Correspondence.

Belt Crawls.

To the Editor of the Scientific American:

The communication entitled "A Belt Problem" calls to mind a discussion in the *Mechanical News* a few years ago in regard to the same subject, and in which the first writer observed the same phenomenon that Quirk mentions.

The "crawl" of the outer belt is explained by the fact that it runs on a pulley larger, by twice the thickness of the belt, than that on which the inner one runs, and, provided there were no loss, it would gain the thickness of the inner belt, say $x \times 2 \times 3{\cdot}1415 +$ at each revolution. It is readily seen from this that if the pulleys are of different sizes, and make a different number of revolutions, the outside belt will gain more rapidly on the smaller pulley, thus causing unequal tension.

In case the small pulley is the driver, the outside belt will be tightest on the working side, which, provided the difference were not too great, is as it should be; but if the driver is the larger, then the outer belt would be slack on the working side and have a tendency to hold back; which would go far to overcome the advantage gained by the extra grip given by the extra weight, and would certainly add much to the strain on the inner belt, which would not only have to do all the work, but overcome the "crawl."

The use of a double belt becomes then a useful makeshift in some cases, where the driver is slightly smaller or of the same size as the driven; but in other cases there is probably more loss than gain, and even under favorable circumstances it is of questionable utility for continued use, as the slip of one belt upon the other would probably cause a great amount of wear; and the two belts run side by side, or a single belt of twice the width, would be much more durable and give more power. W. D. G.

Cloquet, Minn., October 13, 1890.

Water Supply Systems Compared.

At the recent meeting of the American Society of Civil Engineers, Mr. J. Leland Fitzgerald read a paper devoted to a comparison, from the financial standpoint, of different systems of water supply to towns. The author compared the gravity system, reservoirs, and direct pumping; concluding that for large towns the efficiency of the two former is the same, while direct pumping is superior by 20 per cent. The advantages of reservoirs are better fire protection, economy in running expenses, and purer water. Mr. Fitzgerald declared that, whatever the size of the town, a gravity system of supply is preferable whenever the following conditions are all fulfilled: A supply of unquestioned present and future purity; quantity sufficient for the needs of the next 20 years without great additional outlay; and the original cost such that 8 per cent thereon is not in excess of 60 per cent of the total working expenses, including interest and sinking fund. A direct pumping system is the most economical when the town is large enough to take half a million gallons and upward daily; when the supply is good and abundant, although found at a low level; and when there are no great differences of level in the distribution system. If there are highly elevated portions of the same district, these, if small, are best supplied from a separate reservoir fed by a force main. When the consumption of a district is less than half a million gallons daily, direct pumping with a reservoir of at least 20 hours' capacity, situated in the distribution system, is the most economical. When a town supply is intermittent, of course a reservoir capacity sufficient to afford the requisite storage for periods of drought is necessary. Although the author admitted that no hard and fast rule can be made in a matter of this sort, yet a few general principles like the foregoing are useful aids to the treatment of doubtful cases.

A Gas Value Indicator.

In view of the difficulty experienced by the general run of gas consumers in checking their gas bills against their meter register, Mr. J. L. Cloudsley, of Smith Square Works, Westminster, has devised a cash value indicator for gas meters. This consists of a dial placed on the front of the meter and having around its edge figures, each representing 100 cubic feet of gas, from zero to 1,000. Under each of these figures is the cost of the amount of gas represented by the figures at a stated price per 1,000 ft. The quantity consumed is indicated by a pointer, which is worked from the ordinary indicator of the meter, and after 1,000 ft. of gas have been used, this is indicated on another dial within the priced one; the pointer then going on to indicate a second 1,000, and so on. The dial is made of cardboard, and, should the price of gas vary, the dial will have to be removed and replaced by one showing the altered price. It is conceived that this arrangement will lead to the use of gas by many small consumers who distrust gas meters because they cannot understand them, and who doubt the correctness of gas bills because they cannot check them.

The San Jacinto Tin Mines.

A recent number of *The Engineering and Mining Journal* contains a description of the tin deposits of San Jacinto, San Bernardino County, California. In some respects, says our contemporary, these tin veins are the most promising yet discovered in the United States. Many of the veins are large; they occur in a congenial country rock, and the vein characteristics are, to the miner, favorable and promising.

"The experts' reports given in the prospectus of the company, which are said to show an *average* richness of 20 per cent of black oxide of tin (say 15 per cent of metallic tin) in the ore, are wholly misleading, and, we think, will certainly not be realized. From a recent visit to the mines, during which we were courteously extended every opportunity to examine the property, we feel justified in saying this, but such an *average* richness is quite unnecessary. The greatest tin mine in Great Britain, the Dolcoath, carries 2 to 3 per cent of tin, and though it costs $6 or $6.25 a ton to mine and mill the ore and cover all expenses, the company pays large dividends. Now it is certain that the San Jacinto mines can be worked at a *less* cost per ton than is done in Cornwall, because everywhere in this country we get so much more to the man that it more than compensates for the difference in wages paid. There is no mine in Cornwall that is to-day mining and milling ore as cheaply as are fifty mines that could be named in Michigan, Dakota, Montana, and California, where miners' wages rise to $3 and $3.50 a day. San Jacinto could, therefore, pay larger dividends than Dolcoath out of ore of the same grade, and probably all the investors would be satisfied to be guaranteed Dolcoath's rate of dividends. The same is true of the tin mines of the Black Hills, of Dakota, which we recently had the pleasure of visiting. Systematic work is being done, with encouraging results, in Dakota, yet there the judicious plans adopted do not contemplate the erection of mills and reduction works until large reserves are ready for extraction."

The recent announcement of the sale of the San Jacinto tin mines to an English corporation is confirmed.

The Rancho Sobrante de San Jacinto, as patented by our government, consisted of eleven Spanish leagues, or about 48,400 acres. But the mining company disposed of about 3,500 acres to the town of Riverside, so the present property consists of about 45,000 acres, or about 70 square miles. The tin district is, in a straight line, about ten miles south of Riverside, in San Bernardino County. Also it is about fifty-five miles easterly from Los Angeles, and fifteen miles southerly from Colton, a station on the Southern Pacific Railroad. The California Southern Railroad, running from Colton to San Diego, passes the property on the east, about three miles from its boundary; the Riverside, Santa Ana and Los Angeles Railroad passes within a mile or two of the most westerly veins on the tract, and the Pomona and Elsinor Railroad (in process of construction) will skirt the southerly boundary, along Temescal Creek; so the property is now virtually surrounded by railroads.

Temescal Creek will supply an ample amount of water for dressing the ore; but it may be necessary to construct a bed-rock dam to bring all the water to the surface.

The tin veins are found in the low, rolling hills of the San Jacinto mountains, the Gabilan hills, and are elevated several hundred feet above the creek, offering an excellent opportunity for cheap working by tunnels, if sufficient ore is found.

The country rock is composed of syenitic granite, syenite, and slate; but the veins apparently extend but a short distance into the latter. Veins of porphyry and quartzite cut across the country rock in various places, but in a direction different from that of the mineral veins which pass through them, showing that the former were made first. The courses of the veins vary from north and south to east and west, swinging around gradually from the former to the latter direction as one goes from the west to the east. The hills are entirely destitute of all vegetation excepting the native grasses, which enables one to see readily the black croppings of the veins, which may be said to be unique in their distinctness. By standing on the summits of the higher hills one can see them running across a level space, climbing a hill, extending down the other side, crossing a gulch, running up another hill, down again, and so on, continuing in the same plane with unusual regularity. Again, a slide on the side of a hill exposes a vein standing almost perpendicular, and as black, nearly, as a seam of coal.

The widths of the veins are, of course, not uniform; they vary from 18 inches to 30 or more feet. The widest one measured was found to be 24 paces—say 60 feet—in width, and it was a most promising one, too.

From the most westerly to the most easterly vein the distance is, as the crow flies, about three and a half miles, and within this space upward of 70 lines of croppings of apparently as many different veins were found. They were practically identical in character; a sort of syenitic rock which, in Cornwall, is known as "tin capel," or "lode granite." With the exception of the more extensive ones on the Cajalco lode, the developments consist of a number of "test pits" sunk to various depths—usually from 2 to 12 feet—in the croppings of different veins, all of which show more or less of the black and white mottled ledge matter that is so characteristic of this locality. In some instances copper is found in the ore in considerable quantities; in others it is found only as a stain; and, again, it is not seen at all. Silver, gold, and nickel are said to be found there also.

It is extremely doubtful if any deposits of tin ore so far discovered in the United States can in any way approach those of the San Jacinto district in closeness of resemblance to the lodes of Cornwall. As for the richness of the ore and the quality of the tin produced, these points remain to be more fully determined by the new English corporation or its successors.

The San Jacinto Estate, Limited, has a share capital of £505,000, which is divided into 500,000 ordinary shares of £1 each, and 1,000 founders' shares of £5 each. Also £125,000 of debentures will be issued, making a total capital of £630,000; or, at $5 to the pound, $3,150,000. It is also stated that the price to be paid for the property by the English corporation is $400,000 in cash and £250,000 in ordinary shares. The amount already paid is known to be $350,000 cash. Of this sum $300,000 were paid to the shareholders of the old company, leaving $50,000 to be used, presumably, for various expenditures made in connection with the sale. If the above statement as to the amount to be paid for the property is correct, then the promoters will receive $50,000 in cash and $1,250,000 (£250,000) in shares. Then it is stated that $250,000 (£50,000) in cash have been placed in the treasury of the company as working capital, so the total cash outlay is $650,000. This just equals the sum of the debenture capital, £125,000, and the founders' shares, £5,000. Hence the ordinary shares seem to be "distilled" water. The new company, therefore, starts in business with a total capital of $3,150,000. Six per cent per annum on that amount is $189,000. To make $189,000 per year it would be necessary to treat about 45,000 tons of ore annually, or 150 tons per day for 300 working days.

In addition to the probable worth of the tin veins, the property acquired by the San Jacinto Estate has a large value for agricultural purposes, as a part of the land can be irrigated by a suitable system of storage reservoirs, and possibly by artesian wells. Such land is now worth $100 and upward per acre. Also, the water in Temescal Creek could be used to irrigate adjoining land. So that if the tin veins, in spite of their promise to the contrary, should prove to be comparatively valueless, the entire amount of cash paid for the property, and perhaps much more, could probably be realized from sales of land and water.

Bad Effects of the New Antipyretics.

Excluding the effect of heroic doses, and considering only those which are ordinarily regarded as medicinal, Dr. Goldmann is led to the following conclusions:

Antifebrin.—Individual susceptibility to this drug differs widely. Even the smallest doses are capable of giving rise to dangerous symptoms. Especial caution is necessary in using it among children. Its continued administration begets a cumulative action. Collapse, cyanosis, vomiting, and profuse sweating not infrequently result.

Antipyrin.—Neither may any absolute dose be stated of this substance. It also needs to be used with prudence among chidren. It also possesses a cumulative power. Exanthems, collapse, cyanosis, dyspnœa, vomiting, and excessive perspiration. are often its effects. That death sometimes follows the exhibition of comparatively small quantities admonishes us to prudence.

Phenacetin.—Eruptions and copious sweats are not infrequently occasioned, the latter especially in persons predisposed to free perspiration. Cyanosis and collapse are of less common occurrence. It should be given cautiously to children.

Without expecting it to take the place entirely of the other two bodies, phenacetin may well be preferred to them in many cases, especially in regard to the fact that it is less liable to create embarrassing and dangerous manifestations.—*Med. Bulletin.*

Remains of a Great Mastodon.

The skeleton of a mastodon found at Higate, forty miles west of St. Thomas, Canada, is on exhibition in that town. The area of the grave where the monster's bones were found is 35 by 21 feet. The bones were scattered over it, one joint fitting into the other in a bed of gray marl about six feet below the surface. Over the marl is a thick layer of black, loamy soil. The length of the animal, gauged by the measurements of the bones already found, and allowing for those that have not yet been discovered, is, from the point of the nostril to the root of the tail, about twenty-two feet. This is greater than that of the celebrated *Mastodon giganteus* discovered near Newburg, N. Y., in the summer of 1845, and the skeleton, as a whole, is larger and more complete than any that have been found in Kentucky, Ohio, Missouri, California, or Oregon.

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The Bogoslov Volcano.

The most interesting result of the recent trip of the Rush was a visit paid by the officers to Bogoslov Island, where is the famous volcano of that name. In conversation with one of the officers, an interesting *resume* was obtained of the discoveries and data gleaned by the visit. Bogoslov is sixty miles west-southwest of Oonalaska. It originally consisted of one island with two craters, one of which first sprang into activity in 1792.

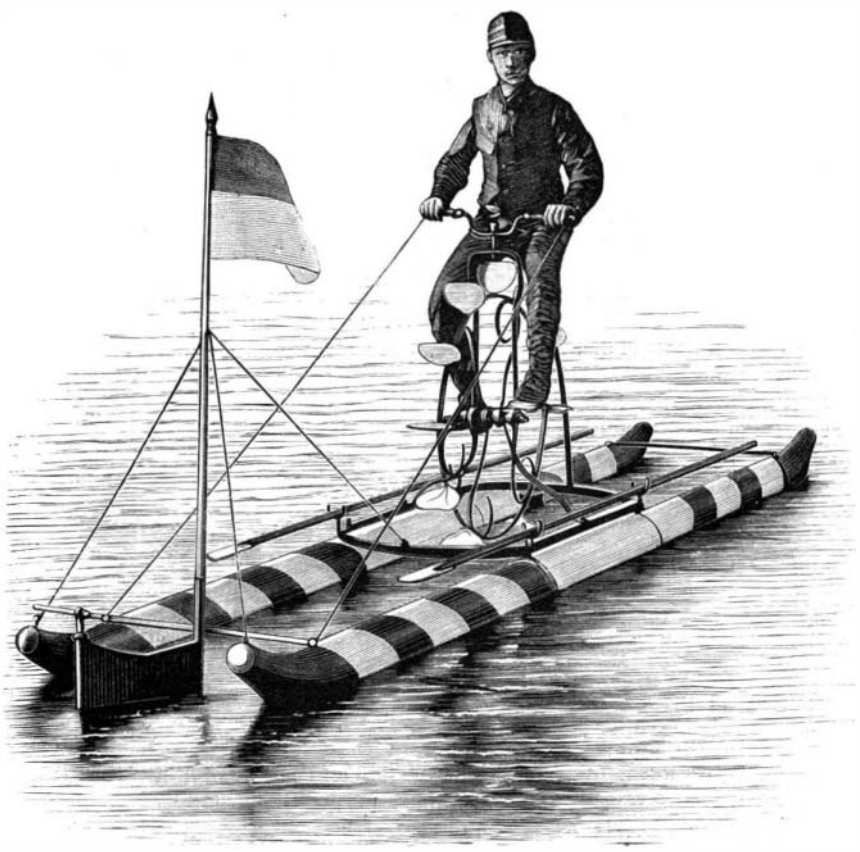
Last winter the island was the scene of a strange convulsion of nature. The second crater, now known as New Bosgoslov, became active. In some powerful convulsion the sandspit which had connected the two parts of the island was submerged, and one crater was separated from the other by several fathoms of water. It is thought that during this convulsion changes occurred in New Bogoslov below the water line; that fissures were opened, through which volumes of water made their way into the caldron within. This accounts for the immense quantities of steam which the officers of the Rush saw escaping from the crater at a distance of fully sixty miles.

Of the two craters, New Bogoslov offered the most interesting field of study to the officers of the Rush. They ascertained the crater to be only 200 feet above the sea level. The peak had disappeared in the gaping hole. Along the sides of the volcano large deposits of lava, pumice, ashes, and volcano rock were seen. From fissures on the level earth springs of boiling sulphur arose to heights of from seven to ten feet. The officers planned an ascent to the crater—a hazardous feat which could only be attempted when a favorable wind carried the sifting volumes of sulphurous steam in a single direction. When near the mouth of the crater the footfalls of the officers were echoed within the volcano. On peeping over the edge of the mouth an impressive sight was witnessed. Steam in endless quantities rushed up from unknown depths, and rumbling, bubbling noises, like that of thunder, were heard. The air was impregnated with sulphur, and near the crater one could breathe only with difficulty.

One of the most novel discoveries in connection with the ascent was that the ocean birds used the volcano island as a natural incubator for their young. Thousands of gulls flew away at the approach of the Rush. They left behind them, along the sides of the volcano, eggs in all stages of development.—*San Francisco Chronicle.*

AN IMPROVED WATER CYCLE.

Since one general form has been adopted for the main frame and the principal parts of the cycle as it is commonly seen on the street and road, the improvements in these machines are limited to the details, and consequently inventive genius has turned with renewed zeal to the construction of the water velocipede. To the several forms already known is now added the water cycle built according to the ideas of Joseph Korner—who has a foundry in Olmutz—the arrangement of which can easily be seen from the accompanying drawings. The seat for the rider is placed above the single high wheel, and from here the rudder, which is located in front, can be operated in a simple manner. Iron, steel, brass, and wood are used in the construction of the machine, and it weighs about 156 pounds. It can move in any direction at a very good rate of speed, carrying, if desired, another person besides the driver, his weight being about 136 pounds. The machine can be taken apart for transportation, and by loosening or tightening four screws the parts can be shifted so as to be horizontal. Its movement is smooth and regular, there being no uneven oscillations. To the flag staff, which holds the rudder in a horizontal position, a sail can be attached, thus increasing the speed four or five times. The rider can use the two oars, shown resting on the forks, in pushing the machine off the sand banks without dismounting. Trials of the water cycle have been made in the neighborhood of Olmutz which have been remarkably successful. In one of these trials a distance of more than a quarter of a mile was covered in four minutes up stream, and in two and a half minutes down stream. The numerous turns were made with perfect safety.—*Illustrirte Zeitung.*



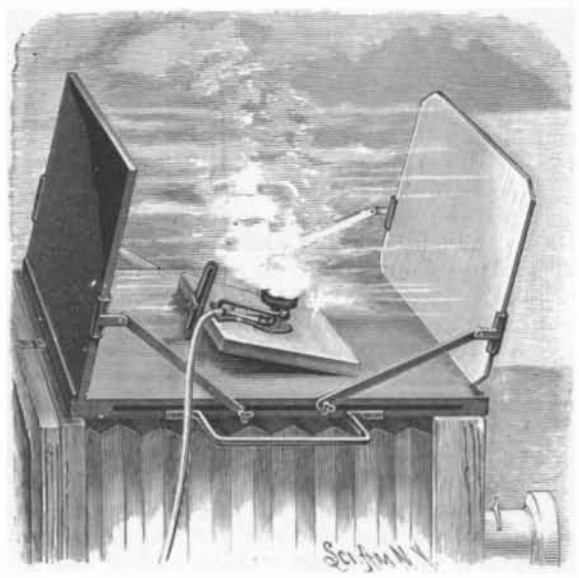
IMPROVED WATER CYCLE.

Electric Elevated Roads.

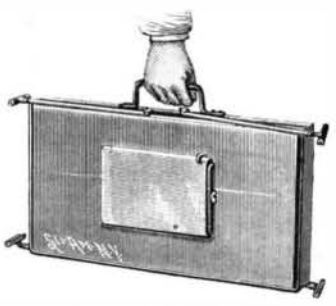
Elevated railroad schemes are very numerous in Chicago at present. Articles of incorporation have been issued for another rapid transit company which proposes to construct an elevated road upon the north side of the city to be operated by electricity. This is a section of the city which needs increased rapid transit facilities, and an elevated road may be all right, but the question is, Will it be operated by electricity?

A DEVICE TO FACILITATE TAKING PHOTOGRAPHS BY FLASH LIGHT.

The shadows caused by the brilliancy of the light, and reflections from polished surfaces, when pictures are taken by flash light frequently make it impossible to obtain the best results. To obviate this difficulty the device shown in the accompanying illustration has been provided, consisting of a base adapted to be supported upon a camera, and holding in position a translucent plate at one end and a reflector at the other end, while between them is an adjustable shelf adapted to support a magnesium lamp, or upon which magnesium may be burnt. The base is composed of two boards, with strips between their ends and one upon one side, so as to form between the boards a shallow pocket to receive the translucent plate and the reflector, whereby the device when taken down may be packed in small space for transportation. The plate and reflector are held in upright position, resting in transverse grooves in the ends of the base, by means of arms pivoted to the base and provided at their other ends with clamps or holders adapted to receive and hold the plate and reflector at the desired inclination. Hinged centrally upon the base is a shelf, provided at one end with a slotted bar and set screw, to raise or lower that end, to give any desired inclination to the lamp base to get the best effect of the light. When this device has been properly adjusted upon the camera to cause the light to be diffused in the direction of the object to be photographed, the quantity of light flashed by the burning magnesium is preserved, while it is made uniform by diffusion, lighting up all points, reducing and mellowing the shadows, and avoiding reflections and interference from the presence of polished objects. For further information relative to this invention address the patentee, Mr. John S. Bridges, 15 South Charles St., Baltimore, Md. The apparatus can be folded into compact form for transportation, as may be seen from the small engraving.



BRIDGES' PHOTOGRAPHIC FLASH LIGHT DIFFUSER.



DIFFUSER FOLDED.

Antimony Hypodermically for Apoplexy.

In the *Medical Bulletin* (July, p. 243) Dr. J. F. Bird reports some interesting clinical notes respecting the hypodermic use of tartarized antimony in the treatment of apoplexy. Its sedative action is highly indicated, whether the condition be arterial or nervous excitement, or both combined.

He first used it in the case of the late Dr. James McClintock. On reaching the house, he found the doctor lying on the floor, having fallen from the sofa on which he had been sitting. The respiration was hurried, but there was no stertor. Pulse 120, but not full or strong. Three or four doctors who had preceded him pronounced the case hopeless. No medicine could be administered by the mouth, and blood-letting was inadmissible. He immediately injected half a grain of antimony—tartar emetic—hypodermically, and very soon the pulse began to fall, and the hurried respiration abated. In half an hour he repeated the operation, and soon found all the bad symptoms subsiding, and the patient passed a quiet night. Next morning he was perfectly conscious, and made a rapid recovery so far as the apoplexy was concerned. His next case was a Mr. Klein, who had fallen to the floor very suddenly, but with symptoms very different from those of the previous case. This man had violent convulsions, a rapid and full pulse, with stertorous breathing. Two physicians were with him, and regarded the case as *in extremis*. At Dr. Bird's suggestion one of them injected a fourth of a grain of antimony hypodermically, and in a few minutes the stertorous breathing became less marked, the pulse began to fall, and the convulsions became less violent. The doctor injected another fourth of a grain of antimony, when all the violent symptoms abated. Two hours afterward the man sat up and was taken to his home.

In another instance he was called in the night to see a Mr. Hance, who was seized in a manner similar to the foregoing cases. He was convulsed; skin hot and red; pulse greatly accelerated, but not very full or strong. Respiration was greatly quickened, and breathing stertorous. He was perfectly unconscious. Dr. Bird resorted at once to the antimony, using a fourth of a grain, which had a marked effect upon the symptoms. In about twenty minutes he repeated the dose, and had the satisfaction of seeing all the symptoms subside, and a state of semi-consciousness return. In this case, because of the general turgidness of the face and neighboring integuments, he had a few cups applied, but allowed but little blood to be taken. There was no further trouble, and in a few days he was able to resume business.

Summing up his article, Dr. Bird is of opinion that for the treatment of apoplexy tartarized antimony is an invaluable therapeutic agent hypodermically administered. The same mode of treatment may be resorted to in canine practice when valuable dogs are attacked with fits.

New Style of Fly Wheels.

A novel fly wheel, of large dimensions, which differs materially in construction from those ordinarily in use, has been designed by Messrs. Mannesmann, to guard against the terrible danger of bursting, to which accident cast iron fly wheels are only too subject when worked at a high speed. This wheel, which is in operation at the Mannesmann Tube Company's works, in connection with their process for making seamless tubes, consists of a cast iron hub, to which are securely bolted two disks of steel plates, about twenty feet in diameter. Round the periphery of the wheel thus formed, about seventy tons of No. 5 gauge wire are wound, under a tension of about fifty pounds, thus binding the whole securely together. There can be no comparison between the resistance of a wheel so constructed to the centrifugal force and that offered to this force by a cast iron one. This fly wheel, of twenty feet diameter and weighing seventy tons, revolves 240 times per minute, therefore the periphery of the wheel has a speed of 2·85 miles per minute, or nearly three times the speed of the Flying Dutchman. It works on the main shaft, from which the tube mill is driven by means of helical toothed steel wheels.—*Specialties.*

EVERY year a layer of the entire sea, fourteen feet thick, is taken up into the clouds. The winds bear their burden into the land and the water comes down in rain upon the fields, to flow back through rivers.

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