin process, fresh, strong, blue-myrtle chlorophyl solution must be used, and the amount of eosin must be strictly limited, otherwise, the plate will not be so sensitive to yellow and to blue-green. I now prefer to apply the eosin by simply tinting it with water in which the plate is to be washed, after applying a plain solution of chlorophyl. I have an

over-exposed negative of a bright chrome card, which I made on one of these chlorophyl-eosin plates, with an exposure of one minute in the light of a coal oil lamp having a single small Argand burner and nickel reflector. No color screen was used, but, owing to the yellowness of the coal oil flame, all the colors have photographed correctly. An unstained plate, with same exposure and development, showed only the high lights of the picture very faintly.

#### The Law as to Party Walls.

A party wall in law is the wall dividing lands of different proprietors, used in common for the support of structures on both sides. At common law an owner who erects a wall for his own buildings which is capable of being used by an adjoining proprietor, cannot compel such proprietor, when he shall build next to it, to pay for any portion of the cost of such wall. On the other hand, the adjoining proprietor has no right to make any use of such wall without consent of the owner, and the consequence may be the erection of two walls side by side, when one would answer all purposes. This convenience is often secured by an agreement to erect a wall for common use, one-half on each other's land, the parties to divide the expense; if only one is to build at the time, he gets a return from the other party of half what it costs him. Under such an agreement, each has an easement in the land of the other while the wall stands, and this accompanies the title in sales and descent. But if the wall is destroyed by decay or accident, the easement is gone, unless by a deed such contingency is provided for. Repairs to party walls are to be borne equally; but if one has occasion to strengthen or improve them for a more extensive building than was at first contemplated, he cannot compel the other to divide the expense with him. In some States there are statutes regulating the rights in party walls, and one may undoubtedly acquire rights by prescription on a wall built by another, which he has long been allowed to use for the support of his own structure.—*Building.*

#### Mineral Ultramarine.

J. R. Jackson, F.R.S.—The preparation of ultramarine is as follows: The pieces of lazulite the most rich in color are picked out, they are washed, and then plunged into vinegar, and if the color does not change, the quality is esteemed good. The stones are then again repeatedly heated, and plunged each time into vinegar. By this means they are easily reduced to an impalpable powder. This is then well worked up into a paste with resin, white wax, and linseed oil, to which some add Burgundy pitch. The paste is then put into a linen bag and kneaded under water, which at first assumes a grayish color, resulting from the impurities that are first separated from the mass. This water is thrown away and replaced by fresh, and the kneading recommenced, when the water becomes of a fine blue. This is poured off and allowed to settle, the precipitate being ultramarine of the finest quality. The repetition of the process furnishes color of inferior quality in succession, and finally the residuum, being melted with oil and kneaded in water containing a little soda or potash, yields what is termed ultramarine ashes. The inalterability of ultramarine is a most valuable quality; but this very property is injurious to the effect of old paintings, for while the other colors have changed, this, preserving its original brilliancy, all harmony is destroyed, as may be observed in many old paintings and frescoes.

#### Convention of Civil Engineers.

The Annual Convention of the American Society of Civil Engineers will be held at Denver, Colorado, on July 2, 3, and 5. Sessions for professional discussion, and one for the transaction of business, will occupy the three days. At the close of the Convention, several railway excursions will be made to a number of points of engineering interest in Colorado. These excursions have not yet been fully arranged, but will probably include Greeley and the extensive irrigation works in its vicinity, Georgetown, Leadville, Gunnison, and Pueblo. It is proposed that they shall terminate at Colorado Springs, where the engineers will separate for their respective homes. A large attendance is anticipated, and in consequence very favorable transportation rates have been secured. Mr. Henry Flad, the President of the Society, will deliver the annual address during one of the sessions of the Convention.

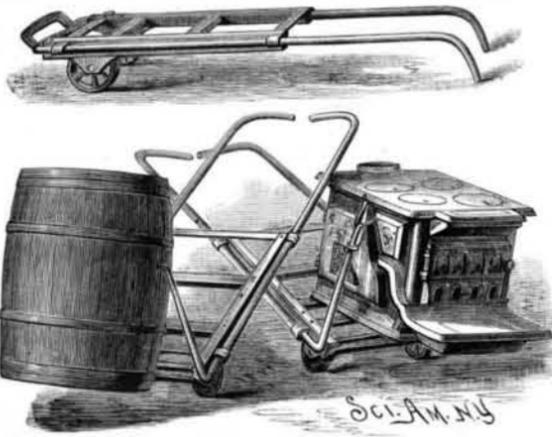
DAVID VAN NOSTRAND, a well known New York publisher and importer of scientific books, died June 14, in the 75th year of his age. He was first employed in a city bookstore when 15 years old, and subsequently became acquainted with many military and scientific men, who gave him orders for books, relying upon his good judgment for their selection. He thus, as well as from the natural bent of his tastes, developed a business especially in the line of military and scientific books, his military publications during the war of 1860-65 having been numerous.

**Generating Steam by Slag.**

Mr. Brotherton, Superintendent of the American Smelter, at Leadville, Col., has patented a plan for generating steam for motive power at the smelters through the use of slag. By this method the slag is dumped into large shallow vessels, which are afterward run under boilers, and the heat used in generating steam. An experimental test of the method resulted in maintaining 75 pounds pressure on a vertical boiler for seven days. If the plan proves practical, it will result in a saving to the smelter of \$1,200 to \$1,500 a month.

**IMPROVED HAND TRUCK.**

In eyes secured to the side edges of the platform, which is mounted on wheels in the usual way, are journaled rods extending beyond the lower end of the platform. The outer parts of the rods are bent at right angles to form arms, and the extremities are bent inward and pointed, to engage with the article to be carried, as shown in the left of the cut. The other ends of the rods are bent toward each other, forming arms, which serve as levers for turning the rods to move the lower arms toward each other. The upper and lower arms are bent in planes approximately at right angles with each other; when not to be used, the lower arms are folded one over the other upon the edge of the truck, which can then be used in the ordinary way. When a stove or similar article is to be handled, small attachments are slipped over the grip points, when the stove can be easily carried, whether it be on its legs or not, by one man, who

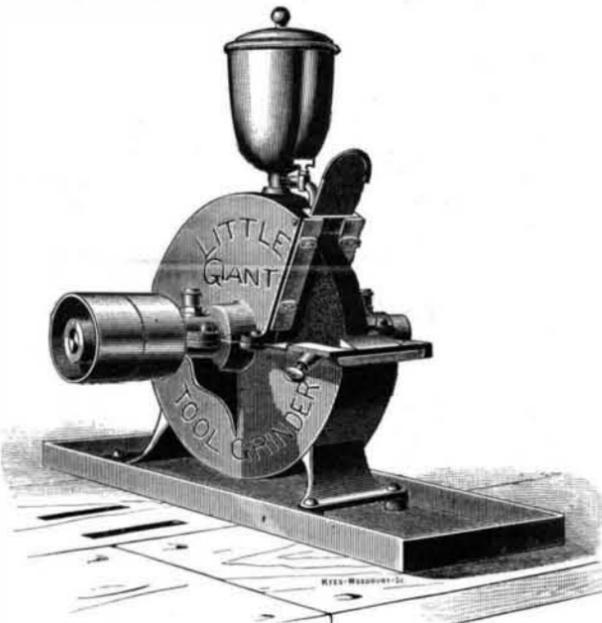
**SMITH'S IMPROVED HAND TRUCK.**

need not touch it with his hands. This feature makes the truck particularly valuable in handling such articles as spools of barbed wire.

This invention has been patented by Mr. Charles W. Smith, of Belmond, Iowa.

**IMPROVED TOOL GRINDER.**

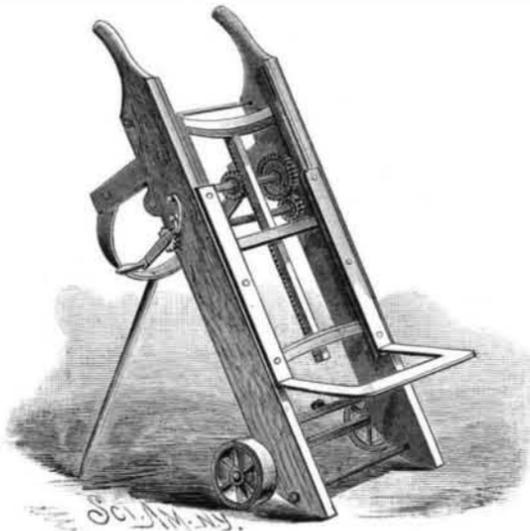
The accompanying engraving represents an improved machine for sharpening machinists' tools of all kinds. The corundum wheel, the grade of which varies to suit the kind of work to be done, runs in water, thereby avoiding all danger of drawing the temper from hardened tools. A wheel made of this material cuts faster than the ordinary grindstone, is more accurate, and much cleaner. This grinder occupies a space only 12 by 22 inches. No water flies from the wheel, as it is covered with a hood, except where the grinding is done.

**THE LITTLE GIANT TOOL GRINDER.**

The manufacturers of this grinder—the New York Supply Company (limited), of 50 and 52 John Street, New York city—have adopted a special corundum wheel, which, by reason of its porous nature, is constantly moist, and, in consequence, all danger of drawing the temper of the tools is obviated.

**A NEW HAND TRUCK.**

The hand truck here illustrated is so constructed that it can be used as an elevator for loading boxes, sacks, and other heavy articles into wagons. In the inner sides of the upper part of the frame are formed

**CALDWELL'S NEW HAND TRUCK.**

grooves, in which slide bars of a frame, to the lower part of which are attached plates that overlap the side bars of the main frame. A toe is formed at the lower end of the plates. To the centers of the cross bars of the sliding frame is secured a rack bar, the teeth of which mesh with a pinion on a shaft driven by gearing operated by a crank handle at the side of the main frame. By properly turning the handle, the frame and its load can be raised, a pawl and ratchet wheel preventing the gearing from turning back. To the legs of the frame is hinged the forked upper end of a long leg, upon which the truck is supported when raised into an inclined position, so that the crank can be conveniently operated to raise the frame and load. When the load has been raised to the required height, it is held in place by the pawl, and can be placed in the wagon by swinging the upper part of the truck forward upon the toe as a fulcrum. When not in use, the leg is held against the under side of the truck by a spring clamp.

This invention has been patented by Mr. John Caldwell, P. O. box 87, Wilmington, Del.

**Woolen as a Sanitary Measure.**

A new philosophy of clothes is announced to the world under the title of Dr. Jaeger's Sanitary Woolen System, which seems already, after a trial of only four years, to have taken a strong hold upon many of the people of England and Germany, where the manufacture of the woolen fabrics and garments is conducted, subject to the scrupulous inspection of Dr. Jaeger himself, and conformably to his discoveries [and theories respecting it as a cure and preventive of disease.

His claims in its behalf are broad and sweeping, and apparently extravagant. Nevertheless, his doctrine is rapidly gaining converts in both countries. The *London Times* speaks of it as having been adopted by some of "our most eminent sanitary reformers, while in Germany it has not only revolutionized the trade of Stuttgart, where its founder practices, but the clothes are worn and highly appreciated by such men as Count Von Moltke, who may be expected to apply the principles in question to the German army."

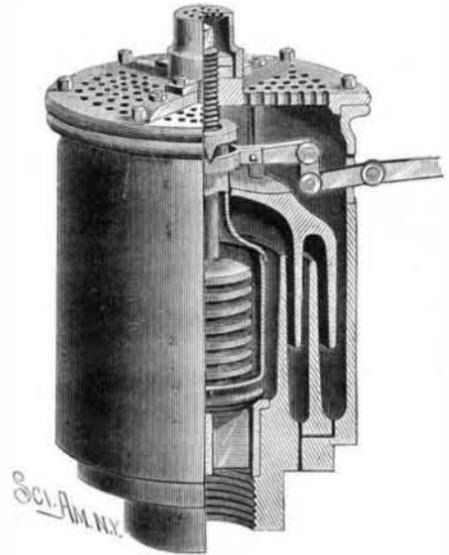
Everybody knows that almost everybody is the victim of some kind of ailment or infirmity; but hardly anybody would have suspected, till Dr. Jaeger revealed the results of his investigations and discoveries, that many of the ills that flesh is heir to are the effects of the "material and form of the ordinary clothing of the present day." But this is precisely what Dr. Jaeger claims to have proved, while he professes to have found a very general, though by no means a universal, remedy. It lies in the renunciation "of all material of vegetable fiber (linen or cotton) or silk in clothing and bedding," and the substitution "of clothing and bedding of animal wool throughout, so constructed as to afford to the body the maximum of protection from chill and damp, with the minimum of impediment to the escape of the exhalations from the skin."

He rests his theory chiefly on the well known properties of wool, which make it a poor conductor of heat, while it is highly permeable and transmissive to the exhalations of the skin. The *London Lancet* calls this the "rallying point" of his system, and the *Sanitary Record* (London, Feb. 15, 1884), says: "The under-clothing has been extensively worn since its introduction, and has received a general consensus of approval on its intrinsic merits."

Any one curious to see these novel articles of clothing, from a collar to an overcoat, from a shoe to a necktie, and from chemise to shawl, will soon have an opportunity afforded them at 827-829 Broadway, where a large exhibition and salesroom is soon to be opened by the "Dr. Jaeger Sanitary Woolen System Co."

**MUFFLER FOR STEAM VALVES.**

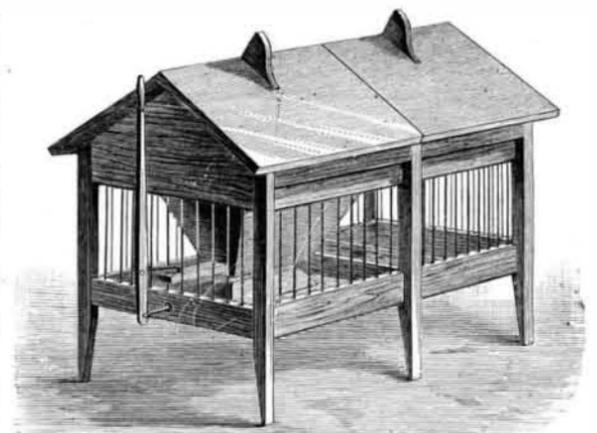
This muffler, the invention of Mr. Thomas E. Hill, of Rahway, N. J., is for deadening or preventing the unpleasant hissing sound of escaping steam from the valves of steam engines. The main casting is formed with an outer circular casing and with inner upwardly projecting concentric flanges, which form annular chambers and a central circular chamber, the bottom of which is formed by a valve fitted in an opening in the casting. This valve is held to its seat against the pressure of steam by a spring arranged in a box that may be lifted against the pressure of the spring by suitable levers. The pressure of the spring upon the valve can be adjusted by means of a bolt, the upper end of which screws into the center of the top plate, and the lower end of which bears against a plate resting on top of the spring. It will be seen that by turning this bolt, which passes loosely through the upper or neck portion of the box inclosing the spring, the latter can be made to exert more or less pressure upon the valve. Held within the casing is a deflector formed with two downwardly projecting concentric flanges, which enter the annular chambers formed in the casting. This construction compels the steam escaping from the valve to take a circuitous course through the chambers, in which it is diffused and its pressure reduced; it finally issues in

**HILL'S MUFFLER FOR STEAM VALVES.**

many small jets from the numerous holes formed in the top plate.

**FEEDING STAND FOR POULTRY.**

The side, end, and center frames of the feeding stand are provided with rods in their panels, which are separated sufficiently from each other to allow the fowls to gain access to the feed. One-half of the roof is fixed, while the boards forming the other are hinged and provided with arms for limiting their motion when opened. In one compartment of the stand is a hopper, having openings in the bottom, which can be closed by a valve operated by a hand lever, pivoted to the frame as shown, or opened to allow the feed to escape. Below the hopper is placed a bar so shaped as to divide the grain entering from the hopper into the feed trough. In the other compartment is placed a metallic water trough, between which and the end of the compartment is formed a receptacle for soft feed. The grain from the hopper flows into the compartment, and is spread evenly on all sides by the bar; the flow of the grain is checked by the partial filling of the feed trough. As the grain is consumed, its place is supplied

**MCDONALD'S FEEDING STAND FOR POULTRY.**

by fresh grain from the hopper, and in this manner a continuous supply is maintained in the trough, and the fowls are prevented from scattering or wasting the feed.

This invention has been patented by Mr. Samuel McDonald, of Cochran's Mills, Pa.