

**THE LOEB PATENT RESPIRATOR.**

In modern life the occasions when places charged with irrespirable and irritating gases have to be entered are constantly on the increase. In a case of conflagration the fireman or member of a life saving corps may have to enter a room full of dense smoke for the purpose of removing therefrom some one whose life is in danger from suffocation. In chemical works an accident may fill a building with noxious irrespirable gas or fumes of chemicals, making it well nigh impossible for any one to enter. In breweries or other establishments using ammonia ice machines, a break in any of the joints may set free enough ammonia to make it utterly impossible for any one to approach the scene of the accident to shut the valve or adopt other means of preventing the escape. For such cases as these the Loeb respirator is manufactured by the Loeb Respirator Company of this city and Berlin. Our cuts show its internal construction and give a view of the apparatus in use by firemen.

The purifying apparatus is carried upon the back and consists of three approximately cylindrical vessels. The air enters at the bottom of the two outside vessels, drawn in by the lungs of the person using it. These cylinders contain layers of cotton wadding, some dry and some moistened with glycerine and intercalated between which sections of cotton are layers of bone black or animal charcoal. The central cylinder, whose top connects with the top of the side cylinders, contains glycerine arranged with a dip pipe so as to form a seal. For special cases an acid or alkaline liquid may be substituted for the glycerine. The air drawn through the wadding and the bone black is aspirated through the glycerine so as to give it a final washing and is then fit for respiration. From the purifying apparatus a hose is carried over the shoulder to the mouth. To its end a rubber mouthpiece is attached, which is held between the teeth. A pair of clamps are placed on the nose so as to close the nostrils, so that all the air is taken through the purifying apparatus and reaches the lungs by the mouth.

The mouthpiece is of T shape. The portion connecting with the purifying apparatus is closed by three little check valves opening upward, while the arm of the T projecting away from the mouth has also a check valve opening outward. When the wearer inspires, the air is drawn through the purifying apparatus; the three valves open upward and the air readily enters the lungs. When he expires, these valves close and the other valves open, letting the air from the lungs escape.

The central or glycerine department of the purifying apparatus is so constructed that by turning the apparatus over, or by otherwise roughly handling it while in transit, the liquid cannot enter the chambers filled with coal and wadding, or into the valve box attached to the hose. The flanges within the glycerine chamber are so arranged as to catch all the liquids in any contingency.

For very bad cases a smoke helmet is provided to be worn with the apparatus. This helmet is made of buckskin and is easily connected with the mouthpiece. For the eyes glass spectacles are used, each glass of which is provided with a slide, which when pulled out and pushed back draws a piece of felt across the glass so as to clean it, something which is quite necessary in some cases. For signaling a whistle is provided, which can be attached to the outlet tube of the mouthpiece, or the workman carries a balloon or pneumatic whistle which sounds by the compression of an India rubber bulb. The same company supply various other auxiliary apparatus.

The tests of efficiency of the respirator have been most exhaustive and complete. A recent test made in New York before the chief of the fire department and other officials consisted in filling a wooden house, of about fifty cubic yards capacity, with smoke produced from a fire fed with shavings, tar, sulphur, and Cayenne pepper.

The room was filled with black smoke and was absolutely untenable. The inventor himself and his assistant successfully entered it, staying in fourteen and fifteen minutes respectively. Either of them could have stayed in much longer if desired. The respirator was then taken apart and the cotton was found black-

ened by the impurities which had been extracted from the air.

Finally, Mr. Loeb entered again, when, after he had remained some eight minutes, the building, by some means or other, caught fire, and it burnt for a minute or more before the inventor left it, coming out entirely unharmed by his experiences. Similar tests have been tried, all of which have been successful. The apparatus has had extensive introduction in fire departments, chemical factories, breweries where ammonia ice plants are used, and in similar places. As a life-saving agent at fires, its use is obvious, but in chemical works, breweries and the like, it may aid in the prevention of great damage to property as well as to life and person.

Should the apparatus be used in ditches, wells, etc., filled with sewer and other gases, a hose is to be

gratis by property owners along the right of way. The company believes that in a few years the fruit, vegetable and passenger business over the route will pay for regular steel rails, when the others will be used for ties. A small steam dummy will furnish power for the Avon Park and Haines City road.

**Belated Discoveries of Gold Mines.**

The Leadville, Col., mining district has an extremely instructive history. It first became famous as a gold camp, the washings in California Gulch having been very rich. Some gold veins were also discovered, the Printer Boy mine being long pointed to as a demonstration that Leadville had gold mines, and the whole district was, of course, thoroughly prospected for gold. The subsequent discovery of silver-lead carbonates in large quantities turned all attention to silver and lead, and the camp soon became noted as a very large producer of these metals, and was the Mecca of all good prospectors. The hills and valleys in all the country surrounding Leadville were again prospected as probably no other district on the continent has been, and many mines, and some outlying mineral districts, were discovered and opened. As Leadville mines attained depth, the rich silver-bearing lead carbonates gave out and the ores became low-grade in silver and lead and commenced carrying much copper, which was very desirable, but they also began to carry zinc blende, which was the opposite. Leadville became a copper camp.

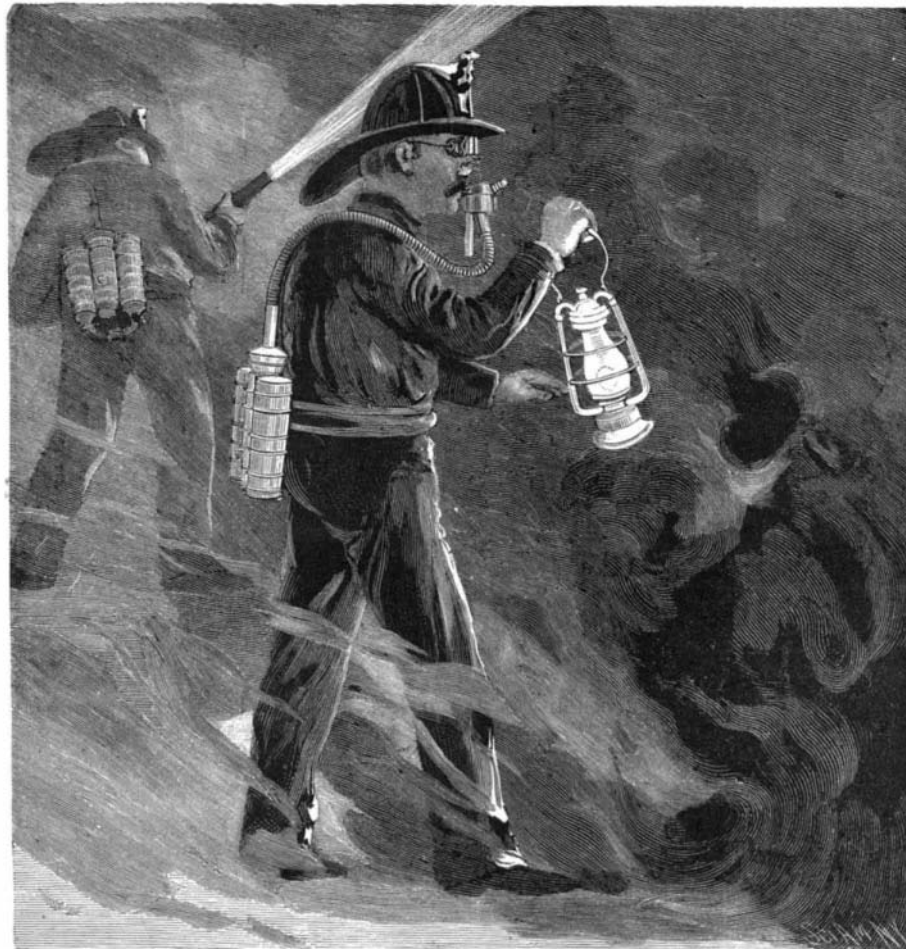
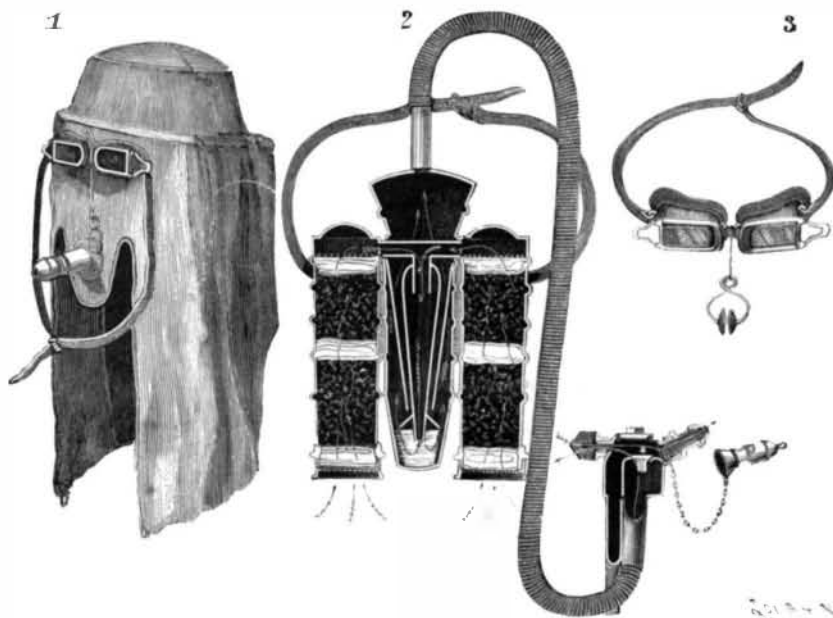
Then came the tumble in silver, which led to the closing of many of the mines. No one wanted low-grade silver mines, and the miners overran the country searching for gold. They found it in many districts, and on the thoroughly prospected hills surrounding Leadville, where thousands of prospectors in early days had searched in vain, they opened the Little Jonnie, the richest gold mine in Colorado. Discovery has since followed discovery in rapid order, and on another page of this issue a telegram from our special correspondent announces the last new discovery, \$80 (4 ounces) a ton gold ore, at a considerable depth from the surface. This, it is supposed, will lead to a new and rich gold mine.

The Cripple Creek district, which for twenty years was well known to contain some gold, and which was prospected again and again, and condemned, has in the past few years been demonstrated to be an extremely rich gold camp, probably the richest and most inviting district in the West.

The question now suggests itself, Where is this thing going to end? If the two richest gold camps in the country have been opened quite recently in ground which for twenty years has been the most thoroughly prospected area on the continent, and these enormous riches escaped detection, how many other rich silver, and especially gold, mines may yet be found in ground that has been prospected and is now condemned? Is not our method of prospecting very crude and inefficient when such belated discoveries are possible?

It must not be ignored, however, that with the progress which has been made in recent years in the metallurgy of gold and silver, many ores which were formerly worthless are now "bonanzas," nor should it be forgotten either that low-grade mines may be quite profitable enterprises and yet contribute but little to the aggregate of the world's gold production. A great many tons of ore must be treated to get a single kilogramme of gold.—Eng. and Min. Jour.

The French Geographical Society has received from General Venukoff a communication describing a submarine volcano which is under survey by the officers of the Russian dispatch vessel Lotzman. The volcano declared itself last summer, and, although under sea water level in the Caspian, projected a large quantity of mud and debris into the air. As a result of the survey, the position of the volcano has been determined as 38° 13' 30" north latitude and 52° 37' east longitude from Greenwich meridian, and above 24 miles from shore. The diameter of its crater is less than 20 feet, and at 200 fathoms from its center the depth of water is about 8 fathoms, while at a distance of one mile the sea has its normal depth.



**THE LOEB PATENT RESPIRATOR.**

connected, the hose connection being shown in our illustration.

**A Wooden Railway.**

Work is about to begin on a railroad in Florida which is a curiosity of its kind. Some time ago the citizens of Avon Park and Haines City, Fla., believed that a transportation route connecting them would be of great advantage. The country is sandy and nearly level. A company was formed, but the people lacked in capital what they made up in enterprise. It has been decided, so the Manufacturers' Record is informed, to build the road with wood rails, which are large enough to be laid so that they will be half embedded in the sand, without other ballast. They are to be held in position by wooden pins two inches in diameter and eighteen inches long, while the ends are connected by plank couplers placed underneath and held by pins. Not a pound of metal will be used in construction of the track, although the line will be forty miles long. Most of the "rails" will be furnished

**The Demand for Electrical Engineers.**

BY FREDERICK H. FORD.

In a recent issue of a technical paper, devoted to the interests of electricity, there appeared an article, copied from the New York Sun, in regard to the demand for educated engineers. The writer made the statement that, in his opinion, the field of electrical engineering offered more promise of wealth and fame than "law, the grocery business, writing, or knife grinding."

Although no editorial comment was made upon the article, its appearance in a technical paper would give added weight to the opinions of its writer in the mind of a young man making a choice of occupations.

A great mistake is being made in continually holding up the profession of the electrical engineer as one offering almost unlimited possibilities in the matter of salaries and demand for men. This mistake is most frequently made by persons who probably really know nothing whatever of the subject, and who are of the class who are continually making the statement that "electricity is in its infancy; and the laws which control its working are but little understood."

The aim of the present article is not to question the value of a technical education for the electrical engineer, but to give some facts in regard to the demand for young men with such an education.

At the present time there are probably not more than half a dozen entirely distinct companies in the country that would be able to furnish the entire electrical equipment for a plant for light or power of more than 500 horse power capacity. In these large works the design and planning of both plants and machinery is under the immediate charge of two or three electricians who have a thorough understanding of the practical requirements of their work, as well as the theories which govern it. The ideas which they furnish are carried out by the draughtsman in an almost purely automatic manner by the use of tables and slide rule. In the shop the work is carried on from working drawings, and no special knowledge of electricity is required. When the machines are tested for efficiency or other qualities, the work is done according to some scheme worked out by the chief electrician, and the results are worked out by means of formulae selected by him to fit the case in hand. In many cases the persons making the test know nothing of the reasons for what they do. In the smaller factories the apparatus is often designed by some outside engineer. It is turned out from working drawings, and no attempt is made to test the machines in any way. Often there is no one in the factory who can, with justice, lay claim to the title of electrician.

In the central station for power and light we find the same conditions. The aim of the supply companies has been to turn out machines of the utmost simplicity of design and construction. To such a degree of perfection has this been carried that all parts of a machine liable to injury or wear are made interchangeable, and it only requires a fairly good mechanic to make what repairs are needed. The work of keeping the machinery running is a matter of such simplicity that almost any mechanic is thought equal to the task after a few months' experience.

The capital invested in the electrical industries of the country is largely in the form of stock companies. The larger companies have been gradually absorbing the smaller ones, and have united among themselves. This has lessened the demand for educated electricians, the executive departments of the companies, uniting having been combined into one department. The closing of many large works owing to financial trouble or patent litigation has also thrown a large number of men having both experience and ability on the market, thus causing the supply of engineers to be in excess of the demand. The struggle for place caused by this state of affairs has forced down the wages to such an extent that the average engineer will not receive a better salary than the head bookkeeper of a large wholesale concern.

The statement that for the average young man the field of electrical engineering offers more promise of success than "law, authorship, the grocery business, or knife grinding," may be questioned.

He will be obliged to spend at least six years in preparation before he will be able to earn enough to barely pay his expenses, and during the greater part of this time he will be paying out money instead of earning it. The same time spent in preparation for either law or medicine would qualify him for beginning practice, while the time spent in business or journalism should find him in a good position. In the law or medicine he is working for himself, and he reaps the benefit of whatever success he may have. The young engineer will in most cases not have the capital needed to start in business for himself, and is forced to accept a subordinate position with some company.

Here he will get but a part of the profit coming from any success on his part, the greater share going to his employer, while he will suffer for his failures as much as if he were working for himself.

The young man choosing electrical engineering as a profession must do so with the understanding that he will have to work hard and long, and for wages which are not large in relation to the work done. For the

young man who loves engineering enough to work for engineering, and not for wealth, there is as good a field in electrical work as in any branch of engineering. The idea that there are positions with large salaries attached waiting to be filled by him is a mistake. There are but few large salaried positions at best, and they are filled by men having large experience and influence with the capitalists back of the company.

The demand in electricity at the present time is not for educated electricians, but for educated capitalists; for men who will see that it is better to hire men who know why things should be done, and who will look after economy in the output, rather than to hire cheap men and waste the salary of a good man in inefficient methods of working.

When capital has been so educated, then and not until then will the relation between work done and pay received by the engineer compare favorably with that of the lawyer, the doctor, the writer and the merchant.—The Electrical World.

**A Magnetized Governor.**

The Electrical Engineer states that an engine and dynamo, direct coupled, were started and worked in a satisfactory manner. After a time, however, complaints were received of unsatisfactory regulation. From the character of these complaints it was concluded that there might be some defect in the governor, and the maker incurred the expense of sending a complete new governor, requesting that the old one should be returned. The new governor was placed, adjusted, and the plant started, and the report came back that the regulation was perfect. In the course of a week or ten days complaints were again made of unsatisfactory regulation. It then occurred to the engine builders that possibly the governor was affected by magnetism. They conferred with the makers of the dynamo, and were told that in their judgment such could not possibly be the case. The governor wheel, it should be stated, was on the far side of the engine. It has since been ascertained that a monkey wrench is held fast to the rim of the governor wheel when the engine is under full speed; the speed of the periphery of the wheel being about 5,400 feet per minute. When the engine is in service the magnetic attraction is sufficiently strong to pull a man standing at the front or crank end with a wrench held out within two feet into the engine. Any magnetic substance, such as iron or steel, if placed on the throttle valve wheel, is held firmly. The distance between the center of the dynamo and the eccentric is about 48 inches.

**RECENTLY PATENTED INVENTIONS.****Engineering.**

**LOCOMOTIVE.**—Melbern B. Bulla, Yuma, Arizona. In this engine the connecting side bars for the main and rear drive wheels, and the counterweights of the latter, are dispensed with, so that it is not liable to roll at a high speed or move on a hard pull, and will run smoothly at any speed. It is a compound engine, and has friction wheels between adjacent drivers below their centers, the arrangement being such that when live steam is admitted to the steam chest of the high pressure cylinder the friction wheels are moved into firm frictional contact with the faces of the front and rear drive wheels, and move out of such contact when the steam is shut off from the high pressure cylinders.

**LOCOMOTIVE WATER ELEVATOR.**—George P. Glenn, Jacksonville, Fla. This invention furnishes an apparatus for utilizing steam and compressed air, together or separately, to actuate pneumatic water elevators, providing also a coupling device to connect the pneumatic pipes, the apparatus consisting of a suitable valved steam or air pipe carried by the locomotive and tender, and an air pipe carried by the movable joint of the water supply pipe, and furnished with a coupling device for automatically forming a connection with the pipe carried by the tender. Where locomotives are not provided with pneumatic air pumps, steam alone may be used for raising the water.

**ROTARY VALVE.**—Brainerd W. Smith, Delphes, Ohio. This valve mechanism comprises two segmental valve seats in the steam chest, with ports leading to the cylinder ports, the cylindrical valves turning in the seats, each having a cavity to connect the interior of the steam chest with the corresponding cylinder port and the latter with the exhaust chamber. Lugs connected by a link project from the valves, a valve stem pivotally connecting with one of the valves, and the stem having a head adapted to engage with its top surface the under face of the steam chest cover, the head also having rearward extensions traveling on a rib forming part of the bridge for the valve body. The valve is quick acting, requires but little power to operate it, and without strain on the valve gear.

**FLUE CLEANER.**—Joseph Bott, Leadville, Col. This device comprises a scraper forming a piston, and adapted to be propelled forward by steam or other fluid under pressure, a revoluble drum driven by such pressure being connected with the scraper to return it in the flue. The casing has an open end adapted for engagement with the flue, and an exhaust opening, and the piston is preferably made of two disks between which is clamped a rubber or leather disk fitting snugly in the flue and adapted to yield on rough places in the flue.

**Electrical.**

**ELECTRIC CABLEWAY.**—Richard Lamb, New York City. This inventor has devised a mechanism to convey logs from the interior of a forest, move other

heavy bodies or propel canal boats, etc. The invention consists in supporting a motor-carrying car on a cable, effecting tractional friction between the car and hauling cable, and combining with the propelling trolley a log-carrying trolley on the supporting cable and connected with the propelling trolley. The latter is provided with a counterweight or balance to maintain it in a practically vertical position, and also has a seat for the motorman.

**Railway Appliances.**

**CAR COUPLING.**—Frank R. Bischoff, New Castle, and John C. Baird, Cheyenne, Wyoming. This is a knuckle coupler so made that by the movement of a single lever the locking device will be removed from the path of the knuckle and the latter will be swung to one side. The pivoted knuckle has a rear portion extending transversely beyond one side of the drawhead, and carries a latch or lock bar, with a device for elevating the latch and engaging the projecting portion of the knuckle to move it sidewise. The coupling has but few parts, all of which may be made very strong. By beveling an outer portion of the vertical wall of the drawhead recess the knuckle may be rocked to either side, and thus provide for coupling upon curves or for ample room between cars when rounding curves.

**SWITCH AND SWITCH SHIFTER.**—Robert E. Brackelsberg and Lewis Graff, Mankato, Minn. In switches for street railways this inventor has devised an improvement of simple and durable construction whereby the switch may be automatically shifted from an approaching car. The invention consists of a frame adapted to be lowered on the car, and a shifting block sliding transversely on the frame to engage and shift the switch mechanism.

**LEVELING TRACKS.**—Hiram H. Spollenburg, Wadsworth, Ill. This is an improvement upon the surfacing board set crosswise upon the rails and supported by loose blocks, to determine the proper adjustment in raising or lowering railroad tracks, and the invention provides for the employment of a target or measuring board supported by a slotted post or standard, a rail clamp to which the post is secured, and two sight boards or blocks adapted to be set upon a rail, and one of them clamped to it.

**Mechanical.**

**CUTTING MACHINE.**—Frank J. Richards, Needles, Cal. This is a machine more especially designed for use on boilers, to conveniently cut off stay bolts at any desired distance from the plate, and the machine has a revoluble spindle with a head in which cutters slide radially, while a longitudinally sliding sleeve engages the inclined backs of the cutters to fit the latter to the work. The sliding motion of the sleeve and the feeding of the cutters are readily regulated according to the work, and the cutting tools may be easily removed and replaced.

**NAIL DRIVING IMPLEMENT.**—Leonhardt Kornert, Uffenheim, Germany. This tool comprises an essentially cylindrical tube having at one end opposing longitudinal slots into which project pivoted spring-controlled grippers, there being an exterior handle end to each gripper, while a plunger slides in the tube. The implement facilitates the driving of nails in places difficult of access, and it may be elongated by additional screwed parts for driving nails at a little distance away.

**GYRATORY ROCK CRUSHER.**—Samuel C. McLanahan, Hollidaysburg, Pa. According to this invention a vertical shaft is suspended from abearing at the top, and has below it a conical crushing hub operating in a crusher chamber, while at its lower end it is held in an eccentric bearing rotated by a beveled gear to give a gyratory motion to the lower end of the shaft and a corresponding motion of less degree to the conical hub in the crusher chamber. The invention provides improved means of suspending the haft, bracing and strengthening the crushing chamber at its upper edge, and closing the joints between the shaft and the stationary parts of the machine.

**MACHINE FOR FORMING STOVEPIPE JOINTS.**—Josiah E. Smiley, Smiley, Ohio. This machine comprises a frame with a fixed mandrel having a female die on its upper face, a vertically movable mandrel with male dies on its upper and lower faces, a bed plate having a female die on its upper face, plungers vertically movable over the mandrels having female die members, and lever mechanism for operating the plungers. The machine is especially designed to quickly and accurately form joint sections of a special character for which a patent has been applied for by the same inventor.

**SOLDERING MACHINE.**—Charles L. Olmstead, Big Timber, Montana. This is a simple machine by which solder may be economically applied to the seams of roofing tin or seams of tin employed to cover large surfaces. A suitable melting receptacle forms a portion of the machine, which is guided upon the seam, acid being applied to the seam in advance of the application of the solder, and a smoothing iron following the solder receptacle, insuring the solder being conveniently applied to and set upon the seam, the work being done very quickly and inexpensively.

**MACHINE TO HEAD AND CRIMP CANS.**—John W. Green, Portland, Oregon. This machine has a support to hold and clamp the can body temporarily in place, a revoluble carrier so holding the cover that its center will coincide with the center of rotation to turn the cover upon the open end of the can body, while a revoluble crimping disk is adapted to exteriorly press the cover flange on the can body and rotate both the body support and the cover carrier to firmly crimp the cover in place and seal the can body and its contents. The operation is continuously carried on as long as the main drivingshaft is rotated, the operator placing a filled can body on the body support and a cover in the cover feed, and the sealed can being delivered in a chute at the side of the

machine, the various mechanisms being timed to automatically carry out the entire work.

**Miscellaneous.**

**VULCANIZER.**—Edmond H. Casgrain, Quebec, Canada. This is an improvement in hand vulcanizers for vulcanizing small articles, the pot having an outer cover and a cover plate within the pot top carrying a mould-carrying yoke. A vertical stem on the cover plate is encircled by a sleeve threaded to fit in the cover, there being a guide plug at the upper end of the stem through which a screw spindle extends downward through the stem and cover plate. The vulcanizer is strongly made, the cover and mould may be very quickly adjusted and hermetically sealed, and the mould compressed to any desired extent after it has been sufficiently heated.

**DOOR CHECK.**—Patrick McMahon, Whitestone, N. Y. This is a door guard and bolt designed as a substitute for a chain bolt and to afford a greater degree of safety, the construction being such that the bolt may be readily disengaged from the guard when the door is closed, although it cannot possibly be disconnected from the guard when the two have been attached and the door is opened. The device is simple, strong and inexpensive, and in connection with it may be employed a dead latch which cannot be forced open beyond a limited distance by any one outside the door.

**INVALID BED OR COUCH.**—Richard V. Wicks, Brooklyn, N. Y. According to this improvement, one lying on the bed or couch may, with but slight exertion, elevate or depress the head section, holding it fixed at any desired point between the horizontal and vertical. The mattress automatically adjusts itself to the position of the central portion of the body, and a support is automatically provided for the legs at the thighs and knees. A cool and simple head rest or pillow is also provided which is capable of adjustment laterally and vertically.

**LAWN SPRINKLER.**—Alexander Burt, Dunedin, New Zealand. This sprinkler will give a jet of a cyclonic character, or a single fine jet, as may be desired, and it may be used in the same manner as the plain nozzle of a hose, or be employed for spraying trees or shrubs with a chemical fluid or insecticide. It may be used either single or double and the water or other fluid may be cut off in a very simple and convenient manner.

**PROPELLING GARDEN IMPLEMENTS, ETC.**—Hampden Wilson, Crockett, Texas. This inventor provides an improved harness to be comfortably worn by a male or female to facilitate the propelling of garden implements or machines, whereby all the power employed will be most advantageously applied without unduly fatiguing, but will rather be beneficial to the operator, who will be impelled to continuously keep an upright position, favorable to lung expansion. The harness is so made as to suit people of different stature, leaving the hands of the operator free to guide the machine, which