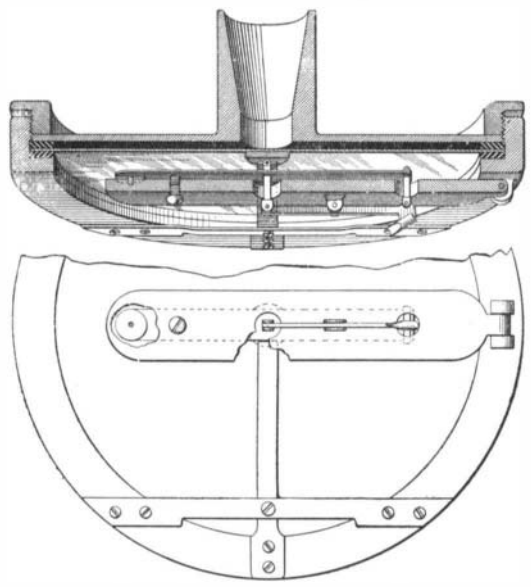
strip of the same metal or other allied material, and under the pressure of current-conveying contact-rolls, the wire is flattened and pressed into this joint. The union takes place under pressure and electric heating. It is said that the parts are so homogeneously welded together that the pipe is practically one piece.

INTERESTING NEW INVENTIONS.

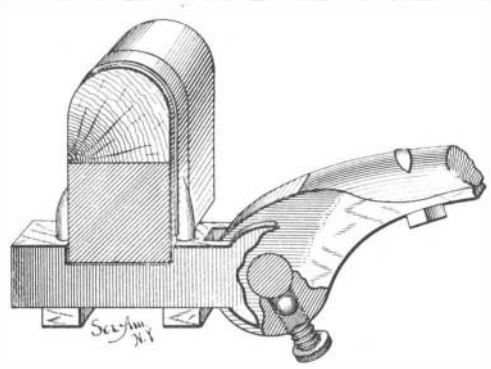
EDISON'S NEW PHONOGRAPH.—Phonograph diaphragms are usually placed under strain by the compensating weight employed to cause the stylus to press upon the wax and at the same time to accommodate any eccentricities in the blank. These strains destroy much of the sensitiveness of the diaphragm. Mr. Edison therefore employs a counteracting spring co-operating with



EDISON PHONOGRAPH-RECORDER.

the diaphragm. This spring counteracts the normal strains to which the diaphragm may be subjected, and which may be due either to the employment of the usual compensating weight or to the direct engagement of the recording device with the record. Our illustrations represent a partial sectional view through a phonograph recorder employing a compensating weight, and a bottom view of the improved recorder. The spring is connected at one end with the weight and at the other end by a link with the working end of the lever-carrying stylus.

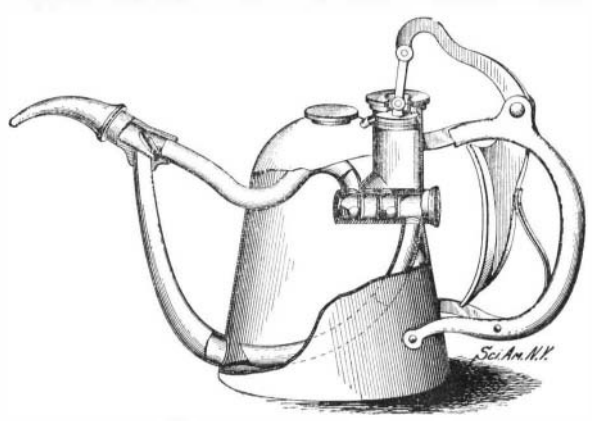
THILL-COUPLING.—A ball-bearing thill-coupling of an improved form has been patented by Seth Bartholomew, of Sturgis, Mich. The thill-iron has a threaded aperture in which a steel ball fits. A screw-threaded



BALL-BEARING THILL-IRON.

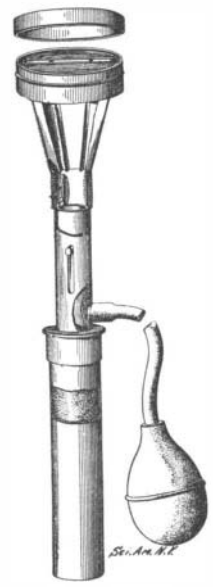
bolt has its inner end concave to fit the ball. By screwing up the bolt from time to time, the ball is pressed in, thus preventing rattling and providing a smooth, movable pressure conducive to the uniform wear of the parts in contact.

PUMP OIL-CAN.—A can from which oil can be either poured in the usual manner or driven out has been devised for the use of engineers. Time is saved and spilling and wasting of the oil is prevented. The can is provided with a pump, the piston-rod of which is pivotally connected with an operating-lever fulcrumed



COMBINED OIL-CAN AND PUMP.

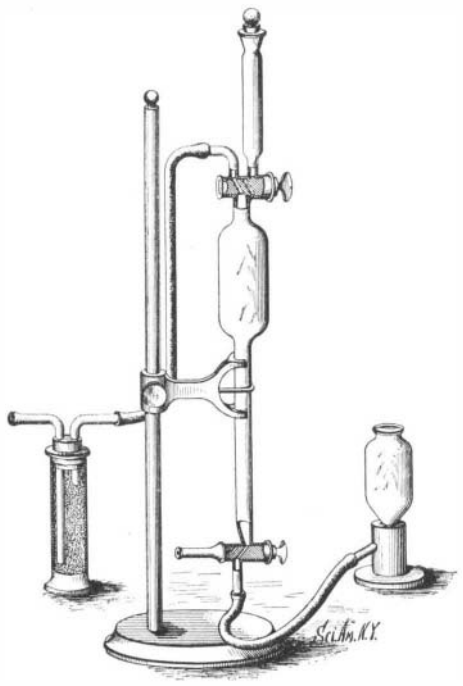
on the handle of the can. A stout spring serves to return the pump-piston automatically to its normal position after operation. The pump-cylinder is connected with a valve-casing comprising valve-chambers arranged to be closed by spring-pressed valves. A pipe leads into the oil from the one valve-chamber, and a second pipe leads to the spout. By actuating the operating-lever the pump-piston on the up-stroke will draw oil into the chamber, press back the first valve, and permit the oil to flow into the pump-cylinder. The next down-stroke of the piston will force the oil past the second valve and down through the spout. A spout-pipe of the usual pattern is also provided to permit the oil to be poured out of the can.



A NEW FLASH-LAMP.

FLASH LAMP.—In a flash-light of recent invention, the flash powder is held in a reservoir from which charges are successively drawn and blown into the lamp frame. The lamp is, furthermore, provided with separate burners that can be interchangeably connected with the reservoir to vary the width of the flame produced. The first of these ends is attained by means of a receiver into which the powder is introduced from the main reservoir by inverting the lamp. To prevent the powder from running out at the opposite end of the receiver a hinged cover is provided which can be operated by means of an arm. By employing an extension of flattened tubular form to be fitted over the outlet tube a longer flow of powder and corresponding increase in duration of the flame are obtained.

GAS-ANALYZING APPARATUS.—An exceedingly rapid, as well as a direct method of quantitatively analyzing gas is the invention of C. C. Tutweiler, of Philadelphia, Pa. His titration apparatus comprises a graduated burette



STREET GAS ANALYZER

provided with three-way valves located at the top and at the bottom. By means of the top valve the burette can be placed in communication with a tar arrester; by means of the bottom valve the burette can be placed in communication with a mercury-leveling bulb. A stoppered graduated vessel is arranged to drop iodine or other liquid into the burette. By properly manipulating the valves and the mercury bulb, it is possible to obtain in the burette a definite volume of gas measured at atmospheric pressure and under a negative pressure. Small quantities of a standard iodine solution are dropped into the burette in measured quantities. The quantities so introduced are proportional to the sulphureted hydrogen in the burette, or in other words, in a measured volume of gas which it contains.

How the Welsbach Light Was Discovered.

While engaged in the spectroscopic examination of the light emitted by incandescent erbia and other rare earths Auer von Welsbach found that a small fragment of the earths held on platinum wire did not give sufficiently bright spectra. In order to increase the available illuminating surface he adopted the plan of impregnating pieces of cotton fabric with the salts of the earth. When the cotton was subsequently burnt out the residual oxides were found to be sufficiently coherent for his purpose. Lanthanum oxide treated in this way glowed so brilliantly as to suggest the possibility of applying it to practical illuminating purposes. Thus the idea of the "incandescent mantle" originated. But a mantle of lanthanum oxide was found to disintegrate when exposed, owing to the absorption of moisture and carbon dioxide. This fact led to the use of other oxides, notably zirconia and thoria, in admixture with the lanthana for the purpose of imparting stability to the mantle. Auer thought that such oxides must be so intimately mixed as to form a "molecular mixture." Haitinger, who assisted Auer, then discovered the value of small proportions of ceria in improving the illuminating power of the mantles.

So far the development of the invention had been commercially unsuccessful; the fortunes of the companies concerned were at a very low ebb. Auer again turned his attention to the use of thoria, then a very rare and costly substance. After fifty or sixty hours the light, although originally improved, fell off until it was no better than that of mantles made without it. Then began investigation into the nature of thoria. Crystallization methods were devised whereby it could be prepared in a pure state quickly and in considerable quantities. Then the astonishing discovery was made that the purer these thoria were the lower was the illuminating power of the mantles, until finally a point was reached at which the mantles had very little illuminating power at all. A keen hunt for the light-exciting substance finally led to the discovery that ceria, which persistently clings to thoria and can be removed therefrom only with the greatest difficulty, was the true light agent. Cerium solution was now added gradually to a purified thorium solution, and at last the well-known thoria-ceria mixture, giving the brilliant results of the present day, was invented.

New Magnetic Ore-Separators.

The idea of separating iron ore from the crushed rock in which it is contained was first prominently brought to the public attention by Thomas A. Edison. Since his very elaborate experiments, other inventors have entered the field. A Philadelphia inventor, Marcus Ruthenburg, comes to the fore with a new magnetic separator for ore. In the machines hitherto constructed, much of the magnetic force is expended in bodily uplifting the particles of magnetizable material from the gangue and sustaining the weight of the particles during their progress through the machine without other support than the stress of the magnetic field. Mr. Ruthenburg has devised a magnetic separator wherein the magnetizable portion of the material treated is supported during the process of its extraction from the gangue by means independent of the magnetic field. As a result of this contrivance, an economy of magnetic force by no means inconsiderable is said to result.

Another Philadelphia inventor, Robert McKnight, has devised an improvement in magnetic separators in which the ore flows down an incline of considerable extent over a belt passing in front of a number of stationary magnets. It has been found that in such machines the particles of ore that cling to the belt and are carried upward by it, move through varying fields of force. If the belt be composed of a sheet of magnetic material, or if it contains large sections of the magnetic material, changes of polarity in this material will disturb the attraction of the magnetic particles to the belt and tend to dislodge them from it. Moreover, if the belt be metallic, the difficulty of moving it in front of the magnet is considerable. By causing the belt or apron on which the ore flows and on which the magnetic particles are collected to move together, Mr. Knight believes that he obviates these objections.

Phonographic Improvements.

Among the patents recently granted in the United States are two which relate to novel methods of producing and reproducing sound records, the inventors of which, Emile Berliner and Gianni Bettini, are both well known for their many experiments in the reproduction of sound.

Berliner's invention is concerned with a new method of producing gramophonic records. The invention consists in the method of forming a preliminary groove in a gramophone disk and then superposing the sound record upon this groove. It is claimed that any person can make a sound record by means of this grooved tablet without the use of other machinery than that which he is already supposed to possess. The ordinary gramophone is only a reproducing machine; but by means of this invention it can be converted into a recording machine.

Bettini's invention is concerned with a very ingenious method and apparatus for duplicating or multiplying master records. An ordinary microphone-transmitter provided with a stylus is designed to follow the sound-record line of the master-cylinder. This transmitter is in circuit with a source of electricity. The fluctuations of the current caused by the vibrations of the diaphragm of the transmitter are utilized to effect corresponding movements in the parts carrying the reproducing styli in contact with the cylinders upon which the record of a master-cylinder is to be duplicated. In other words, Bettini reproduces his master-record telephonically.

Brief Notes Concerning Patents.

A system of wireless telephony, invented by Nathan Stubblefield, of Murray, Ky., was given a public demonstration at that place on December 31 in the presence of a number of the learned men of that vicinity and prominent officials. The tests are reported to have been very successful. The instruments used are very similar to the ordinary telephone paraphernalia and the communication is carried on through the earth.

M. J. Dolphin, of New York city, the inventor of a number of devices for use in the Post Office Department, was in Washington recently arranging for the introduction of some new machine for canceling stamps on letters. He says the latest thing in this line is an electrically-driven and thoroughly automatic machine which handles between 40,000 and 50,000 letters an hour. The size and shape of the package are not considered at all, and one passes through the machine the same as another, which is a new feature in the operation of these machines. Another innovation is that the stamper is arranged to strike the stamp but once. In large letters heretofore there were sometimes several impressions on the envelope.

Frank Israel, of Wichita, Kan., is the inventor of a process of seed planting which he claims presents great advantages over existing methods. He has invented a machine which places seeds at regular intervals along a tape of paper. These tapes are supplied in any desired length, and by their use the seeds can be planted at the right distance so that the best results will be secured. He has also invented a machine resembling a hand drill for placing these tapes in the ground. This is an adjustable device by which the ribbon of seeds can be placed at any desired depth. The seeds and machines are about to be placed on the market.

The attention of J. Hampden Dougherty, of the Department of Gas, Electricity and Water of New York city, has been called, in a letter from Mayor Low, to a patent appliance for measuring the amount of water flowing from a hydrant. This is especially designed for the use of fire departments, and is said to be of great value to the engineers, but such gages have never been generally used in this country. This particular invention is the design of E. S. Prentice, of the London County Council, who is also a member of the Institute of Civil Engineers. The device has been in use in London for a number of years.

John E. Anger, the manager of the Electric Railway, Tramway and Carriage Works, Ltd., of Preston, Lancashire, England, was formerly a resident of Wilmington, Del., where he was employed by the Jackson & Sharpe Company. He has been in England for a number of years, and during that time he has invented several devices which are in general use on the street transportation lines of the larger cities abroad. His latest effort is a means of automatically taking up the slack which occurs in braking apparatus due to the wear on the brake shoes. This has been patented in this country as well as those of Europe. It has been in successful operation on one of the Liverpool lines for some time.

The Board of Public Improvements of the city of St. Louis recently undertook to put the stamp of their approval on some one design of street car fender to be adopted as the standard for use in that city. In a few days after the announcement the Board found itself overwhelmed with models and inventors. The deluge was so great that the Board was compelled to recall the feature of the invitation to competitors which provided that each design would be given a trial, and only those which were the most promising were put to the test. This greatly angered those who were slighted and the Board got itself heartily disliked by all the inventors of the city. The contest resolved itself down to ten designs, which are now being practically tried on the cars of the city, and the one which seems to answer the purpose best will be finally selected.

Experiments with the submerged bell as a means of signaling for marine purposes have been going on some time, and it is said that the idea has been greatly improved since the first tests several months ago. An 800-pound bell suspended from the barge "Sea Bell" was struck with a force only equal to a 1-foot fall of a 50-pound pile driver, and the vibrations made were clearly noticeable on board of the "Ivernia," which was in another part of the harbor about a mile away. The clearness of the signals was most startling, and a number of those present could hardly be convinced that the vibrations of a bell rung a mile away could pierce the thick skin of the steamer and make themselves manifest with such remarkable distinctness. The sounds were noticed by the men on other boats in the harbor who were unacquainted with the cause. This system is the joint invention of the deceased Elisha Gray and Arthur J. Mundy, of Boston, Mass. In the Scientific American of February 2, 1901, will be found a very complete illustrated article on the system written by Mr. Mundy himself.

Legal Notes.

Presumption and Evidence as to Inventorship.—The United States Circuit Court of Appeals for the Seventh Circuit has handed down a decision in the case of the Barr Car Company vs. Chicago and Northwestern Railway Company—a case which is rather remarkable for the curious circumstances out of which it arose. The suit was brought by the appellant as the assignee of Lester J. Barr for the alleged infringement by the appellee of letters patent for a "coal and iron car." It seems that the railway company had employed a certain George H. White in various capacities, and that in 1881 he conceived the idea of a single-hopper, double drop-bottom car designed to overcome grave objections in the cars then in use by the company. A verified application for a patent was filed February 12, 1883, but was abandoned by White because the claim finally allowed was so narrow that he deemed it useless to pay the final fee. While White was employed by the railway company Barr entered his office as a draftsman. Barr claimed that between 1880 and 1883 he conceived the idea of the car for which White filed an application; that he prepared both specifications and drawings, signed them, and verified them as a witness. Neither prior to their execution nor thereafter until he left service under White did he make any claim that he was the inventor of the car, although White had publicly declared himself as the inventor. Barr's application for a patent was filed January 6, 1886, and was finally allowed in a restricted form. Barr explained his silence by reason of certain unfortunate business ventures, which necessitated his coming to some arrangement with White contrary to the rules of the company, whereby he might pay off certain of his creditors. Because of this fact he claimed that he did not suggest to White at the time that he was the real inventor, fearing that White might cause his discharge. When White left the service of the Chicago and Northwestern Railway Company Barr accompanied him.

The Court admitted that a patent raises a *prima facie* presumption that the patentee is the first and original inventor; but the fact that Barr had prepared an application for the same invention for another person and signed it as a witness overcomes this presumption, and throws upon him the burden of proof that White was not the inventor. The fact that no claim was made by Barr until three years after he had drawn up the specification and made the drawings must tend to defeat his assertion; for such an action is not that of a reasonable man. In the absence of active compulsion by White, who was his superior, Barr's statement that he feared the loss of his position if he asserted his right to the invention in the face of the claims of his superior is not entitled to great weight. For the Court held it would be carrying the rule of compulsion or duress a great way and to a dangerous extent to hold that anyone occupying a subordinate position is not to be bound by his acts because of a fear of a possible loss of employment.

The Whitehead Torpedo Suit.—In the United States Circuit Court for the Eastern District of New York a suit was recently brought by the Howell Torpedo Company against the E. W. Bliss Company, American manufacturers of the Whitehead torpedo, for alleged infringement of Letters Patent No. 311,325, issued to Admiral John A. Howell, June 27, 1895, for "certain new and useful improvements in marine torpedoes." The question at issue was whether the Howell flywheel was an anticipation of the Obry gyroscope. It seemed undoubted to the Court that Admiral Howell was the first person to suggest and use a rapidly-revolving flywheel in a marine torpedo to preserve fixity of direction and to secure the torpedo against the influence of deviating forces. The gist of Howell's invention, so far as the correcting of deviations in the course of the torpedo is concerned, consists in so placing the rotation axis of the flywheel as to obtain a resultant axis of motion in the case of deviating forces acting on the torpedo, and in combining with the flywheel thus placed certain steering mechanism brought into action by the resultant motion, and arranged and automatically operating to set up opposite deviating forces which will counteract and neutralize the unusual extraneous deviating forces. The Whitehead torpedo, on the other hand, includes a gyroscope placed in the torpedo with the axis of the flywheel parallel with the longitudinal axis of the torpedo. The Court finds that the system of steering in the Whitehead torpedo is not only not dependent upon "resultant motion," but becomes ineffectual in proportion as such motion occurs. The Whitehead steering gear depends upon fixity of the axis and rings unaffected by an extrinsic force; the Howell steering mechanism depends upon the introduction of a higher force that destroys this fixity and produces an abnormal operation of the gyroscope, causing the ring to change that status which the revolution of the flywheel tends to produce. The possibility of resultant motion is indispensable; its occurrence in the torpedo is a detriment; in the Whitehead it tends to baffle the operation of the steering gear; in the Howell the evil is turned to its own correction. In the light of these differences the Court dismissed the complaint, holding that the steering mechanism used in the Whitehead torpedo shows a meritorious advance in the art and that it may not be considered as an infringement of Admiral Howell's invention.

Trade-Mark Infringement.—In an action brought to restrain William A. Fors and Harry D. Dye from using certain labels, upon the ground that they were infringements upon those adopted by the plaintiffs, William B. and Bernhard Volger, it appeared that the plaintiffs had for nine years manufactured inking pads and had adopted the word "Excelsior" and a descriptive label bearing the words "Excelsior Felt Pads," and that the product had become known to the trade as the "Excelsior Pad," that the defendants after purchasing the Excelsior pads for nine years "stopped doing so and placed upon the market felt pads under a label which was an excellent copy of that adopted by the plaintiffs except for the word 'Excelsior.'" By the trial court, a decision was given for plaintiffs. Judge Ingraham, in delivering the opinion of the Court when the case came up for review by the Appellate Division of the Supreme Court of New York, stated that there was not the slightest doubt but the defendants by merely changing the word "Excelsior" to "Excellent" and adopting the remaining portion of the label of the plaintiffs, were guilty of an infringement which was a fraud upon the public. The defendants laid great stress upon the fact that there was no name upon this label, implying that a person could not acquire a valid claim upon a trade-mark unless his name was a part of the trade-mark. This novel proposition, the Court held, was entirely opposed to the principle upon which a trade-mark when adopted becomes property which a court of equity will protect.

Invention—Evidence of Commercial Success.—Where, in the device of a patent, the departure from former means is small, yet the change is important, the doubt as to whether the inventive faculty has been exercised is to be weighed in view of the fact that the device in question has displaced others which had previously been employed for analogous uses, and this may decide the issue in favor of invention, especially where other inventors, of experience and skill in the art, had unsuccessfully attempted to solve the problem presented. Star Brass Works *vs.* General Electric Company, 111 Fed. Rep. (U. S.) 398.

Garbled Letter Used to Mislead.—Complainant published a letter announcing to the public that he was engaged in writing a life of President McKinley, and giving the name of the publisher. He further stated that there was being advertised another "Life of McKinley," purporting to have been written by him; that in 1896 he had prepared a campaign publication regarding the then Republican candidates for President and Vice-President, which he understood was being changed and sold as his "Life of McKinley," but that he had not had anything to do with such book since its first publication. Defendant, who was publishing and selling still another book on the same subject, issued a circular in which he copied that part of complainant's letter which denied his connection with the second work mentioned therein, but omitted the portion relating to complainant's new work, and added an endorsement, which, in connection with the extract printed, was calculated to mislead the public by inducing the belief that any book offered as complainant's was fraudulent and not authentic. The proofs showed that such circular in fact created the confusion in regard to complainant's book which it was the purpose of his letter to prevent. Held—that such circular was constructively fraudulent, even if not so intended, and its promulgation caused an injury to complainant, against which he was entitled to protection of injunction. Halstead et al. *vs.* Houston, 111 Fed. Rep. (U. S.) 376.

The "Argonaut" and Holland Submarine Boats in Court.—Suit has been brought by the Electric Boat Company, builders of Holland submarine boats, against the Lake Torpedo Boat Company, designers and builders of the "Argonaut," a vessel designed for submarine navigation and fitted with exterior driving wheels so that it may crawl along the bottom. Damages to the amount of $100,000 are claimed. The builders of the Holland boat allege that their patented arrangement of ballast tanks, storage batteries, and means for controlling the direction of the vessel's motion have been infringed. The outcome of this suit will be watched with interest.