SCIENCE UP TO DATE.

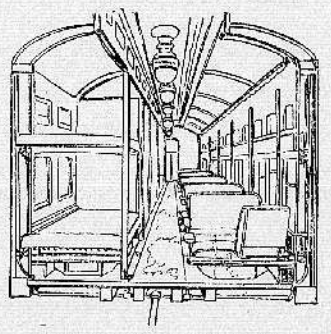
LATE DEVELOPMENTS IN PROGRESSIVE FIELDS.

A Combined Crushing Mill for Miners of Precious Metals—New Idea in Parlor Cars—An Invention for Home Amusement.

A NOVEL PASTIME is described as an improved game of skill which may be played and enjoyed alike by the aid of by young or old a board, a magnet and a roller of suitable dimensions. The board, which may be of any suitable size and shape, has indicated upon its surface by lines, coloring or in any other manner, a straight or sinuous course or a combination of the same, along each side of which a number of stops are arranged, the path being graduated from end to end to a suitable scale, as represented in the accompanying illustration. The width of the course is the same or slightly greater than the length of the roller working within the same, the game being played by each person placing the steel roller across one end of the course and rolling or drawing it along the course as far as possible by the attractive influence of the magnet so that it will escape the stops, which, when it is desired to make the same more difficult, may be magnetized.

Pneumatic Berths and Cushions in Cars.

According to the improvement forming the subject of the accompanying illustration, the cushions for the seats, as well as the bed or mattress, in a combined sleeping and parlor car, are connected with the compressed air pipes of the train and adapted to be inflated by opening suitable valves in connecting pipes, or to be collapsed and compactly stored, according to the daily or nightly requirements. A patent for this invention has been recently issued. The mattresses or bed cushions and also the chair cushions are simply air-tight bags of soft rubber or other suitable material, and from a main compressed air pipe running centrally under the floor three branch pipes lead to them in each car section, one of the branches supplying air to the two chairs and the other two branches supplying air to the upper and lower berth mattresses respectively. In each branch a three-way cock for admitting or cutting off the air supply and opening a vent or discharge. The mattress or berth cushion is creased to fold like an accordeon and is attached at the head and foot to a flexible strap winding upon the barrel of a spring, whereby it is drawn in collapsed condition into a covering casing at the side of the car when not in use. To guide it to position and support it when extended, it has hooks which catch over transverse steel frame supports, connected at right angles to vertical standards adapted to fold flat against the side of the car. The entrance of the air causes the inflation and extension of the mattress, which at its outer edge is connected to a panel rail moving in and out with it and on turning the valve to discharge the air, the mattress is drawn back in folded position by the tension of the spring. Each section has a base compartment under each seat for blankets, bed linen, etc., and the chair swivels on the base about the compressed air inlet pipe, the chair back frame folding forward when the cushions are collapsed. The cushions are distended or collapsed by the adjustment of the valves in the same manner as the mattresses are. The sections are separated by curtains arranged on vertical spring rollers, and the curtains that close in the sections from the aisle hang from a rod held by arms to rock in such a way that the curtains may be swung back against the ceiling, as shown at the right in the



SLEEPING AND PARLOR CAR.

illustration. This improvement is designed to not only save time and trouble in adapting any portion of the car to either use, as required, but is also calculated to render the car much more sanitary and comfortable.

A Chemical Discovery.

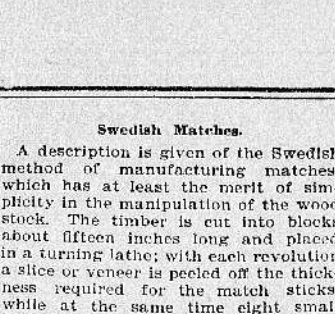
A French chemist claims to have proved that, on burning in air equal volumes of coal gas and of hydrogen, the same weights of nitrogen are converted into ammonia, and that, on burning equal volumes of coal gas and of hydrogen, the nitrogen transformed into nitrous acid will also have approximately the same weight; but on burning carbon monoxide, nearly two and one-half times more nitrogen is found in the state of nitrous acid than in the former case. In the burning of one kilogram of each of these gases, it is stated that the most nitrogen in the state of ammonia, and in the state of nitrous and nitric acids, is found in the product of the combustion of hydrogen, only one-fourth of the quantity being found in the case of coal gas and about one-twentieth in burning carbon monoxide. On burning wood charcoal in air, whether merely dried or heated to redness, the quantity of nitrogen contained in the nitrous and nitric acid collected is said to be almost equal to that of the product, and there is not much difference in the result of burning an equal weight of coke. It is remarked that the formation of ammonia during the combustion of coke or charcoal is merely a result of the decomposition of these substances, and thus the weight of the ammonia formed varies according to the degree of heat.

Swedish Matches.

A description is given of the Swedish method of manufacturing matches, which has at least the merit of simplicity in the manipulation of the wood stock. The timber is cut into blocks about fifteen inches long and placed in a turning lathe; with each revolution a slice or veneer is peeled off the thickness required for the match sticks, while at the same time eight small knives cut the slice into seven pieces, like ribbons, and of the length required for the sticks; these ribbons are then broken into lengths of six to seven feet, knotty and defective pieces are removed, and the ribbons are then fed through a machine which cuts them into pieces like a straw cutter, these then passing through an automatically arranged machine with cutters which slice off as many pieces, the thickness required for a match, as there are cutters, one machine turning out from 5,000,000 to 10,000,000 match splints a day. The data given of this manufacture shows that Sweden and Norway have long been among the largest match producing countries in the world, their exports amounting to about 20,000,000 pounds of matches per annum, while in Germany the number of factories is stated at 200 with an annual yield of about 70,000,000,000 matches, and in Austria there are some 150 factories with a correspondingly large output.

A Comined Crushing Mill.

The mill shown in the illustration is designed to perform its work rapidly and effect the utmost possible saving of gold and silver. The bed plate is slightly thinner at its outer edge, so that the tapering crushing rollers fit and follow it nicely, and it has a central well in which the quicksilver may lie, this well being supplied through a duct from an amalgam box on the outer side of the tub. Extending up through the center of the tub is a shaft casing, preferably cast integral with the bed plate, the driving shaft being stepped in a suitable bearing below, and on the shaft is a spider frame having at its top a collar which turns above the casing and is keyed on to the shaft. The lower ends of the arms of this spider frame



THE MILL.

merge in a collar on which are journaled between which are pivoted the shafts of the crushing rollers, which are thus allowed to swing vertically, that they may ride over any large or particularly hard rock without doing damage. In the tub, just above the rollers, is a cross frame of parallel cross plates connected by diagonal plates, to check the rotary current of water, so that the quicksilver in the central basin will not be disturbed. The tailings flow out with the water from a spout at the top of the tub, the free metal amalgamating with the quicksilver, while the concentrates settle on the bed plate. At one side, near the bottom, is a valve-controlled pipe through which the concentrates may be drawn out.

Light Without Heat.

The announcement recently made of a German method of producing glass which will transmit light freely, but not heat, is founded upon the following statement of details, presumably from the source of operations: A plate of this material, four-tenths of an inch thick, containing 2.8 per cent of iron in the form described as ferrous chloride, allowed only 4.06 per cent of radiant heat to pass through it, while another plate of equal thickness and containing quite as much iron as ferric chloride, permitted 11.2 to pass. The chemical distinction is exceedingly small but the effect is very marked. Using oxide instead of chloride, and again having it in a ferrous condition, one per cent produced a glass having a very faint blue tinge but even more impervious to heat than the other sample. A layer .332 inch in thickness allowed only 0.4 per cent of the heat from a bat's wing gas flame to pass through, 0.72 of that from an argand burner, and 0.73 of the heat from a lime light; but it would transmit twelve per cent of the heat from sunlight, ordinary window glass, on the other hand, letting some eighty-six per cent through.

Popular Science Waifs.

In New Zealand cats are used to destroy rabbits.

The first author to attempt the explanationof ocean currents was Kepler.

The serpent moves by elevating the scales of its abdomen and poling itself along.

The beautiful analine dyes are made from the refuse products of gas manufacture.

Photography can be done under clear water at the depth of about 1,500 feet.

In 467 grains, by weight, of sea sand, 6,000 shells of minute sea animals were found by Orbigny.

Ever tiny protuberance on a branch of coal represents a living animal, which grows from it like a plant.

The temperature of a fish is only 21½ degrees below that of a man. It is his dripping sides that makes him seem cold. When dead his temperature rises.

The eyes become bloodshot because, while ordinarily the vessels of the corners are too small to admit the red corpuscles of the blood, when inflamed they enlarge and the red particles enter and give their color to the white.

Big Boring Project.

Two important engineering projects are mentioned in connection with the Simplon tunnel on the Jura-Simplon Railway. One of these, by M. Lommel, is described as providing for a double line through the tunnel to borings to be undertaken at a height of 2,200 feet above the level of the sea—the tunnel to be eleven and one-half miles in length, and the cost approximating $22,000,000. According to the second, the tunnel would be constructed at a somewhat lower level, and there would be but one line of rails; this would reduce the cost to about half the amount above named, and the great work, it is calculated, could be carried to completion in about five and one-half years.

FOR WOMEN AND HOME

INSTRUCTIVE READING FOR MAIDS AND MATRONS.

Lace and Economy—The Latest Creation in Collars—Costume for a Young Girl—Some Up to Date Hints for the Household.

LACE COLLARS are no longer regarded as luxuries—they are considered economical investments. One lace collar, if ingeniously treated, is capable of varying the effect of half a dozen different waists. Every woman knows that if the bodice of her gown appears like new her entire costume is stamped as such. Therefore, great is the value of a lace collar. It must be a large collar of some heavy lace like Russian thread, and should fall well over the corsage and form epaulets over the sleeves.

When it is purchased it should be worn untrimmed over a dark waist and will give a stylish effect to the whole costume. On its next appearance it may be joined to a gay little stock of chiffon or velvet; again it may appear lined with any of the new shades of silk. This will give a charming touch of color to a black bodice. It may also be made effective by turning it with ribbons, as shown in the illustration, having the loops stand up high on the shoulders and the longest ends reaching below the waist line. These ribbons should appear to be fastened to the collar by small bunches of flowers.

for older women. One of the conspicuous grace had two broad box plaits running down from the shoulder over the bust, nearly converging at the waist line. The V shaped portion of the brown waist thus left open was filled in with a soft peach-colored silk, overlaid with dotted cream net. Its sister gown, of clear green crepon, had pipings of dark green velvet let into the skirt seams. The body of the waist was made of a clear golden yellow silk, with full sleeves and a short square-cut jacket of crepon. Where the jacket fronts falled by four inches to meet over the bust a full butterfly jabot

A FASHIONABLE COSTUME FOR STREET WEAR.

Imagine a cream white lace collar trimmed with heliotrope ribbons in this manner and fastened with dainty clusters of forget-me-nots. This collar crowned with a forget-me-not blue chiffon stock would be an addition to any costume. After a lace collar has been treated in these various ways as a last resort it may have the design outlined in jets, gold threads or tiny colored beads. Then again it will appear like new and fulfill its economical mission.—New York World.

Hard to Recognize as Collars.

For a Young Girl.

Girls getting along into the dignity of 15 and 16 years were sweetly gowned, for the most part, in brown or green, their ankle-long skirts temperately gored, and anyone of the bodices they wore in very good style for older women. One of the conspicuous grace had two broad box plaits running down from the shoulder over the bust, nearly converging at the waist line. The V shaped portion of the brown waist thus left open was filled in with a soft peach-colored silk, overlaid with dotted cream net. Its sister gown, of clear green crepon, had pipings of dark green velvet let into the skirt seams. The body of the waist was made of a clear golden yellow silk, with full sleeves and a short square-cut jacket of crepon. Where the jacket fronts falled by four inches to meet over the bust a full butterfly jabot frilled out, and face was intertwisted in the high wrinkled collar of yellow silk.

Make Aprons of Crash.

Another excellent use for crash is in making kitchen aprons. We somehow have the idea if an apron is for the kitchen it must necessarily be either dark gingham or calico, or something wholly unattractive. As a matter of fact, a neat person will not wear a kitchen apron after it is soiled, and dark material keeps clean no longer than light—it only conceals its unclean condition longer. There is no reason then why a kitchen apron should not be attractive as well as useful, and anyone who has once used for this purpose a fine, pretty piece of delicately checked linen crash will scarcely want to return to the ugly, dark aprons of former days.

A Royal Trousseau.

The trosseau of the Princess Alix, who is now the bride of the czar of Russia, cost $250,000, in addition to the one thousand blue and silver foxskins, miscellaneous furs of every description, precious stones by the quart, and yards upon yards of cloth of gold and cloth of silver, and as many more of priceless laces furnished to the manufacturers, a leading French house, by the Russian court.

It need hardly be said that one of the royal perogatives is the opportunity to "cut," as the college boys say, "going to the dressmaker to be fitted. A young woman of the precise figure of the princess was found to try on all her wonderful finery, and so precious were the articles furnished by the Russian court, they were sent under seal and as much red tape as if the fate of nations depended upon their arriving. Nor was this all. A representative of the court remained on the spot during all the preparations of the trosseau, to see that nothing was stolen by the work people, and that inferior articles were not substituted.

A ROMANCE.

"Report at the library before going off duty. You are to take charge of a private surgical case and Dr. Bronson wishes to see you."

These were the words spoken by our head nurse one beautiful spring morning.

As I walked quickly down the long hall toward the library my heart beat high with hope. At last I was to have a case under Dr. Bronson. How I had envied the other nurses as they had lived day after day under his supervision. Truly fortune was beginning to smile upon me.

There, seated at the desk, was the doctor, and, as I entered the room, he did not move, so deeply absorbed in thought was he. Sinking into an easy chair I studied his face for a few moments. He was young and almost handsome; I say almost, because there was a restless, wandering look in his large, dark eyes which detracted from his appearance, and yet, though I couldn't tell wherein it lay, there was something intensely fascinating in his face.

Suddenly my reverie was broken by the entrance of three ladies—a tall, middle-aged woman, and two young girls whom I rightly judged her daughters.

The doctor greeted them cordially and I was soon informed that the younger daughter was to undergo an operation on the following day and that she was to be my patient.

Elizabeth Townley (Beth, her pet name, seemed to suit her better), was about 20 years old, and while she was not pretty, she had a sweet, vivacious face and a wealth of fluffy brown curls. From the moment I met her I admired her, and the longer I knew her the stronger grew my admiration.

The following day at 2 Miss Townley was brought to the operating room and, as she lay there consciousness gone, her face like marble, save a pink spot on either cheek, her hair curling in little damp ringlets around her sweet face, I fancied myself her lover and thought how easily one could love her. I wondered if the doctor had the same thought, but when the work began in earnest we were all too busy to indulge in "sentimentalism."

When at last it was over and consciousness had returned and the intense anxiety of surgeon and nurse was over, I found time to look at the doctor. Ah, the old restless look had almost completely faded from his eyes and in its place was an expression of rest not unmixed with determination.

After this I studied both patient and physician. I rarely saw them together, but I knew by the doctor's face whenever he came from her little room that he was refreshed and strengthened for his work. But Beth was clever and wise and she often declared herself heartless and "unimpressible," but I thought if she were heartless it was because she had already given her heart to Dr. Bronson.

All through the bright spring days he brought her wild flowers and, after making his evening rounds, would read to her, while she, in turn, played little melodies on her guitar or amused him greatly by relating some of her school-day pranks.

She was the life of the lower floor and many a lonely heart was made glad by her merry laugh, her cheery "Good-morning," or a bunch of blossoms from her abundant supply.

Sometimes Dr. Bronson would laugh a low laugh of contentment and suppressed happiness and I would wonder: "Did she charm away that old look in his eyes?" But how? She had scarcely seen him ere it vanished.

So the day slipped—nay, rippled—by on the tide of that sweet, low laughter and music of contented voices. Gradually Miss Townley became able to move about in her wheelchair. Dr. Barton seemed to be growing melancholy and the old restless, longing look came creeping back. He would wheel her up and down the halls and then leave her by the open door, where the sweet spring's breath came floating in, and go about his duties, still watching her with a loving care that seemed pathetic to me, for I felt that there was a story to his life that no one knew and which withheld its sequel.

Finally he told her that in a few days—less than a week—she would be well enough to leave the hospital. I was in the room when he told her and I noticed that the words came reluctantly and could scarcely be heard. He left the room suddenly, almost fiercely, and the old look was deeper than ever.

That night there was a fearful storm. The wind blew a perfect gale, and hurled the sheets of falling rain against the window panes. The thunder dropped its heavy-forged bolts in quick succession, while the lightning kept the scene brilliant as day.

Dr. Bronson was in and out of the wards all night, but he went oftenest to Beth's room to ask:

"Are you nervous in this frightful storm?"

She would answer softly, "Oh, no," and then, having no excuse to remain longer, he would pace the halls nervously while the fury of the storm increased. He thought one bitterly.

"Oh, if she would only show me some sign of fear or distress, that I might go to her and do something just to be near her!"

Here he was interrupted by a tremendous crash. It seemed as if heaven and earth were clasped in close embrace and were swaying and rocking in the furious blast.

With one bound he was at Miss Townley's bedside. She lay there white as marble, her forehead cold and her lips blue. The corner of her room next the street was blackened and burning.

Seeing that no time was to be lost, he gathered her in his strong arms and carried her to the ward across the hall and laid her down and sent at once for me.

In the hour that followed Dr. Bronson hung over Beth, using every means to save the life that I saw had become so dear to him.

The fire did little damage, and as soon as the storm rolled away to the east, its mutterings growing fainter and fainter, we saw Beth's pale lips grow pink, her eyelids quiver and then slowly lift and the eyes rest on the doctor's anxious face.

"Thank God!" came quickly from his lips, and he knelt beside the little, low bed and bent his head on her outstretched hand. Is it unmanly to weep? Some say it is, but the noblest tears I ever saw shed were those that fell from Dr. Bronson's eyes. They were the spray from an ocean deep and fathomless, the ocean of his great love.

I slipped away then, for he seemed completely overcome, and I thought they two were best alone just then.

When he came out his eyes shone with a new light which the traces of tears only reflected and intensified. He went directly to is room and I returned to Beth. She looked up and smiled, and I saw tears in her eyes, too. She did not wipe them away, but wept again as if in remembrance of the last hour. It was almost morning now, the rain still fell, but gently, and the air was fresh and cool. She said softly, "I think I can sleep now," and so I left her.

The next day she was taken home. The west wing of the hospital was closed for repairs and the patients were moved to another floor, and I saw little more of Dr. Bronson.

The other day a thick envelope came for me, and upon opening it I read these words:

"Mr. and Mrs. George H. Townley announce the marriage of their daughter, Elizabeth Walker to Dr. Philip Heron Bronson, September fourteenth, eighteen hundred and ninety-two."

A COWBOY'S NERVES.

The Strange Discovery He Made in a Dentist's Chair.

One morning in Silver Ranch a wild yell was heard at the far end of the street, and the anxious inhabitants who momentarily poked out their heads, saw "Terranteler Tom" on his pony dashing up the street discharging a revolver from each hand. The heads disappeared, and it was a deserted street, with but one inhabitant. That temporary, solid citizen was the aforesaid "T. Tom, Esq." A sign stayed his wild flight. Upon that sign was the inscription, "Dr. Hopkins, Surgeon Dentist."

When the reliable old citizens cautiously looked out and saw the pony in front of the dentist's they knew Tom had the toothache, and realized that there was fun ahead. Of course, they knew he'd only shoot the dentist, and wind up, with a friendly drink all round, so they gathered around the doors and windows of the tooth-pulling shop to see if Tom's hand was just as steady as ever. Tom opened the conversation as follows:

"You long-legged grasshopper, pull this tooth, and be quick as lightning and gentle as a zephyr."

"All right. Sit down in that chair, and I'll 'yank' it out for you."

Tom leaned back in the chair, with a cocked revolver in each hand and replied:

"You jest get the drop on that tooth now, or I'll yank you."

Dr. Hopkins had a chair fixed for just such customers. He had a heavy galvanic battery under the seat which could throw a circuit heavy enough to paralyze Jumbo, and he just quietly turned the knob on "Terrantler Tom," and walked around and took the pistols out of his hands. Tom writhed as though he were fastened to the chair of the Inquisition; his eyes stood out like door-knobs; he tried to yell, but no sound escaped his lips. It was something new to Tom, he didn't understand it; he had never heard of a galvanic battery and he thought he was going to die. Quickly the dentist pulled the tooth, took the remaining cartridges out of Tom's revolvers, and then, gradually letting up on the battery, he said cheerfully:

"Tooth is out, sir; $5, please."

"What in all the tarnal grizzlies and wild cats was the matter with me while you was pulling that tooth?"

"Oh, your nerves just gave way a little. That's the way with most everybody when they get in a dentist's chair."

Tom was so ashamed to think his nerves had given way that he paid the dentist, invited all hands to drink and rode off as gentle as a lamb, thinking for the first time in his life that he had mistaken his vocation and ought to enter the ministry.—New York Mercury.

Electric Motors Are Showing an Economy of Fifty Per Cent.

There have been many cases of the use of electro motors to drive lines of shafting or isolated parts of plants to prove conclusively the remarkable increased efficiency obtained, especially where the conveyance of steam for a long distance was necessary. This has led to a more thorough study of the amount of power absorbed by the line shafting and counter-shafting. The minimum loss that can be looked for, and this is obtained only in exceptional cases requiring constant vigilance, is 25 per cent of the total power developed, and more frequently runs as high as 65 to 70 per cent. A safe average would be from 40 to 50 per cent, although the actual loss must be determined for each and every case. With the use of electro motors, when properly designed and proportioned for the work, as, indeed, is as necessary in electrical work as with any other problem of mechanics if the best results are desired, this percentage of loss can be materially reduced. An inefficient result may be expected with bad electric engineering just as with a poorly arranged case of millwrighting, but, the electrical proportions being once obtained, there will, within reasonable limits, be no decrease in efficiency from the deterioration.

The advent of electricity for such purposes seems to have enabled managers to realize more fully than ever before the loss accompanying what was heretofore generally accepted as the most efficient method of furnishing power to the individual machines of a plant. The use of electric motors in the place of shafting and on isolated machines where the motors are belted directly to the isolated shafts or to the machines has been sufficiently extended to render the verification of the results obtained unnecessary. It is no exception to find a reduction of 50 per cent of the power consumed. This is not due entirely to the saving of loss through friction, but also to the advantage gained by the intermittent action of machinery of every kind. Tests show that where the motor drive has been substituted, the machines are in operation but little more than one-half the time, or more correctly stated, the power required is only about one-half the total average power of the machines when doing work. As remarkable as these results may seem, sufficient data are on record to prove their correctness.—Cassier's Magazine.