Stains and Their Removal.

It is, perhaps, hardly necessary to say that stains should be treated as speedily as possible after their first appearance. When once dry they are more difficult to remove, requiring both time and perseverance. Paint should be instantly wiped off; grease on wood, stone or carpet should be congealed before it has time to penetrate, by throwing cold water over it. Tea, coffee, ink, wine, and fruit stains will disappear in a quarter of the time if they can be attended to while wet. Spots on colored material must not be rubbed, but dabbed over and over again until they disappear. Rubbing roughens the surface and often leaves a whitened circle almost as unsightly as the original stain. The dabbing is best done by covering a finger with an old handkerchief frequently changed, and great care should be taken to confine the operation to the area of the stain itself, and not to extend the damage by damping and dabbing the surrounding material. In the treatment of stains, to know what you mean to do, and to do it quickly and neatly, is more than half the battle. We will take stains on white washing materials first.

For acids, tie up a bit of washing soda in the stained part, make a lather of soap and cold soft water, immerse the linen, and boil until the spot disappears.

For anilines, wet with acetic acid, apply diluted chloride of lime, and wash out carefully.

Apple and pear stains may be removed by soaking in paraffine for a few hours before washing.

Blood, if fresh, is removed by soaking for twelve hours in cold water, then washing in tepid water. If the mark still remains, cover it with a paste made of cold water and starch, and expose to the sun for a day or two. Old stains require iodide of potassium diluted with four times its weight of water.

For coffee and chocolate, pour soft boiling water through the stains, and while wet hold in the fumes of burning sulphur.

Fruit stains can be treated in the same way if fresh, but if old rub them on both sides with yellow soap, cover thickly with cold water starch, well rub in, and expose to sun and air for three or four days. Then rub off the mixture and repeat the process if necessary.

Grass stains are removed by alcohol.

Ink requires milk for its removal; the spot should be soaked and gently rubbed. A fresh stain will disappear quickly, but an old one may need soaking in milk for twelve hours.

For iron mould, spread the stained part on a pewter plate set over a basin of boiling water, and rub the spots with bruised sorrel leaves, then wash the article in soft warm suds. Or, cover the spots with a paste made of lemon juice, salt, powdered starch, and soft soap, and expose to the sunlight.

Mildew can be removed by the above paste, or by simply wetting the spots, covering them with powdered chalk, and bleaching on the grass.

Paints must disappear before turpentine and perseverance.

Scorched linen can be restored if the threads are not injured. Peel, slice and extract the juice from two onions, add half a pint of vinegar, half an ounce of curd soap, two ounces of fuller's earth, boil these well, and, when cool, spread over the scorch, let it dry on, and then wash out the garment.

Tar can be taken off with petroleum.

Tea stains yield to the action of boiling water poured through them from a height, or to glycerine.

Wine stains, if old, treat like old fruit stains; if fresh, table salt spread over the spots while wet will neutralize the damage.

Stains of which the cause is unknown will frequently disappear if held in a pan of milk boiling on the fire, or by dipping them in sour buttermilk and drying them in the sun. The articles should then be washed in cold water, dried, and the process repeated several times in the day. The following bleaching liquid will effectually remove any trace that may still remain after the garments have been through the laundry. It may be called an instantaneous ink and stain extractor, but requires to be used with care lest the fabric suffer. Put a quarter of a pound of chloride of lime and a quart of soft water in a wide-mouthed bottle and shake it well. Cork tightly for twenty-four hours, then strain through cotton and add one teaspoonful of acetic acid to every ounce of the mixture. Damp the stain, apply the extractor, and wash well in clear, soft water.

For the removal of stains and spots from colored materials and carpets, ammonia takes the first place. Almost any mark, new or old, will yield to its persevering use, and if dabbed on (not rubbed) it will itself leave no trace of its use. It can be applied to woolens, cottons, and silks. It will remove ink spots from marble, paper, and wood. Grease flies before its application; and when diluted with water, spots caused by orange or lemon juice or vinegar are removed by it from the most delicate materials. For very nice fabrics some people like to use the old-fashioned javelle water, to be obtained from the chemist, but ammonia, delicately applied, does quite as well. From carpets, curtains, and suits of clothing it will remove almost every stain, including that caused by whitewash. Ink spots are always the most difficult to efface. Take up as much of the ink as possible with a spoon and blotting paper, and then use milk or clear water until it disappears, being careful not to extend the area of damage done by rubbing the ink into the adjacent material. Benzine will remove paint from delicate fabrics; if it fails, turpentine must be used, and the mark which it leaves effaced by alcohol. If in the process of removing stains the color departs from the material, it can generally be restored by dabbing with chloroform. —Dyer and Calico Printer.

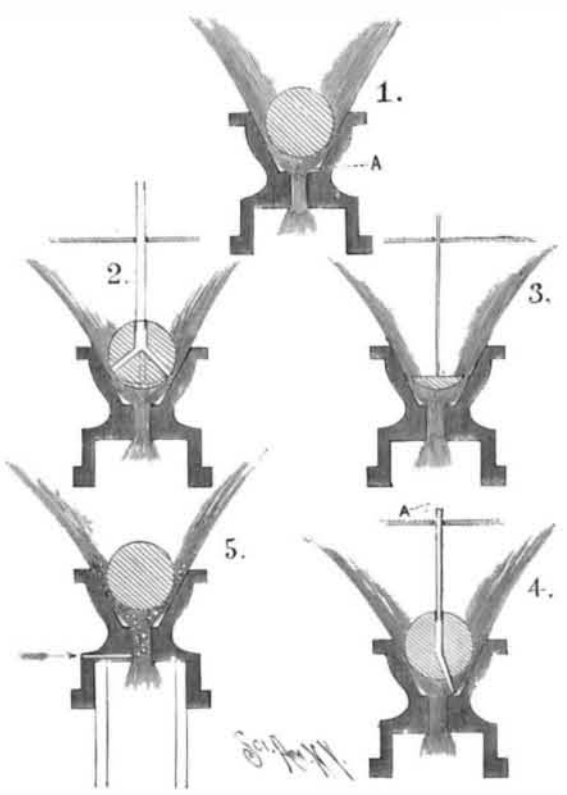
Correspondence.

THE BALL NOZZLE.

To the Editor of the SCIENTIFIC AMERICAN:

Not being entirely satisfied with your explanation of the phenomenon of the ball nozzle, we procured one, and find that the vacuum is located at A, Fig. 1, instead of at the point where the water is tangent to the ball. The following experiments, we think, will prove it: We drilled a hole in the ball, Fig. 2, about ⅛ inch in diameter, and half way through the ball from that we drilled three others to the point where the water is tangent to the ball. In the larger hole we inserted a stiff tube and passed it through a hole in the cross piece above the nozzle; that held the ball in the position shown in the figure, but left it free to be thrown out. If the vacuum was at the point of tangency, the air passing down the tube and out at the side would fill it and the ball would be blown out, but the ball remained in the nozzle.

We then cut the ball down, Fig. 3, until there was



THE BALL NOZZLE.

but a small disk or button left, $\frac{2}{16}$ of an inch in diameter and $\frac{2}{16}$ thick; this was supported by a wire as shown in the figure; the pressure was not great enough to carry it out.

The only place then remaining that a vacuum could be formed was below the water above the shoulder of the nozzle. To prove that the vacuum was at that point, we drilled a ball as shown in Fig. 4, and in the lower opening inserted a tube $\frac{1}{16}$ of an inch in diameter, letting it project beyond the ball about ⅛ of an inch, just enough to carry it below the water; the upper tube was passed up through a cross piece as shown in the figure.

We found that the air passed down the tube, filled the vacuum; and the ball was thrown out.

The opening in the tube at A, Fig. 4, was then closed so that the air could not pass down the tube to the vacuum; the ball would then remain in the nozzle.

We think that the above experiments prove that the vacuum is at A, Fig. 1, and not at the point where the water is tangent to the ball. N. W. GREEN.

Albert Lea, Minn., September 6, 1895.

[We think the experiments of our correspondent fail to prove anything derogatory to our explanation to which reference is made; on the contrary, they seem to prove our theory correct. We admit a vacuum is formed at A in Fig. 1, as pointed out in the above letter; but this would be insufficient of itself to cause the retention of the ball in the nozzle. The admission of air at three or more points in the vacuum zone in the manner shown in Fig. 2 would only destroy the vacuum at those points. The vacuum would still be sufficient to retain the ball.

When air is admitted through the tube A to the space A, it is distributed sufficiently to reduce the vacuum at the surface of the ball and elsewhere in the nozzle, so that the ball is thrown out by the water jet. In Fig. 5, which we have added, is shown an experiment in which air is admitted to the smaller part of the nozzle. This is distributed through the water, preventing the formation of a vacuum anywhere in the nozzle, consequently the ball will not be retained in the nozzle. Air mingled in any way with the water will cause the ball to be thrown out.—ED.]

Destructive Collision of Tandem Bicycle and Carriage.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of August 3 you speak of the striking force of a wheelman at ten feet per second. I will give you something to think about. Three young men left here on the evening of September 7, to ride to Aurora, about twenty miles distant. Two rode a Rambler tandem, one a Fowler wheel; all three are expert long distance riders. When nearing Aurora, they reached the top of a sharp decline, and the temptation to race was too strong, and away they went. Coming from the other direction was a light wagon, containing a woman and two men, the wagon drawn by one horse; all reached the bottom of this hill at the same time—the horse at a slow trot, the boys at thirty miles per hour (and all the argument you could make will not make them come down a single mile).

The tandem struck the wagon somewhere about the left front wheel, none can tell how. Result, wagon wheel turned inside out, axle bent, shafts torn off and one man thrown out on his face. William Hill, first rider, thrown straight ahead about 30 feet, badly bruised and left leg injured, though able to be about on the 12th. Clare Phelps, second rider, thrown about the same distance as Hill, but at an angle of about 70°, using a right angle to the road as a base, bruised about the head and face, otherwise O K the next day. The wheel or tandem about 30° and in the ditch, the front wheel smashed, fork bent short back against the frame and the frame bent between the rear handle post and the front seat post in such a way as to force the front seat over the top of the rear handles; the seat was raised as high as it would go, for Hill is tall and the handle bars were low.

Hill's weight, 150 pounds; Phelps', 137 pounds; tandem, 48 pounds. These young men are used to the cyclometer and timing. Mr. Jarred, the other wheelman, has made his 2½ minutes time on country roads very often, and declares he never rode so fast in his life, and I believe him. A. A. WILSON.

Sandwich, Ill.

Note on Helium and Argon.

BY PROF. H. KAYSER, OF BONN.

Hitherto helium has been found only in a few minerals, and we do not know as yet in what state it exists there. It may therefore be interesting that I have found it in a free state in nature. Some time ago I received information that in the springs of Wildbad, in the Black Forest, bubbles of gas rise which—according to an old analysis of Fehling—contain about 96 per cent of nitrogen. As in all such cases it is possible that considerable quantities of argon may be found, I submitted the gas to analysis.

About 430 c. c. were mixed with oxygen, and sparks were caused to strike through it in presence of potassa lye. The excess of oxygen was then removed by means of potassium pyrogallate. After desiccation there remained 9 c. c., which were filled into Geissler tubes for a spectroscopic examination of the gas. It showed the lines of argon and helium, the latter not in a small quantity, as its lines appeared very bright and could be readily photographed. Runge and Paschen have found that the gas evolved from cleveite and broggerite is a mixture of two substances, one of which, helium, is most highly represented in the visible spectrum by the yellow line, D_3, while the other, not as yet named, is represented by the green line, $\lambda = 501{\cdot}6\ \mu\mu$. Both these elements are also represented in the Wildbad gas, though it seems to me that the second element is here in a smaller proportion than in broggerite, as the green line is relatively feebler.

In this result it seems to me especially interesting that thus for the first time a place has been discovered where the two gases included under the name "helium" are liberated and stream out into the atmosphere. Hence free helium must be found in the air along with argon. In fact, I have found in Geissler tubes which I had personally filled with the purest argon possible—and that at a time when I had not yet worked with helium, so that no admixture with it could have occurred in my laboratory—on direct comparison with helium tubes the presence of D_3 in the argon spectrum; and I have obtained photographically the strong lines at $388{\cdot}9\ \mu\mu$. The lines are certainly very faint, but I consider the presence of helium in the air of Bonn as beyond any doubt. Whether this presence of gases in the springs of Wildbad has any connection with their hygienic efficacy, and whether the gases occur in similar springs, the future must show.—Chem. News.

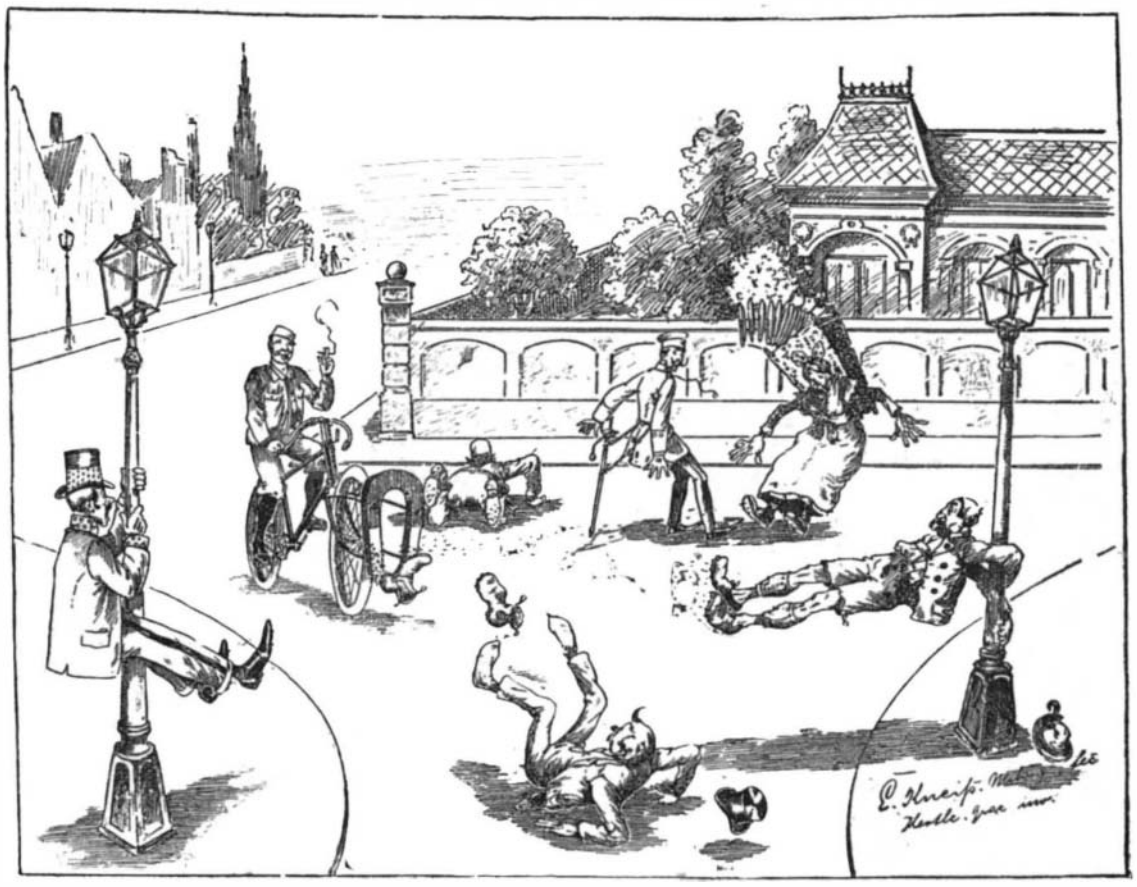
Students as Conductors in Philadelphia.

The Electric Engineer says that "during the past summer between 30 and 40 students of Jefferson Medical College, the Philadelphia College of Dentistry, the University of Pennsylvania and other colleges in this city obtained employment as conductors on the cars of the People's Traction System of Philadelphia. All of the young men came from outside the city, and were working their way through college. The last of them handed in their resignations last week, which the company accepted with regret, for the young men had proved to be the best conductors in its employ. An official of the company said the students were thoroughly honest, intelligent and polite, and as their desire was to earn as much money during the summer as possible, they were always willing to work extra hours and take out special cars. They lived economically and have probably saved something like $130 each, which will go a good way toward paying their college expenses next winter. One of the students has almost concluded not to go back to college, he likes railroading so well, and is still in the employ of the company."

THE MAGNETIC BICYCLE.

In some parts of the country there are malicious persons who throw tacks in the roadway to annoy bicycle riders by perforating the pneumatic tires. To meet this difficulty it has been proposed to attach a magnet in front of the forward wheel, with the object of picking up the tacks as the machine rolls along.

A caricaturist in one of the comic papers has made use of this idea in the accompanying sketch. Here the cyclist is represented as carrying such a powerful magnet that it not only picks up tacks, but even draws out the nails from the shoes of passers-by.



THE MAGNETIC BICYCLE.

Obstinate Thumping.

Sometimes an engine which usually runs well develops an obstinate pound or thump, which persists in spite of all the doctoring that can be done to the machine. In vain the engineer will go from the wrist pin to the crosshead, and from eccentric to bearing. Even the flywheel and the manner in which it is keyed upon the shaft will be investigated, to see if the thump is located therein. After all these things have been tried in vain, just give the engine a trifle more compression and note the result. Probably it will cure or make it worse. In the latter case change the valve again and give a little less compression than there was before. In nineteen cases out of twenty, says the Safety Valve, the change in compression will do the business. The philosophy of the business is this: The compression is too little or too great to allow the engine to run smoothly over the center; and at that point the piston gives a "yank," which causes wrist pin and connection and sometimes the main bearing to vibrate to the extent of the lost motion, forming the thump or pound, which is so objectionable to the good engine runner.

Should Your Boy Go to College?

Is a college course the best training for a boy designed for a business career? Upon this important question good judges differ. The editor of Munsey's, believing that those entitled to discuss this question with authority are rather the practical men of action than the theorists of educational science, has collected and presented the views of some of New York's leaders of affairs on this subject. In his introductory remarks the editor says:

"It might perhaps be thought that in the trial of such a cause each juror's verdict would depend upon his own personal history; that the college alumni would support the honor of their alma mater by voting for an academic training, while those who stepped directly from the school to the shop or office would advise others to seek business success by the pathway they themselves followed. This is, however, by no means invariably the case. There are university graduates—men who made good use of their time in the classrooms, and who went on to honorable places in the world—who question, nevertheless, whether those four formative years might not possibly have been spent to still better advantage. And on the other hand many if not most of those who have gained success without a college course look back upon their early days with a regretful sense of having missed something that would have helped and benefited them all through life; of having entered the arena without a weapon which nothing can entirely replace, even though they win the battle with the arms at their command."

Mayor Strong thinks that while a college education is a good thing to have, it is far from being indispensable to the business man. He says that if he had to choose between two applicants for a position, the one a college-bred man and the other a smart young fellow with only a common school education, he should engage the first, if the post in view would warrant it, and provided the college man displayed an equal capacity for work. If the other applicant was found to be more active, more willing, he would prefer him. Mayor Strong concludes by saying:

"A college education requires the investment of a small capital and the expenditure of several years of study. The boy of natural talent, who enters business life when he leaves the public schools, begins to earn money at once; but it does not follow that the college man's time and money have been wasted. His increased broadness of vision, the greater extent of resources at his command, will equip him to contend with the exigences of life, and to grasp the business problems that will confront him, with a surer hand, a clearer head, and more ready determination than his brother. The latter's advance in his chosen field will be steady, the result of unceasing labor. The college-bred man will gallop gracefully to the front, while the other's gait is slow and plodding, formed in the painful school of experience."

Similar ground is taken by Hon. Roswell P. Flower, who says that if he had a dozen boys, he would not send all of them to college, but would carefully select from the number those he judged to be best fitted for higher education, and the rest would have to get along as best they could with elementary knowledge. He had to make his own way thus insufficiently equipped, and while he is quite contented with his fate, he cannot help wishing sometimes that in his youth he had had better opportunity for developing his natural ability. Mr. Flower invites a glance at the careers of some of America's great intellectual leaders of the past who had no college education, such as Clay, Douglas, and Lincoln. He says:

"I think a college education the greatest boon that can fall to the lot of a boy endowed with a clever and active mind and a wholesome thirst for knowledge. However humble a man's station in life, knowledge will enrich him in the long run, one way or another. At the same time a university training is not essential to success in business life. Moreover, I should hesitate to advise a parent to send even the brightest boy to college if I was not quite sure that he could withstand the temptations sure to be offered to him there. There is too much luxury about our present-day college life. . . . Very few of the business men and politicians of the older generation were college-bred; the majority of those who are leaders in the commerce and industry of to-day, too, have achieved success upon a basis of a common school education; but the desirability of a university course is becoming more and more apparent as the struggle of life sharpens. Nothing will more thoroughly fit a boy for the battle before him than natural talent developed by a college education, and backed up by frugal habits."

One of the most conspicuous disbelievers in the university for the training of a boy for a business life is the well known banker, Henry Clews, who is reported as saying:

"Think of a man going into business with three-fourths of his brain cells filled with classical knowledge, dead languages, and high sounding but unpractical ideas!

"I have been severely criticised for saying that I would not have a college-bred man in my office. Here is my reason: To become a successful merchant, banker, or broker, one must begin young. Most college boys, when ready to enter an office, are over twenty years of age. I have a son at college—a six footer, in his twenty-first year. Can I ask him to undergo the training I deem necessary for every business man? Would he be willing to commence at the foot of the ladder, with boys of sixteen, and on a salary of $150 per year? Why, that youth not only knows more, in every branch of knowledge, than all the office boys and clerks in this office; he knows more than his father, too.

"A collegian cannot, or perhaps will not, humble himself sufficiently to learn the rudiments of the business man's vocation. He rebels against the discipline necessarily imposed upon a subordinate. He has been used to regard himself as a brilliant young gentleman for several years; can you blame him for objecting to sit on the same bench with errand boys? And has he enough practical knowledge to deserve a place behind the desk? In my opinion the average graduate does not even know enough of arithmetic and of caligraphy to earn, upon his arrival in an office, a salary of five dollars a week. My legible hand secured for me the first good position I ever held; the average college graduate writes a fearful scrawl, and is proud of it. I understand that none of our universities employs a teacher of caligraphy. This is a sad defect, of which the collegian does not become aware, as a rule, until it is too late to remedy the evil.

"I have practically tested the problem whether a college education is desirable for a business man. Years ago I employed several college men, one after another; none of them succeeded in benefiting either my business or himself. So I got rid of them. Of the boys who came to me equipped with nothing beyond a common school education, a sound mind, and an ambition to work, dozens are now independent business men, while as many hold responsible positions with large firms."

A more moderate view is expressed by a member of the famous Seligman fraternity, who says that in his business he prefers men who have received a college education, but does not make employment conditional upon that fact. Although college alumni are comparatively scarce among the business men of the present generation, he believes that the next generation will abound with them, for in every walk of life the necessity of higher education is becoming more and more apparent. He thinks that while a man of sound mind and good habits will come to the front, whether he is college-bred or not, with equal gifts and with the same application the collegian will outstrip him in the race.

The article closes with the views of Mr. Chauncey M. Depew, from which we quote:

"While the world gives on its material side such examples of success as Commodore Vanderbilt and such instances of wise statesmanship and service to his country as Abraham Lincoln, we must remember that in the affairs of life no comparisons can be made with the phenomenally gifted who are endowed by the Almighty from their birth with powers far beyond the equipment of their fellows. With the business man who must be more than his vocation, the artisan larger than his trade, and the farmer more learned than in the traditions of his fathers, it is the trained intellect disciplined by higher education which alone has any certainty of success.

"This is not a modern thought, a new-fangled idea. American independence, and the founding of our