beginning of the thimble; No. 2 is the blank as it appears after being "drawn up," in the same general way as we have seen the button-top produced; No. 3 is the third stage where the rough edges are trimmed off by a man at a lathe; No. 4 is still another shape, having the bead turned at the lower end; No. 5 is the bead completed, and No. 6 is the thimble ready for a lady's use. There are other operations performed upon each, as all the foregoing are distinct and separate; but we forbear mention of them. The indentations are formed by placing the thimble on a mandrel and causing it to revolve between steel disks which have a number of minute points in them corresponding to the punctures. The German silver thimble is usually esteemed the best for wear, as the metal is much tougher than brass; brass thimbles are generally silver-plated, and are also durable. When the thimbles are plated there is a small wire coiled about them so that they will not slip into each other and become united by the silver deposited on them. These processes are also extremely rapid; and although each thimble goes through many hands, it is by the reason of this very fact that they can be afforded at so low a price. These wares, however, are by no means the only ones made in this factory, and if we desire to see others we must leave the room we have just examined and enter another; as for instance that one wherein are manufactured—

HINGES.

Many thousands of hinges are annually turned out here. Their numbers would literally exceed belief. Brass hinges are made from a long strip of sheet-brass. Each individual hinge consists of two leaves, as the reader well knows; and these are both made at one operation. The press first cuts out a square piece of brass, very little larger than the intended hinge. This blank, or rather these blanks (for they are made in great quantities at a time) are taken to another machine, which cuts one leaf out of the other in such a manner that no metal whatever is wasted. In fact so exact is the separation that the parts cannot be fitted together again by hand without some filing. In the process described there have been small tongues left projecting from the side of the leaf, these are to form the joint or joints, of the hinge through which the wire passes. The joint is made in another machine by rolling up the brass tongues in a circular form; after this the joints are trimmed, have the wire inserted and are riveted by young girls, and are otherwise made ready for market. We must not omit to notice one machine, however, which would seem, to the uninitiated, to be unnecessary; that is the one for opening and closing the hinge. After they have been fitted up some slight inequalities, and the stiffness of the joint, makes it difficult to open them. This trouble is removed very speedily by the apparatus in question. With a duplicity of purpose and apparent simplicity of design, which would do credit to a veteran politician, the machine seizes the hinge presented to it, thrusts a steel point between the leaves, opens it completely, and passes it on to the other end, where a different movement completely reverses the previous operation and closes the hinge up again like a jack-knife; here it drops into a box and is carried away by an attendant, to be drilled and countersunk. Some hinges are polished; others are left in a rough condition, and all classes and patterns are made here, from those designed for a rough box or marine work, up to the silver-plated ones for pianos.

MISCELLANEOUS ARTICLES.

At one time large quantities of daguerreotype plates and metallic borders or "mattings" for the same were made here; but the introduction of photographs or card-pictures and ambrotypes, has materially lessened the consumption of them. The number still made, however, is far from being insignificant; and we will inform our readers how the plate is produced on which their graceful features are sometimes imprinted by the skillful fingers of the sun. A copper ingot of suitable fineness, having been selected, is placed in a lathe and faced off true on one side. This corrected surface is first coated with pure silver, and the ingot is then rolled out into a long strip, just as we have seen the brass worked. As the copper is reduced, the silver follows it, until the desired attenuation has been reached. But daguerreotype plates, thimbles, and hinges are only a part of the articles here produced; in addition there are a number of others which we are unable to describe in this connection for want of space. Of late years a highly ornate style of pill-box has been introduced, made out of thin sheet-brass, silvered over, and stamped with an appropriate design. We did not learn that the flavor of the pills was at all benefited by the improved method of preparing them for market; but we heard that one enterprising son of Esculapius circulated a quantity of his pills enclosed in the new style of box among a desirable class of customers, and the result—as briefly and tersely set forth by our informant—was that "They liked 'em so well, they came back for more." Kerosene lamp-burners are also produced in large quantities, and the manufacture of them involves no less than 111 distinct operations! We shall reserve a description of this branch of the brass business for another article.

The Scoville Manufacturing Company occupy large and commodious buildings, and contemplate extending their works still further at an early period. They afford employment to about 300 persons, and indirectly maintain a much larger number. At the time of our visit the great rush of the spring trade was nearly over, and the factory was having a "breathing spell," so to speak, before commencing for the summer. The packing-rooms resounded with the bustle and hurry of the workers therein, engaged in shipping the goods; and the motions of those individuals were characterized by a spirit of energy refreshing to witness. It is with reluctance that we close our article without adverting to other interesting details; but our readers must forego further progress over the Scoville Manufacturing Company's premises, and wait patiently until the appearance of our next article of this series, in which we shall conduct them through the large establishment occupied by Benedict, Burnham & Co. All of the work which we have described in this account was excellently made, and needs no praise at our hands; the company have been in active operation for a period extending over fifty years, and during that time it is quite possible that the reader himself may have worn out some of the hinges, or lost some of the buttons made by the busy wheels, the quick working presses, and the skill of the workmen employed by the Scoville Manufacturing Company, whose warerooms, at 37 Park Row, this city, are full of the products of their labor.

VALUABLE RECEIPTS.

Black on Gun-barrels.—The following mode of producing a black coating on gun-barrels is taken from Mr. Wells's "Annual of Scientific Discovery" for the present year:—First, take chloride of mercury and sal-ammoniac; second, perchloride of iron, sulphate of copper, nitric acid, alcohol and water; third, perchloride and proto-chloride of iron, alcohol and water; fourth, weak solution of the sulphide of potassium. These solutions are successively applied, each becoming dry before the other is used. No. 3 is applied twice, and a bath of boiling water follows Nos. 3 and 4. The shade of color is fixed by active friction with a pad of woolen cloth and a little oil. The shade thus obtained is a beautiful black of uniform appearance. This process is used in the manufacture of arms at St. Etienne, France. We regret that the proportions of the different ingredients are not given. Several of our gunsmiths have made many inquiries as to the mode of producing the blue-black coating on the Whitworth and other English rifles. Perhaps the above solution will effect the object. The alcohol is used to make the application dry quickly. The perchloride of iron and the sulphate of copper in No. 2 should be used only in a moderately strong solution, and only about 10 per cent of nitric acid added to the water. We hope that our gunsmiths will meet with success in using these solutions. No. 2 applied in three or four coats, will form the common brown coating for gun-barrels. After the last application has become dry it is rubbed with a wire scratch brush, washed with warm water, then dried, and afterwards rubbed down with a composition of bees-wax dissolved in turpentine.

Dyeing Gloves.—Messrs. Editors:—If you have lady readers, and I assume so, they must have occasion for a lively and beautiful drab color upon white or light-colored fabrics of cotton, silk, linen or wool, such as gloves, stockings, &c. They can produce a dye, which is quite permanent in its character, in five minutes, as follows:—To a pint of rain water add six or eight grains of nitrate of silver; when it is dissolved stir it well and immerse the perfectly clean fabric. See that it is well and evenly saturated, for which use a stick, not a spoon nor the hands. When thoroughly soaked it may be quickly wrung out with the hands, they being instantly washed. In a pint of water dissolve one quarter of an ounce of sulphuret of potassium, place the goods in it and saturate well, then wash in clear water and it is finished. It is better that the first-named solution should be hot, and a little time taken for wool. Glass vessels must be used.—R. H. A., Baltimore, May 11, 1863.

A Few Hints on Dyeing.

To those who wish to have certain fabrics dyed, the following information will be found useful, as regards the colors they will take. Thus, if the material be *black* it can only be dyed black, brown, d. green, d. crimson, d. claret, and d. olive. (*d.* stands for "dark" in all cases.) *Brown* can only be dyed black, d. brown, d. claret. *Dark green:* black, d. brown, d. green, d. claret, d. olive. *Light green:* d. green, black, d. brown, d. crimson, d. claret, d. olive. *Dark crimson:* black, brown, d. crimson, d. claret. *Light crimson* will take the same as dark crimson. *Claret:* black, brown, d. crimson, d. claret. *Fawn* will take d. crimson, d. green, black, brown, d. claret. *Puce:* black, brown, d. olive, d. crimson, d. claret. *Dark blue:* black, brown, d. crimson, d. green, d. claret, d. olive, d. blue. *Pale blue:* d. crimson, d. green, black, brown, claret, puce, d. blue, d. olive, lavender, orange, yellow. *Olive* will dye brown, black, d. green, d. crimson, d. claret. *Lavender:* black, brown, d. crimson, claret, lavender, olive. *Pink:* d. crimson, d. green, black, brown (as all tints will take a black and brown, these colors will not be repeated), pink, olive, d. blue, d. puce, d. fawn. *Rose,* same as *pink,* but also orange, scarlet and giraffe. *Straw, primrose* and *yellow* will dye almost any color required; as also will *peach* and *giraffe. Grey* will only dye, beside brown and black, d. green, d. claret, d. crimson, d. fawn, d. blue. White silk, cotton and woolen goods can be dyed any color. As cotton, silk and wool all take dye differently, it is almost impossible to re-dye a fabric of mixed stuff any color except the dark ones named. It will be observed by the above list that pale blue will re-dye better than any other color.—*Septimus Piesse, F.C.S.*

What Inventions have done.

The New York *Tribune*, in presenting from *Hunt's Magazine* a series of tables showing the increase of property in this country from 1800 to 1863, says:—"There has been an accumulation of very nearly $16,000,000,000, with an increase of income from $86,000,000 to nearly $2,000,000,000. In fact, it appears that three-fourths of this accumulation and increase of income have been made during the last 20 years. It is evident, therefore, that the power of production has received an immense impulse in the present century, in great part owing to the application of steam to transportation (which has virtually multiplied capital by causing its more rapid conversion), and the invention of labor-saving machines, with which, as the cotton-gin for instance, one hand can now do the same work that required four hundred hands formerly."

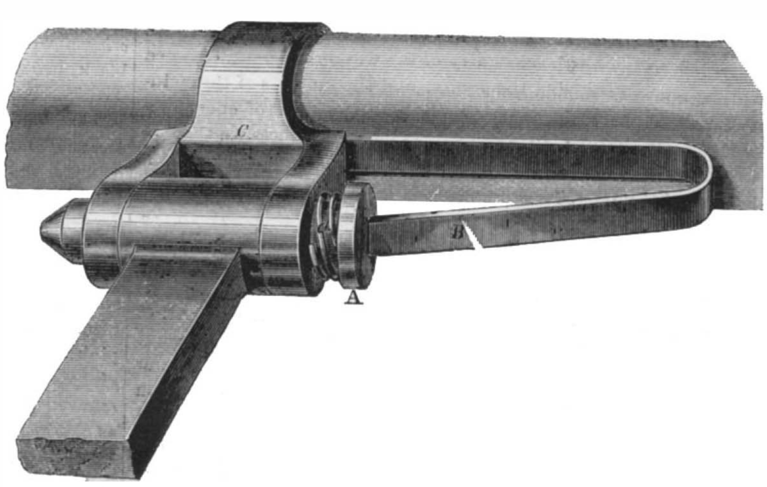
Burning and Exploding of Gases.—Sir H. Davy, in his important and interesting experiments, found that light carbureted hydrogen, the most powerful explosive of the gases, required about seven times its bulk of atmospheric air to be mixed with it to produce the greatest explosive effect; practically, it may be calculated that from eight to nine times its bulk of air will produce the most explosive mixture of coal-gas; but, the air and gas must be mixed previously to inflammation. No matter how rapidly the air may be supplied when the gas is burning, it will merely increase the fierceness of the combustion; there will be no explosion. To form an explosive mixture, the gas must be present in quantity varying from about 7 to 25 per cent of volume; if it fall short of, or exceed, that proportion, it will burn away quietly and not explode.

Anti-incrustation Composition.

The incrustation of boilers is a matter just now engaging much attention, and the usual result shows itself in a multiplication of special patents. Mr. Alexander Delrue, of Dunkirk, France, has taken out a patent for compositions to prevent and remove incrustations. The compositions are composed entirely of vegetable matters, and are prepared by dissolving or infusing in hot water the bark of the oak and pine, as well as the leaves of the sumach tree, ground and reduced to the state of a coarse powder ; this decoction is concentrated to a density of about 10° Beaume, and to it is added a quantity (say from 15 to 30 per cent.) of cream of tartar (bitartrate of potassa) and spirit of turpentine. In employing this liquid to prevent incrustation, a quantity of it is introduced from time to time into the steam boilers. The quantity of the liquid required varies according to the capacity of the boiler, three pints of the liquid being generally sufficient for every thousand pints of water in the boiler, to prevent incrustation forming for about ten days.

Improved Carriage Shaft Fastening.

The annexed engraving is a representation of an improved method for connecting shafts of carriages to the axletree. It dispenses with the nut and screw, usually employed for that purpose, and provides for the speedy detachment of the shafts from any vehicle to which they may be affixed. The invention consists of the bolt, A, and the spring, B, secured firmly to the jaw, C. The end of this spring bears against the bolt, and keeps it in its place. There is also a small spiral spring, *a*, inserted between the head of the bolt and the jaw, which prevents that rattling of the parts so annoying to nervous persons and also to the horse. The bolt is removed by simply depressing the spring, B ; it can then be withdrawn and the shaft or tongue of the carriage removed. The apparatus is at once simple and efficient. This invention was patented November 11, 1862, by Nathaniel Richardson, Byberry, XXIII. Ward, in the city of Philadelphia. Further information may be had by addressing Samuel Comly, at the same place, or Geo. De B. Keim, 162 North Third street, Philadelphia.



RICHARDSON'S PATENT SHAFT COUPLING.

HISTORY OF ANILINE COLORS.

The beautiful red, violet, lilac and other aniline colors which are now so common on silk and fine woolen fabrics are of but recent origin, and may be ranked among the highest achievements of organic chemistry. A peculiar scientific value is attached to them, on account of their strictly artificial character, they being manufactured chiefly from the products of coal tar. A very interesting little treatise has just been produced by Dr. F. R. Hoffman, 47 Fulton street, this city, on the origin and nature of aniline colors, forming a succinct history of their discovery and manufacture. Although we have already presented much information in the Scientific American respecting those beautiful colors, the following, which is condensed from Dr. Hoffman's treatise, will still be found instructive to our readers who are engaged in chemical pursuits :—

Until 1826 all the organic bases which had been discovered existed in nature, principally in parts of vegetables ready formed, and were not volatile, excepting when they were decomposed. In that year, however, Otto Unverdorben, of Berlin, Prussia, discovered a volatile liquid in the dry distillation of indigo, and this was the first artificial organic base. It was called "krystalline," from its property of forming salts readily with acids. This liquid artificial organic base was the very substance which was destined, thirty years after its discovery, to serve as the material for preparing aniline colors, and to become of such high importance in industrial chemistry. From 1830 to 1836 F. Runge, of Oranienburg, near Berlin, Prussia, was occupied in an investigation of the component parts of coal-gas tar, and he published the results of his researches in 1837. Among the constituents of tar he eliminated an oleaginous volatile base, which he called "kyanol," on account of its property of forming various colors, from red to a deep blue. In 1839, J. Fritzsche, of St. Petersburgh, Russia, discovered anthrallic acid, a product of the action of caustic potassa lye on indigo. By decomposing it at a high temperature, the product he obtained was carbonic acid and a colorless basic oil, which latter formed crystallizable salts with the acids, and which he termed "aniline," from the generic name of the species of plants furnishing indigo. The three bases thus discovered by these three chemists were held to be distinct and different until 1840, when Prof. O. L. Erdman, of Leipsic, proved them to be one and the same substance, for which he retained the name "aniline." In 1842, A. Zinin, of Dorpat, in treating nitrobenzole with an acid and alcohol, obtained a volatile base, which he called "benzidam," which was also found to be aniline. But this was an advancement in the line of manufacture, as it was made from a special derivative of coal tar. In 1845, A. W. Hoffman and J. S. Muspratt, of London, produced aniline by passing the vapor of salicylamin over red-hot quicklime ; and from this time forward the study of the secondary products of aniline was continued by several chemists, foremost among whom was Prof. A. W. Hoffman. Through his researches and published essays aniline soon became one of the most closely-examined organic bases. These studies which were undertaken and continued through many years, merely for scientific purposes, led to a more practical application in 1856, by William H. Perkins, of London. None of the mentioned methods which had been employed to obtain aniline is at present used to furnish the material for aniline colors, hence the history of the practical part of aniline, as applicable to manufactures, commenced in 1856. Aniline is ready formed in coal tar, but it is generally prepared from benzole, which exists in greater quantities in coal oil ; it is made by first converting the benzole into nitro-benzole with nitric acid, then it is reduced with the acetate of protoxide of iron, according to the mode first proposed in 1853 by A. Bechamp, of Paris.

Aniline is one of the organic derivitives of ammonia, and it may be viewed as an ammonia in which one equivalent of hydrogen is replaced by the compound radical, phenyl. It consists of 77·7 per cent. carbon, 7·5 per cent hydrogen, 14·8 per cent. nitrogen. The basic character of aniline is well developed. It combines with all acids, forming a series of salts which are the perfect analogues of the corresponding salts of ammonia. In general they are colorless, but assume colors varying from red to blue by exposure to the air. The aniline colors, red, blue and their mixtures, purple and violet, are neither salts of the alkaloid aniline, nor are they simple compounds of uniform composition. They take from aniline salts only their origin and name. Their formation has not yet been fully elucidated or brought to a scientific conclusion.

In 1856, while W. H. Perkins was treating the sulphate of aniline in Prof. Hoffman's laboratory, with the bicromate of potash, he obtained a dark resin, which was found to be soluble in alcohol and yielded a deep violet color. He prepared this resinous coloring matter, and in the same year introduced it first as a violet dye, and soon afterward as a blue dye, and he obtained the first patent in England for aniline coloring products on February 2, 1857, and one for France on April 8, 1858. Near the close of 1857, Prof. F. Crace Calvert and Charles Lowe, of Manchester, England, prepared aniline red colors for dyeing, but did not publish the process nor introduce the color for industrial purposes, because it was then too expensive. Prof. Calvert delivered a lecture on Feb. 18, 1858, before the London Society of Arts, in which he stated that he had prepared colors from the products of coal tar, that were applicable to calico printing. A complete and detailed method for the preparation of aniline red was first communicated by Prof. A. W. Hoffman, to the Royal Society, London, on June 17, 1858 ; and also in a memoir to the Academy of Sciences, in Paris. He used 3½ parts, by weight, of anhydrous aniline, and 1 part of bichloride of carbon, and submitted them for 30 hours to a heat of 338° Fah., and obtained a resinous product, which, when treated with alcohol, &c., yielded a rich crimson color. William H. Perkins was the first person who prepared and introduced aniline colors, and to him belongs the chief credit of their application to the industrial arts. The honor of the discovery of aniline red colors, however, belongs justly to Prof. Hoffman, who first published the method of preparing them ; and it was his method that was first employed in France by A. Verguin, of Lyons, in 1859. Messrs. Renard Freres, of France, took out a patent for the manufacture of aniline colors in April, 1859 ; they having engaged A. Verguin as their chemist, and they have been extensive manufacturers of such products ever since. Dr. Hoffman asserts that they cannot be considered as having any part in the discovery or improvements of such colors.

Most of the aniline red is at present prepared in England, France and Germany with arsenious acid. The use of this substance was introduced and patented by R. Heilman, December 10, 1859.

A definite method of preparing aniline blue was first made public by Horace Köchlin, of Glasgow, in 1860. It was obtained by the action of bichromate of potassa in a mixture of aniline and hydrochloric acid. In 1861 the aniline color called *Bleu de Paris* was made by Persoz de Luynes and Salvetat, of Paris. It is formed by the action of bichloride of tin on aniline, at the boiling point of the latter, in a hermetically-sealed tube. Since that period quite a number of patents have been taken out in France and England for the manufacture of aniline blue.

The favor with which aniline colors were received upon their first introduction in 1856, led scientific and practical chemists to pursue their study with a zeal that has no parallel in the history of chemical industry, and at the present moment chemists are still busily engaged upon their investigation, because there is yet much that is obscure connected with the action of the substances that are employed to vary their shades. These colors will undoubtedly retain a permanent place in the manufacturing arts, and it appears to us that they can be manufactured here as well as in Europe, from whence we have hitherto imported all that has been used by our dyers and printers. Their chief source is the product of distilled bituminous coal, and this can be obtained in unlimited quantities from our Western coal fields.

The Providence (R. I.) Tool Company have a contract for 50,000 rifled muskets of the Springfield pattern, and 7,000 have already been delivered. All the parts—locks, stocks, barrels and bayonets—are produced by the above-named company, who employ 650 men in the manufacture of muskets.

It is claimed by agriculturists that Minnesota is a great State for the culture of flax, and as linen can be substituted for cotton almost wholly, the dominion of King Cotton might be disturbed by its cultivation.