Toughened Filter Paper.

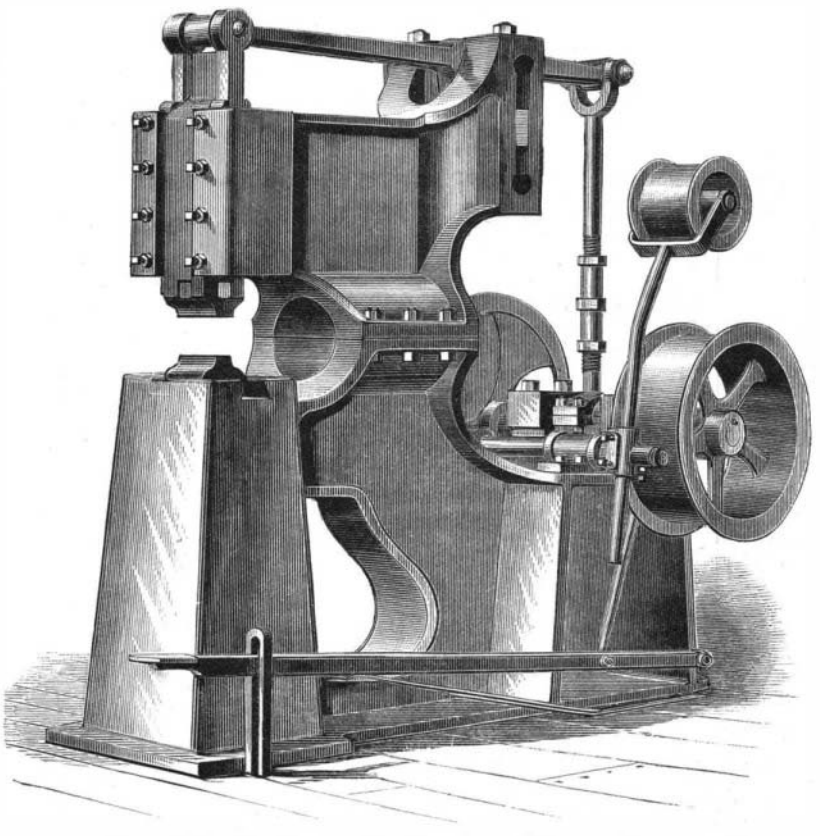
At a recent meeting of the Chemical Society a paper was read on "Toughened Filter Paper" by E. E. H. Francis. Filter paper which has been immersed in nitric acid, rel. den. 1·42, and washed with water, is remarkably toughened, the product being pervious to liquids, and quite different from parchment paper made with sulphuric acid. Such paper can be washed and rubbed without damage, like a piece of linen. The paper contracts in size under the treatment, and the ash is diminished; it undergoes a slight decrease in weight, and contains no nitrogen.

Whereas a loop formed from a strip one inch wide of ordinary Swedish paper gave way when weighted with 3 to 5 ounces, a similar loop of toughened paper bore a weight of about 3 pounds. The toughened paper can be used with the vacuum pump in ordinary funnels without extra support, and fits sufficiently close to prevent undue access of air, which is not the case with parchment paper. An admirable way of preparing filters for the pump is to dip only the apex of the folded paper into nitric acid, and then wash with water; the weak part is thus effectually toughened.

THE "VULCAN" CUSHIONED POWER HAMMER.

The hammer herewith illustrated presents several important features to commend it as one of the most useful of American machine shop appliances. The improvements it embodies are such as will be at once recognized by a hand accustomed to the use of power hammers, or who has had experience in the stamping out of work with dies, a branch of machine construction which is every day finding new channels of development. Its special adaptation for die work is a consequence of the fact that the ram moves in permanently fixed vertical slides, whereby it must necessarily descend each time in the same place, and deliver a true and square stroke. Perfect elasticity of stroke, with cushioning, are obtained by means of four rubber cushions, mounted above and below the fulcrum bearing of the helve, which is a solid steel forging, so that the latter is, in fact, mounted on elastic bearings. The effect of this arrangement is to almost double the stroke of the ram and produce a quick, sharp, and elastic blow. The ram, rebounding instantly, does not in the least chill the iron, as in the case of hammers resting on the work. The hammer, being constructed on the dead stroke principle, the helve is connected to the crank shaft by a connecting rod, the length of which may be adjusted by means of a right and left hand nut, so that the distance between the dies can be quickly increased or diminished, as desired. The force of the blow can be completely controlled by means of the treadle. The machine is built entirely of iron and steel, with the exception of the rubber cushions and the necessary brass work. This design makes it superior to any modification of the trip hammer, it being impossible, when the helve works on fixed pivots, to forge square when the work varies in size; but, as will be readily perceived, it is impossible to forge out of square with this hammer, no matter what may be the size or shape of the work, unless the dies are specially made. Expensive foundations are not needed, since the anvil is heavy enough to receive the force of the blow.

The perfect ease with which this hammer can be operated by the most ordinary workman, it simplicity of construction, and the rapidity with which a large class of work can be turned out with its help, are points which have been already well attested in a practical way in leading machine shops. It is adapted for all kinds of forging and die work, such as edge tools, agricultural implements, springs, machine forging, file makers, tool makers, etc. In the making of all these classes of goods, the exactness with which the hammer can be made to do its work, and the nicety with which its action can be controlled, are points which largely affect the amount of subsequent labor necessary in the finishing, as also the ultimate quality of the goods, and in these respects the hammer shown in the accompanying engraving has elements of superiority which practical men will unhesitatingly concede. The manufacturers of the Vulcan hammer are Messrs. W. P. Duncan & Co., of Bellefonte, Pa.

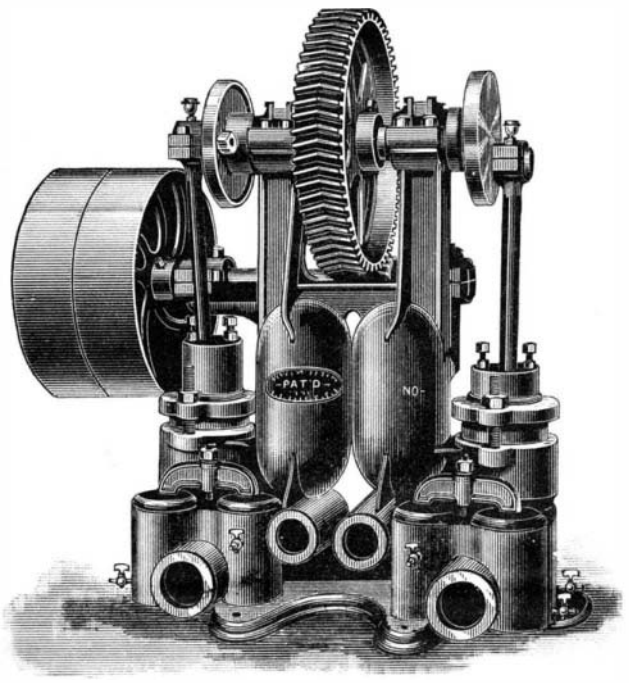


THE "VULCAN" CUSHIONED POWER HAMMER.

DR. EDWARD VANDERPOOL, of New York, recommends Fowler's solution of arsenic in neuralgia of the stomach, in six to ten drops three times per day. His experience with it appears to have been highly satisfactory in the cases reported.—*Independent Practitioner.*

DOUBLE PLUNGER GEARED PUMP.

The accompanying engraving represents a well designed and durable pump for feeding boilers or tanks, and for use in tanneries, paper mills, breweries, etc. The pulley shaft is mounted horizontally about in the center of the frame, and carries a pinion meshing with a large wheel journaled in the upper ends of the frame



DOUBLE PLUNGER GEARED PUMP.

standards. Owing to the form of teeth used, the action of these wheels is exceedingly smooth and noiseless, and the wear upon the contact surfaces is reduced to a minimum. The strength of the pinion teeth is increased by side flanges. At each end of the main shaft is a disk crank, finished on edge and face, and provided with steel crank pins made large to decrease the wear. The connecting rods are united to the crank pins by a cap and box, so that all wear can be easily taken up when necessary, and are fitted with brass oil cups. The lower ends of these rods are connected to the center of the plunger by a new device, designed by the makers of this pump, by means of which wear can be taken up by simply screwing up set bolts on the upper end of the plunger. The suction and discharge pipes, which are tapped to standard pipe threads, are clearly shown in the cut. There are similar openings for discharge pipes on the opposite side of the pump.

The air chambers are large, and are so disposed as to form part of the frame supporting the pullev and crank shafts. The valve seats—both the valves and valve seats are made of bronze metal—are screwed into the valve chamber. The removing of one nut permits both the suction and discharge chambers to be examined. The bracket supporting the pulley shaft is so formed that it can be placed at either side of the frame, as may be found most convenient in setting up the pump.

Practically, the machine consists of two separate pumps, which may be operated together or singly, and which may be used to pump different liquids at the same time. Both shafts are of steel. All the journals have oil boxes with covers to keep out dust and grit from the oil holes. The body of the pump and valve chambers have drain cocks, so that the pump can be thoroughly drained in cold weather. The pump is compactly and strongly built, occupies but a small space considering its capacity, and all its wearing parts are large and well proportioned, insuring easy running and durability. The journals are made large, and are filled with No. 1 Babbitt metal. Additional particulars can be obtained by addressing the manufacturers, the Stewart Heater Company, of 40 & 42 Clinton Street, Buffalo, N. Y.

The Phelps Induction Telegraph.

A most interesting, as well as wonderful, experiment in telegraphy was successfully tried recently by the B. & O. Telegraph Company officials. They succeeded in telegraphing on a railroad train while going at the rate of 40 miles an hour by the Phelps induction system. [This system was described in the SCIENTIFIC AMERICAN for Feb. 21 last.] The experiment was conducted by Mr. Phelps, the inventor, and under the direction of the B. &. O. officials. Messrs. Joseph G. Pangborn, the Assistant General Passenger Agent, and Mr. McLaren, the Manager of the New York city B. & O. telegraph offices, went on the car, and Mr. Weaver, the B. & O. electrician, remained at the receiving office in New York. The experiment was tried on the Harlem River branch of the New York and New Haven Railroad.

Soon after the train was started, and while going at the rate of 40 miles an hour, the operator in the car called New York. A direct wire had been furnished through to Baltimore and into President Garrett's private office in the Central Building in this city. The gentlemen in the car awaited the answer with anxiety. Soon the instrument began ticking as loudly as if in a stationary office. New York had responded. The induction system worked. Major Pangborn then indited a telegram to President Garrett, saying that the Phelps induction system was a success. The telegram went direct to Mr. Garrett, and an answer was received by the experimenters on the car: "Your telegram has been delivered to President Garrett in his private office." Major Pangborn then wrote another: "President Garrett, I am telegraphing to you, on a train going 40 miles an hour, by the Phelps induction system. The wire in our car is 7½ in. from the wire laid on the ties of the track." While the operator was sending the dispatch, Major Pangborn noticed that the train had gone its 12 miles, and that it would soon pass over the wire in the wooden trench. He said nothing, but let the operator continue. The train left the box behind. As it passed over the end there was a fainter sound of the ticking of the instrument, but the message continued. The induction was so strong that the current had gone to the wire on the telegraph pole 40 ft. from the track. It seemed marvelous to the experimenters. Sitting in a car with no wire nearer than 40 ft., and to send and receive messages! When the train returned the experiments were continued, and it was found that the inductor worked as well as on the other track. The message was sent over the wire in the wooden trench on the other track, 11 ft. away. Of course there was a difference in the sound from the one received and sent when the car was over the wire and when 11 ft. from it. On the return the telephone was connected with the induction system, and a message on a wire 60 ft. away was heard. The sender was in New York; and he was sending a message to his wife in New Rochelle: "I will not be home to-night. Business detains me in the city."

Mr. Phelps stated that a system of bells could be placed on the engines and worked by the induction system, so that trains could telegraph to each other, and a system arranged so that when trains were within 1,000 ft. of each other a bell would ring, announcing the number of the train ahead.—*Baltimore American.*

GALLIUM.—Dr. L. Ehrlich, a German chemist, has succeeded in isolating the metal gallium by an industrial process. A preliminary experiment has yielded 0·6 grain of gallium from 80 kilogrammes of zinc blende. The method followed was a modification of that introduced by M. Lecoq de Boisbaudran, which by lixiviation of the zinc sulphate resulted in a small quantity of mud containing ferric oxide and gallium. The galliferous alkaline solution was then electrolyzed in a platinum capsule, and the metal deposited in fine needles. As the melting point of gallium is low, about 30·5° C., and its luster brighter than that of mercury, it may be found of useful application by and by.

Healing by Faith.*

It is not our purpose to deny, or even question, the verity of cures "by faith." The "mind" so acts on the body, and the brain plays so important a part in the nervous system, by which the whole organism is energized and controlled both in regard to its functions and nutrition, that it is not only quite possible, but an absolute fact, that many maladies which are not so far advanced as to be dependent upon changes in structure, or "organic diseases," may be remedied by or through the agency of the mind. We will even go so far as to affirm that a very large proportion of the ailing might be, and probably would be, sound if only they were sufficiently strongly impressed to believe themselves to be so. This influence of the mind on the body has been the stronghold of quackery from the earliest times, and "faith" is as powerful an influence for good or evil now as it has ever been. Such "miracles" as the Salvationists are working with their presage among the emotional classes, whether illiterate or well informed, have uniformly signalized the commencement of a new era in religious enthusiasm. When the first enthusiasm subsides, "miracles cease" of physico-mental necessity. The large class of so-called hysterical, cataleptic, and even epileptic affections are distinctly amenable to this influence; so are those nervous disturbances and derangements which consist wholly or chiefly in disorderly activity, as distinguished from actual disease. The mimetic maladies, of which there are always a very large number of cases, are, of course, amenable to the curative influence of faith. Outside these classes, however, stand a multitude of badly managed or misunderstood cases which only need to be placed on a new footing—it matters little what—to get well. A wondrous crowd of ignorant prejudices still hovers over many districts as to the curability or hopelessness of special diseases which are better understood and more successfully treated—on common sense principles—in the centers of knowledge.

For example, we know of localities and affections which, being associated, produce the most dire delusions as to the length of time bones usually take to unite in healthy subjects; and how coughs and other distressing maladies are, or are not, under the control of the will. In such combinations of facts and fiction, it is easy to get miracles out of such common matters as the union of the accurately applied ends of a fractured radius in three or four days! There is not a word to be said against "healing by faith." Every busy practitioner has cases under his observation that he would be heartily glad to find so powerfully affected that they could be cured even by this agency. All we are anxious to point out is that an intelligent lay press ought not to lend itself to the promulgation of nonsensical beliefs and impressions. Of course, it is true that many of the poor people who are reported to be "cured" are actually benefited, and by their faith. This is a fact, and there is no sort of reason why the benefits received should not be permanent. If the subjects of these cures are thankful to the Giver of all good, that is not a matter to make merry about. It is as it should be. We are glad of their gain, and pleased to find them moved to gratitude. Meanwhile, if these "cures" need be discussed, let the comments made be neither irreverent, offensive, nor puerile. The *modus operandi* of such recoveries is perfectly well understood, and there is nothing either specially noteworthy or wonderful about them.

New Torpedo Boats.

Yarrow & Co. are building for the Austrian Government a pair of large boats of what may be called the excessive speed class. The length is 135 feet and the beam 13 feet 9 inches. These boats are expected to run 24 knots within the hour when light, and 22 knots with gear on board ready for action. The engines are of the three-cylinder or triple-expansion type. The working pressure is to be 140 pounds, and the horse power is estimated at from 1,100 to 1,200 indicated. There will be but one boiler, of the usual torpedo boat type adopted by Messrs. Yarrow, and it will be a point of great interest to marine engineers, says *Engineering*, to see how far it is practicable to get so great a power from a single locomotive type boiler.

The dimensions of the first-class torpedo boats have been increasing of late, while the second-class, or original 60 foot boats, appear likely to become extinct, their place being taken by high speed pinnaces of somewhat larger type than those hitherto carried on war vessels. The improvements in machinery, and consequent increase in speed, enable these craft to be used for torpedo warfare, while they are to be at the same time available for ordinary ships' purposes. The first-class boats, of lengths from 100 feet to 110 feet, are undoubtedly fit to go through any reasonable weather, and such craft will always prove useful; still, by lengthening the boat from 130 to 140 feet, her powers would be greatly increased, while, generally speaking, no serious disabilities would be added. Of course, there is the question of cost, but the testimony of naval officers appears to be so completely in favor of the larger boat that the additional expense would no doubt be warranted.

* From the (London) *Lancet*.

COMBINED DETACHABLE POCKET AND CAP.

An invention recently patented by Mr. Andrew Heller, of 2095 Madison Avenue, New York city, provides a pocket for coats which can be readily detached and used as a cap. To the inner surface of the coat is sewed a piece of fabric, C, having a slot coinciding with the pocket slot, D. The edges of the slot in the piece are sewed to the coat at the edges of the slot, and the upper edge of the piece is sewed to the coat, the lower edge forming the tongue, F. The buttons, H and G, are sewed to the piece as shown in Fig. 2, and the sides of the pocket, A, are provided, at their upper edges,

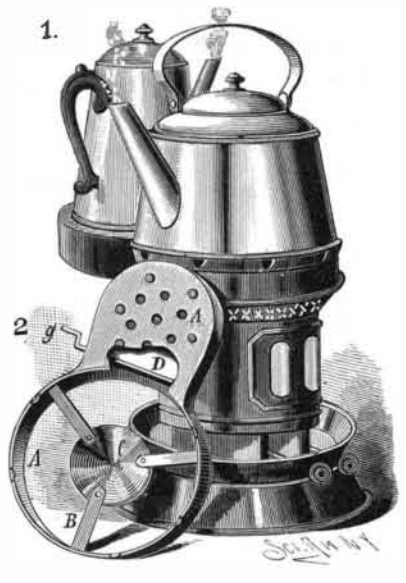
HELLER'S COMBINED DETACHABLE POCKET AND CAP.

with holes to receive the buttons. Cords are passed through the upper corners of the pocket, for the purpose of drawing the sides together when the pocket is held on the coat, or for holding the cap on the head.

As will be readily perceived, the pocket can be easily detached and then worn as a cap, the long side covering the back of the head. It can be combined with any coat, and would prove very handy for travelers, soldiers, and others.

HEAT DISTRIBUTER FOR OIL STOVES.

The invention shown in the accompanying engraving, recently patented by Mr. Benjamin Hunt, of Neosho Falls, Kansas, is designed to distribute the heat and flame of gasoline or oil stoves so that the heat will be applied equally over the bottom of the cooking vessel, thus avoiding danger of burning food from a concentration of heat at one spot. In the main part of the device are radial arms, B, whose inner ends support an inverted sheet metal cone, C. The extension is closed at the bottom by a plate, and at the top by a perforated plate formed with knobs upon its upper surface, for the purpose of slightly raising the vessel to permit the heat to pass out through the holes and come in contact with the bottom. The amount of heat admitted to the exterior can be regulated by a damper, D, pivoted in the entrance.



HUNT'S HEAT DISTRIBUTOR FOR OIL STOVES.

The device is placed upon the oil stove, so that the point of the cone will come in the center of the flame, and deflect and distribute the heat equally over the bottom of any cooking vessel which may be placed upon the upper edge of the main portion of the rim, A. The extension may be used when a slow heat is required. The utility, simplicity, and small cost of the device will recommend it to those using oil stoves.

A Dozen Hardy Shrubs.

To an inquirer in the *Rural New-Yorker* for the names of a dozen of the best ornamental flowering shrubs, Mr. C. E. Parnell, of Queens, L. I., replies as follows:

It is really a difficult affair to select a dozen only, for there are so many beautiful sorts, and all of them present so many claims to our notice, that it appears to be altogether unjust to neglect the many on account of a few. But as there are many who, like your correspondent, only desire, or have room for, a few, one cannot do less then make the attempt at a selection. First, I would choose Weigela nana variegata, one of the most beautiful shrubs in cultivation. It is of dwarf habit, with clearly defined variegated leaves of a bright golden yellow. The flowers, which are of a pale rose color, are produced in the greatest profusion early in June. Weigela rosea Desboisii is of erect, compact growth, and has deep rose-colored flowers in June. Spiræa Thunbergii is a beautiful low-growing shrub of rounded form, and has delicate green lanceolate foliage, and small white flowers, which are produced early in May in such profusion as almost to cover the entire plant. Spiræa Reevesiana is a very graceful, slightly drooping species, with white flowers; while S. callosa alba is a low-growing variety, producing its small, white flowers in large corymbs during June and July. Philadelphus coronarius is rather a long name for a very popular and well-known strong growing shrub that produces its large, pure white, sweet-scented flowers about the middle of June. Hydrangea paniculata grandiflora is so well known as to need no further description than to say that it is one of the best, if not the best, ornamental shrub we have in cultivation. Buist's Variegated Althæa is another choice variegated shrub, the leaves of which are beautifully marked with creamy white. It stands the sun well, is of free growth, and is attractive at all times. Then we must include the Golden Bell (Forsythia viridissima), which is well known as one of the earliest flowering shrubs, the bright yellow flowers appearing before the leaves. Deutzia crenata fl pl. alba produces its double white flowers in racemes four or five inches in length late in June, and is a shrub of vigorous growth; while D. gracilis is one of the most graceful of shrubs. It is of dwarf, compact habit, and the pure white flowers are most freely produced. The Persian Lilac (Syringa Persica) is a shrub of medium size, having small leaves and purple, fragrant flowers.

All of the above are perfectly hardy, and can be cultivated by any one, even by those who possess but little skill or experience, and, if properly cared for, they will prove very satisfactory. They are not rare or expensive, and nice specimens can be obtained at a very moderate price of any of our leading nurserymen.

Ginseng.

A parliamentary paper contains the account of a journey made by the Consul-General of Great Britain in Corea. Some interesting information is given with regard to the production of the famous drug ginseng, so prized as a tonic by the Chinese. It is grown from a seed which is sown in March. The seedlings are planted out in beds raised a foot above the level of the surrounding soil, bordered with upright slates, and covered in from sun and rain by sheds of reeds, well closed in except toward the north side, where they are left to open. In the first or second year the ginseng plant is only two or three inches high, and has only two leaves. It is transplanted frequently during this period. In the fourth year the stem is about six inches high, with four horizontal leaves standing out from it at right angles, and in the fifth year a strong, healthy plant has reached maturity, though it is more usual not to take it up until it has reached the sixth season. Ordinary ginseng is prepared by simply drying the root in the sun or over a charcoal fire. To make red or clarified ginseng, the root is placed in wicker baskets, which are put in a large earthenware vessel with a closely fitting cover, and pierced at the bottom with holes. It is then placed over boiling water, and steamed for about four hours.

Ginseng was for centuries regarded as a very elixir of life all over the East; and especially in China and Japan. Its properties were supposed to be miraculous, but they were generally supposed to be confined to the Corean ginseng But its enormous price put it out of the reach of the poorer classes. The wild ginseng of Corea has frequently fetched twenty times its weight in silver in China. The export from Corea is a strict monopoly, which affords a considerable revenue, and is said to be the king's personal perquisite. Death is the punishment for smuggling it out of the country. The total export is only about 27,000 pounds avoirdupois.

A Great Steamer.

The steamship Etruria, a sister ship to the Umbria, built by Messrs. John Elder & Co. for the Cunard Company, is now ready to leave the Clyde. Built of steel, her tonnage is 8,000 tons; she is 520 feet long, 57¼ feet broad, and 41 feet deep, the engines being of 12,500 indicated horse power. The Etruria is soon to leave Liverpool on her maiden transatlantic trip for New York.