two ends of the shaft play freely on its journals in the ends of the bearings, G, that are secured to the chamber by screws or bolts. The valve, shaft and balance-plate may be cast in one piece. India-rubber is nicely fitted around the edges of the valve and bottom of the chamber at the points of contact, so as to make it absolutely air-tight. If we suppose the weight of the stones on the balance-plate in the box to be 150 pounds, causing the arm of the lever supporting it to gravitate downwards, the waste water when it reaches the water-mark equals the weight of 150 pounds; thus is produced an equipoise or balance of both arms of the lever. When the water rushing in the chamber ascends above the water-mark, the equilibrium is destroyed and the valve opens and discharges about two-thirds of the water, such discharge causing the stone or balance-plate end of the lever to become, in turn, the heavier and to press downward and the valve end of the lever to close, thus trapping a portion of the water. The water so trapped acts as a lute or seal and prevents foul air, sewer gases, &c., from ascending. During heavy rains or showers the valve opens or closes with more or less rapidity, according to the supply, always discharging and trapping the same proportions of water. Should, however, the supply cease and hot weather ensue, dispelling by evaporation the whole or portion of the trapped water, still the valve fitting the chamber air-tight as well as water-tight, effectually precludes the ascension of the gases, &c. The discharged water passes into the culvert, H, and thence through the duct or pipe, I, into the public sewer, J.

A patent has been ordered to issue for this invention through the Scientific American Patent Agency, and it is claimed that it will effect the following objects:—It will prevent the escape of the poisonous sewer gases into the streets through the receiving-basins and culverts and into houses when attached to private drains, sewers and sinks; it also prevents sewer rats from coming up into the streets and houses. When it is attached to the side of a basin (as in Fig. 1) it prevents the filling-up of a basin with large sticks and stones, and that it provides against the overflow at the street corners (so often seen in cities), occasioned by the sediment collecting in, and stopping up, the basin. In low situations near the rivers, when at times the flood tide rises high, it frequently causes the accumulations in the sewers to be forced up into the streets by the back water; this trap renders it an impossibility. Another of its advantages is its non-liability of becoming stopped-up. Should it by any chance become so, a man upon the side-walk, with a long pole thrust through the man-hole, can set it agoing in a few seconds, instead of cleaning it out by the cart-load as is now done in the old ones. The saving effected in the cleaning-out of the basins will amount to thousands of dollars annually. For further information address T. B. Voorhees, 60 Wall street, New York. Models of this invention can be seen by applying to C. W. Baker, 29 Beekman street, New York.

Glycerine in Surgery.

In a communication in the London *Lancet*, by Dr. E. J. Tilt, it is stated that glycerine is now very extensively used in the Paris hospitals—the annual consumption being 3,000 pounds. It is used for skin diseases and for foul wounds. It possesses antiseptic properties and is used pure in lotions and also in ointments mixed with starch. A good ointment is made by boiling 80 grains of starch in 1 fluid ounce of glycerine. This ointment never becomes rancid; it is inodorous and does not change. Corn starch has been found best suited for the purpose. A stiff plaster can also be made with 150 grains of starch boiled in 1 ounce of glycerine. A sedative plaster is made with sulphate of atrophia, 3 grains; veratria, 3 grains; sulphate of morphia, 8 grains; otto of roses, 1 drop; hard glycerine ointment, 1 ounce.

A Milwaukee (Wis.) paper states that the wheat trade of that city, as reported by the Chamber of Commerce, is greater than that of Chicago. The total wheat trade of Milwaukee for 1862 was no less than 17,834,926 bushels. This amount would make it the greatest primary wheat market in the world. Wisconsin wheat is of a very excellent quality.

The Cost of Horses employed upon City Railroads.

The *Ledger* publishes (from the auditor's report of the city of Philadelphia) the following information relative to the cost of horses on the railroads of that city. There are 18 passenger railroads, employing 2,300 horses; the feed, shoeing and harness of these animals cost per annum, the sum of $182,181. In addition to this expense, the cost for stables, &c., amounts to a sum total of $232,204, not including expense for wages for hostlers, and the loss upon the animals that die during the year. Taking this great expense into consideration the *Ledger* advocates the adoption of steam engines for city railroads. It says:—"By the use of dummy engines the railroad companies get rid of the expense of keeping large stables, of the attendance and the expense of keeping from 100 to 300 horses each, the cost of which would double the figures above given. Each car having the motive within itself can be driven, we are told, with a consumption of a couple of bushels of coal per day; giving the liberal allowance of four bushels, and we have a consumption of coal of but a tun a week for each car, or fifty-two tuns a year, which at a cost of $6 per tun, would be $312, annual cost. There are 470 cars in use on all the roads, which, at the above cost to run with steam, would make a total of $136 640 for keeping eighteen roads in working operation, against $232 204, the annual expense of merely feeding, shoeing and harnessing, &c, the horses on the lines of but ten of the railroad companies. Adding the other incidental expenses, it gives a sum probably double the amount. These figures show what would be saved to the public by the use of dummy engines, and how much capital is actually thrown away in using a power more expensive and not nearly so safe and reliable."

The Snows and Seas of Mars.

Mars has lately presented a favorable opportunity for the examination of its surface. The constitution of this planet more nearly approaches that of the earth than any other in the system. Snow can be detected at both poles, the white circle increasing in winter and decreasing in summer. It has been found that the center of this region of snow does not coincide exactly with the poles of the planet. And in this respect it is like the earth, whose greatest cold is not exactly at the pole. A greenish belt with deep bays and inlets near the equator, which is suspected to be a sea, has recently been detected. The termination of the snowy region is very sharp and abrupt, giving the idea of a lofty cliff. A reddish island in the above sea has also been detected. The probability of Mars being inhabited is greater than that of any other planet. Its density is very nearly that of the earth. The heat and light of the sun would only be half of that enjoyed on our globe; but then this may be compensated by an atmosphere which may form a warmer wrapping than ours and by a more sensitive eye. A great part of the surface of the globe is covered with snow for half of the year; the people in Mars would not be worse off than we are in Canada, and life is tolerable here. People emigrating from this planet to Mars would find that they were only half as heavy as they are here, which some would not regard as a disadvantage.—*Leitch.*

Manufacture of a Great Iron Plate.

The London *Times* contains a description of a visit paid by the Lords of the Admiralty to Messrs. Brown's works at Sheffield, England, where the rolled plates for the armor-clad frigates are manufactured. The rollers for making the plates are 32 inches in diameter, 8 feet in width, and are driven by an engine of 400 horse-power. One plate, manufactured on the occasion, was 19 feet long, 4 feet wide, 12 inches in thickness, and weighed 20 tuns—the largest ever fabricated. Several other plates of lesser size were made; one was 17 feet long, 4 feet broad, and 5½ inches in thickness. Bessemer steel was also manufactured in the presence of those naval dignitaries. In twenty minutes from the time of putting the charge of cast iron into the furnace, it was poured out into the mold as tough steel, and formed an ingot weighing three tuns. The manufacture of steel from cast-iron, by what is called "the Bessemer process," is now practiced very generally in all the large European iron-works; that kind of steel is beginning to be used extensively in making rails.

THE WHITWORTH PROJECTILE.

We frequently have occasion to refer to the adoption in foreign countries of American inventions, either in principle or in detail. The Whitworth projectile, now so famous, which, it is said, inflicted the principal damage to our *Monitors* and iron clads in the late attack on Charleston, if not exactly a case in point, illustrates the often-noted fact, that inventors, though widely separated, often catch the same inspiration.

On page 165, current volume of the Scientific American, will be found an illustration and description of this projectile. It will be remembered that it is hexagonal in its section and mechanically fitted to the bore of the gun, which is also hexagonal in its section. The angles or corners made by the junction of the sides of the hexagons, are the equivalent of spiral grooves in the gun, and of projections or flanges on the projectiles themselves, which give the rotary motion to the latter. This plan differs radically from those of Armstrong (which seems to have been abandoned) and others, which depend upon forcing or expanding soft metal into the grooves to give the desired rotation. Capt. Dalghren, in his late report to the Secretary of the Navy, says that no little trouble has been experienced in the stripping of soft metal. Whitworth apprehended this difficulty, and has obviated it by his plan; but whether the future will develop difficulties attending it equally as objectionable as that mentioned by Capt. Dalghren remains to be seen.

By reference to the Scientific American of July 6, 1861, page 5, there will be found an illustration and description of a projectile, the invention of Mr. Sigourney, of Watertown, N. Y., and it will be observed that the leading features of it are precisely similar to that of Mr. Whitworth's, although it is evident that Sigourney's plan, of both gun and projectile, is much the simpler and cheapest. Both depend upon fixed projections, or their equivalents, to give rotation to the projectile (the first requisite); both are mechanically fitted to the bore and grooves, requiring special machinery for the purpose, and neither of these inventors employ soft metal to secure the rotation of the shot.

We do not propose to discuss the merits of the two inventions, as compared with each other, with all the various constructions and exterior configurations of which both are capable, or as compared with others constructed upon entirely different principles. We will, however, venture an opinion upon the operation of the Whitworth projectile, when fired from a muzzle-loader, with which we observe he has lately been experimenting; the practical difficulties attending the use of breech loaders having led him to this; but we do not know whether he used the same projectiles we have described, and gave them the necessary windage, or what results he obtained. Now, the Whitworth projectiles, for breech-loaders, may fit the bore very closely, but for muzzle-loaders a certain amount of windage must be allowed. This being nearly one-sixteenth of an inch, the axis of the projectile and bore will, of course, be eccentric to each other. When the projectile passes out of the gun, the angles of the projectile, only, that are in contact with the angles of the bore, will have a bearing and receive the impulse of rotation. It would seem, therefore, that the result would be a one-sided impulsion, alike destructive of the proper rotation, regularity and accuracy of flight.

The chief value of rifled guns lies in their ability to project an elongated missile with great force and accuracy to a long distance; and, if our criticisms have any weight, the Whitworth gun is equalled, if not excelled, by many guns of home production that depart widely from the features observed by Mr. Whitworth.

The shell that destroyed the *Queen of the West* was fired from the distance of a mile and a quarter. It was one of those lucky hits which sometimes happen in war, and which show how destructive a thing firing could be made if it was well made.

The head gunner on the pirate *Alabama* is one of the most accomplished artillerists that was ever in the British navy. He was paid off and got his discharge a few weeks before the *Alabama* sailed.

The Earth-worm.

The earth-worm lives a very solitary life below ground, driving its little tunnels in all directions, and never seeing its friends except at night, when it comes cautiously to the surface and searches for company. In the evening, if the observer be furnished with a "bull's-eye" lantern, and will examine the ground with a very gentle and cautious step, he will be sure to find many worms stretching themselves out of their holes, retaining for the most part their hold of the place of repose by a ring or two left in the hole, and elongating themselves to an almost incredible extent. If, while thus employed, an earth-worm be alarmed or touched, it springs back into its hole, as if it bad been a string of india-rubber that had been stretched and was suddenly released. The worms have a curious habit of searching for various leaves and dragging them into their holes, the point downwards, and are always careful to select those particular leaves which they best like. As a general rule, they dislike evergreens; and the leaf which I have found to be most in favor is that of the primrose. I have often watched the worms engaged in this curious pursuit; and in the dusk of the evening it has a very strange effect to see a leaf moving over the ground as if by magic, the dull reddish brown of the worm being quite invisible in the imperfect light. The food of the earth-worm is wholly of a vegetable nature, and consists of the roots of various plants, of leaves, and decayed vegetable substances. Many persons cherish a rooted fear of the earth-worm, fancying that it lives in church-yards and feeds upon the dead. These fears are but idle prejudice, for the worm cares no more for the coffined dead than does the tiger for the full manger, or the fox for the bleeding gazelle. The corpse, when once laid in the ground, sinks into its dust by natural corruption, untouched by the imagined devourer. The so-called worms that feed upon decaying animal substances are the larvæ of various flies and beetles, which are hatched from eggs laid by the parent; so that if the maternal insect be excluded, there cannot be any possibility of the larvæ. Moreover, neither the fly nor the beetle could live at the depth in which a coffin is deposited in the earth; and if perchance one or two should happen to fall into the grave, they would be dead in half an hour, from the deprivation of air and the weight of the superincumbent soil. Let, therefore, the poor earth-worm be freed from causeless reproach; and though its form be not attractive, nor its touch agreeable, let it, at all events, be divested of the terrors with which it has hitherto been clothed.—*Routledge's Illustrated Natural History.*

Curious and Costly Books.

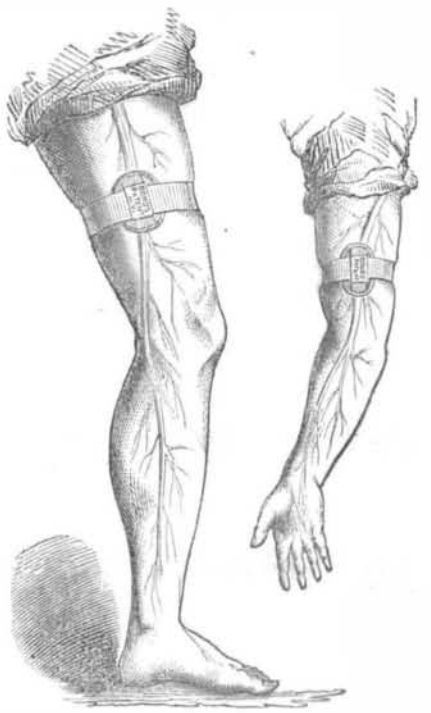
In the year 1572, a splendid production—the "Spanish Polyglot,"—was published, printed by Christopher Plantin. A most magnificent copy upon vellum, in the original binding, was sold in London, some twenty-five years since, for 1,000 guineas, and enormous as was this price, the copy was actually wanting three out of the ten volumes—those being in the Bibliotheque Royale. One of the scarcest books in the language—for there are, according to Dibdin, but two known copies extant—is a little black-letter tome of 1586, entitled "A Discourse of Englishe Poetrie," &c., one of which was sold in the Duke of Roxburgh's collection for £64. We might amuse the reader by citing a few of the quaint and alliterative titles of some of the books of those times. Take the following for instance:—"A Footpath to Felicitie," "Guide to Godliness," "Swarme of Bees," "Plante of Pleasure and Grove of Graces." (1586.) These were most rife in the days of Cromwell. There were many bordering closely on the ludicrous, such as the one styled, "A Pair of Bellows to blow off the Dust cast upon John Fry;" and a Quaker whose outward man the powers thought proper to imprison, published "A Sigh of Sorrow for the Sinners of Zion, breathed out of a Hole in the Wall of an Earthen Vessel, known among Men by the name of Samuel Fish." We might multiply the numbers *ad libitum;* but must content ourselves with adding one or two more. "A Reaping Hook well-tempered for the stubborn Ears of the Coming Crop, or Biscuits baked in the Oven of Charity, carefully conserved for the Chickens of the Church, the Sparrows of the Spirit and the Sweet Swallows of Salvation." To another we have the following copious description:—"Seven Sobs of a Sorrowful Soul for Sin or the Seven Penitential Psalms of the Princely Prophet David, whereunto are also annexed William Humuis's Handful of Honeysuckles, and divers Godly and Pithy Ditties, now newly augmented."

The "Mazarin Bible," so called on account of its having been found in Cardinal Mazarin's library, is considered to be the very first book printed with metal types. The first Bible, of 1462, is an edition which exhibits a matchless effort in the art of printing.

A few years ago a typographical wonder was exhibited in London, being a sumptuous edition of the New Testament, printed in gold on porcelain paper of most immaculate beauty, and, for the first time, on both sides. Only one hundred copies were taken off.

BOND'S IMPROVED TOURNIQUET.

Very many accidents occur from hemorrhage where surgeons are not within call, and in such cases where the bleeding is violent and dangerous, some provision must be made to check it or the sufferer will die from what appears, and really is, in the absence of



medical aid, an insignificant matter. Especially at the present time, while the war is raging, are such incidents common, and it is gratifying to know that at a small expenditure all such catastrophes can be avoided. Our engraving is a representation of an improved tourniquet which, by compressing the vein through which the blood flows, at once stops the issue. It is merely a leather pad provided with an elastic strap which is slipped over the wounded limb and, in connection with the pad, thoroughly accomplishes the end in view. The engraving very fully explains itself and renders further comment unnecessary. The main points about it are that it is so extremely light and portable that it can be carried in the vest pocket, that it is so simple in its construction that it can be afforded at a low price, and lastly and most important of all, that it arrests the flow of blood and prevents that loss of life which would otherwise ensue. A number of eminent surgeons in this city have given this tourniquet their unqualified approval. No soldier should be without one, and friends could not do their absent ones a better service than by sending one of these appliances. Application for a patent is now pending. Further information can be obtained by addressing the inventor, F. W. Bond, 39 Nassau street, New York.

California Flax.—The editor of the Los Angelos *News* has been furnished by Dr. Osborn, of that place, with a parcel of native flax, which grows wild and is said to be abundant in that section. The *News* says it is from a stock which appears to be a species of nettle; in texture there appears to be no material difference between it and common flax. It is thought that this plant might be successfully cultivated. The fiber is quite as fine and strong as a cultivated article of real flax.

VALUABLE RECEIPTS.

To Remove Stains of Indelible Ink.—The nitrate of silver forms the basis of indelible ink. Linen is sometimes stained with it, and it cannot be removed by washing with soap. Such stains can be removed with a solution of the cyanide of potassium, especially if the stain is fresh, but if it is old the best way of erasing them is by the application first of the following mixture:—Spirits of wine 1 ounce, iodine 20 grains, nitric acid 20 drops, hydrochloric acid 20 drops. It is applied with a camel's hair pencil, when the dark stain will become yellow; after this apply a solution of the hyposulphite of soda, or one of the cyanide of potassium, and the stain will quickly disappear. The linen should then be washed in soft water. Stains of nitrate of silver may be removed from paper by the same method.

Care of Harness.—T. Oliver Ayres, a practical harness-maker, Kent county, Del., contributes to the *American Agriculturist* the following suggestions:—"Harness should be kept hung up on wooden pegs in a clean dry room with a plank floor, so that it may be free from dampness. When soiled, it should be washed with Castile soap suds. Harness that is in constant use needs oiling four times a year; if only occasionally brought out, as carriage harness, &c., twice a year will be sufficient, if the washing be not neglected. To oil harness, separate all the pieces, and lay them in water until thoroughly wet through. Then wash them clean and allow them to dry sufficiently. To know when they are in a good condition for oiling, bend a strap, and if the water does not ooze out it is dry enough. Train oil (whale oil) is sometimes used, but neats-foot oil is much better. Mix with it a little lamp-black, and with a brush apply it to both sides of the straps. About six hours after oiling, wash the whole with Castile soap and warm water, let them dry, rub well with a woolen cloth and buckle them together."

Whale and most vegetable oils injure leather. Neats-foot oil, with the addition of one ounce of beeswax to the pint of oil, is the best mixture that can be used for harness. Soap suds should only be used with a sponge to wipe off the dirt; the leather must not be soaked with the suds. A good method of keeping harness in good condition and appearance, is to blacken and polish it exactly like shoe leather, then apply the mixture of neats-foot oil and beeswax.

Alloys of Platinum.—Iron and platinum in equal parts form a crystalline alloy. Platinum dissolves in fused zinc, forming a bluish white hard alloy. Equal weights of nickel and platinum form a yellow alloy; and an alloy resembling gold in color is made of 9 parts of platinum; 16 of copper, and 1 of zinc. Lead, antimony, arsenic, gold and silver form alloys with platinum. When tin-foil and platinum are wrapped together and heated by the blow-pipe, they combine with incandescence, and zinc heated in platinum foil, before the blow-pipe, burns vividly with a slight explosion.

Cleaning Glass.—Mix some fine whitening in a little dilute alcohol, and smear it upon the glass with a soft rag, after which rub off with chamois leather. Looking-glasses may thus be cleaned, and fly specks, &c., removed.

Zincing Iron.—Iron to be coated with zinc is first scoured with sand in warm dilute muriatic or sulphuric acid, washed and dried. After this it is run through a bath of melted zinc, the surface of which is covered with sal-ammoniac. If the iron is covered after being scoured, with a strong solution of the common salts of tin, and dried before being dipt into the zinc, a beautiful wavy surface of zinc is obtained. Zinced iron should be nailed with zinced tacks.

To Protect Animals against Flies and Insects.—Walnut leaves, 4 ounces; lobelia leaves, 4 ounces; boiling water, 1 gallon. Let the mixture stand until cool; then express the fluid through cotton cloth, and add 4 ounces of the tincture of aloes. Apply a small quantity of this compound, daily, to the surface of the body, by means of a sponge.

Remedy for Bites and Stings.—Plantain leaves (*plantago major*), 4 ounces; lobelia leaves, 2 ounces; boiling water, 1 quart. When the mixture becomes cool, bind a quantity of the herb on the affected part, and give the animal, as a drench, four or five ounces of the remaining fluid, every four hours.