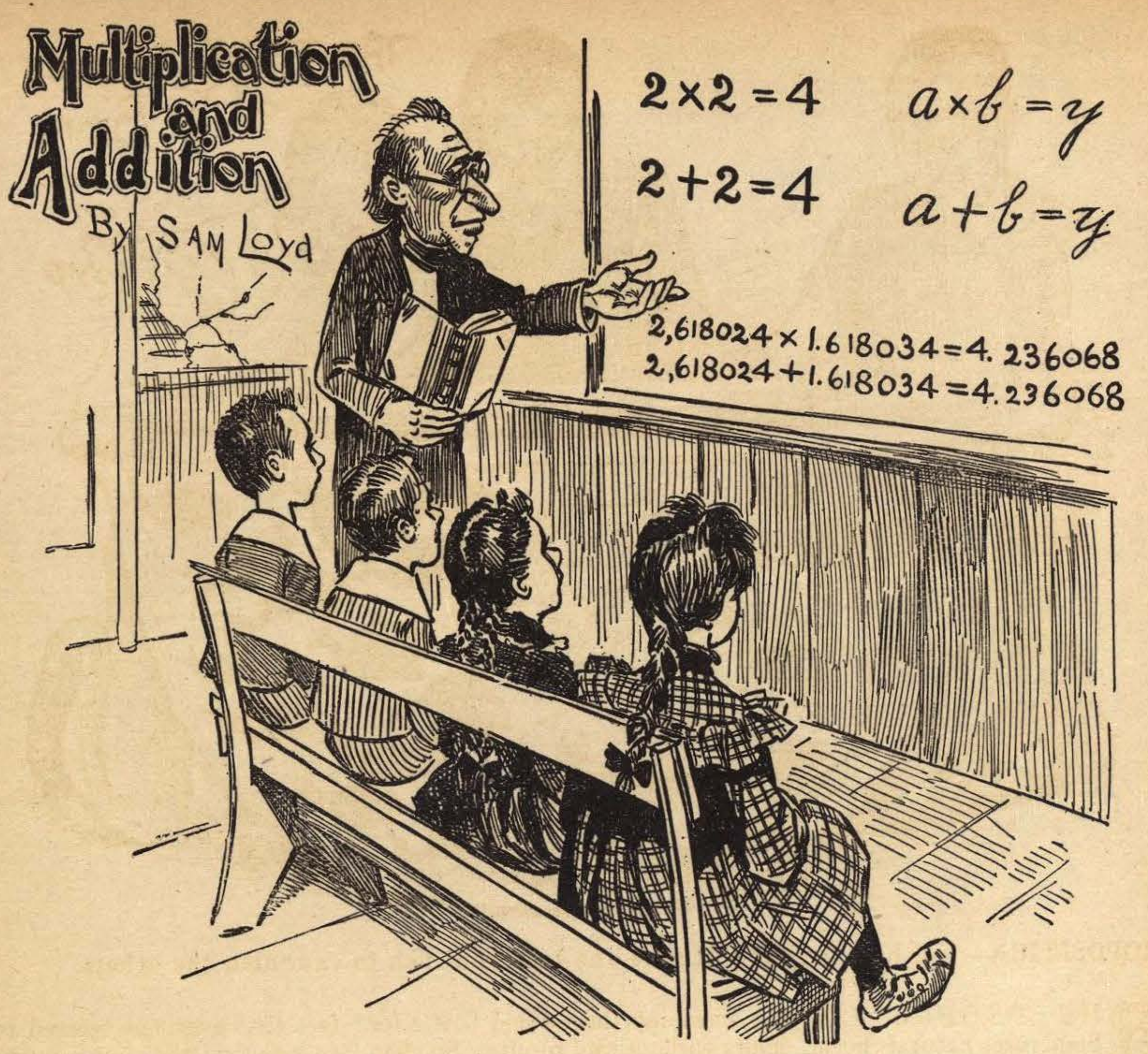


PROPOSITION—Give different values for A+B and A×B=Y

OF COURSE YOU ALL understand multiplica-tion and simple addition and do not require pencil and paper to do a little sum like two and two make four, and yet there are peculiarities about the number 2 which many have overlooked.

Well, some time ago the editor of Notes and Queries, who devoted considerable space to the discussion of mathematical questions, gave a very startling reply to a searcher after information, who pointed out the fact of 2 multiplied by 2 producing the same result as 2 added to 2, and asked if there were any other two quantities which when multiplied or added together would give the same result. The editor said that there was one other solution to the propositon where a+b=y, and where a×b=y, but by a curious blunder in multiplication said 2.618024×1.618034=4.236068, just as 2.618024+1.618034=4.236068.

It is self evident that one of the quantities which we will term a or b is wrong, and as it is merely a problem in simple addition and multiplication, but is sufficiently out of the ordinary to be confusing, it is presented as a puzzle to correct one of the quantities so that the sum will be equal to the product.

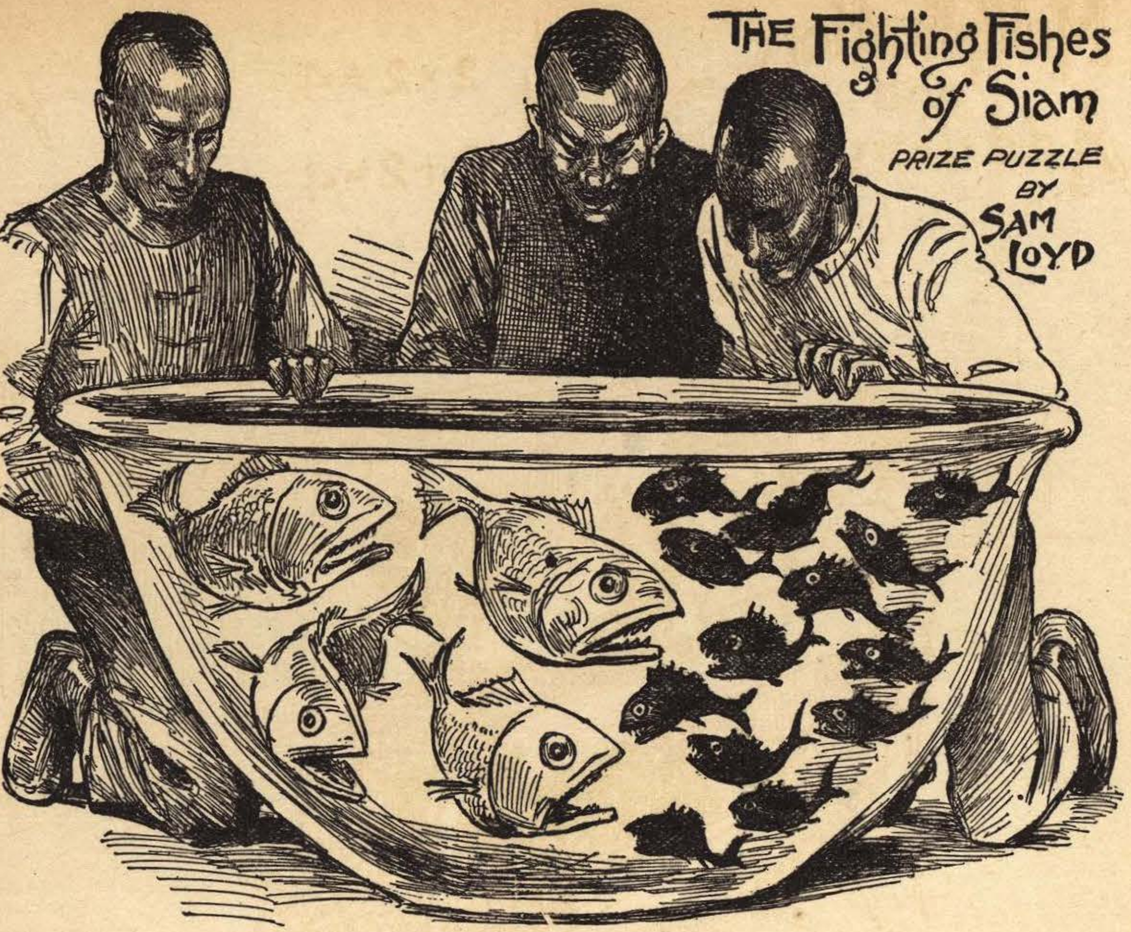
It is really a curious and remarkable fact that there should be any two numbers or series of numbers which when multiplied or added together should give the same result. Calling a 2 and b 2 and y 4 we have shown as an elementary lesson in algebra that a×b=y, just as a+b=y, and it is safe to say that it would puzzle many a clever person to think of any other numbers or quantities wherewith to perform the same feat and yet there is such an endless variety that you may select any number or series of numbers by chance and I will at once tell what to add or multiply with to produce similar results.

The rule is extremely simple and well worth knowing, as it proves that 2 is not a freak number as is generally supposed.

Domestic Complications.

Here is a pretty little tangle from the ordinary affairs of life, which the good housewife solved in a minute, but which drove a mathematician to the verge of insanity.

Smith, Jones and Brown were great friends. After Brown's wife died, his niece kept house for him. Smith was also a widower, and lived with his daughter. When Jones got married, he and his wife suggested that they all live together. Each one of the party (male and female) was to contribute $25.00 on the first of she month for household expenses, and what remained at the end of the month was to be equally divided. The first month's expenses were $92.00. When the remainder was distributed each received an even number of dollars without fractions. How much money did each receive, and why?



PROPOSITION—Tell how long it will take one species of fish to vanquish the others.

THE PEOPLE OF Siam are natural born gamblers, who would bet their last vestige of clothing upon any event which offers a chance to win or lose. They are not especially belligerent themselves, but they love to witness a fight between any other creature from a toad to an elephant. Dog-fights or cocking mains are of daily occurrence and are conducted pretty much according to the recognized lines of civilized countries, but in no other land upon the globe is it possible to witness a fish fight!

They have two kinds of fish, which, despite of their being very choice food, are raised and valued solely for their fighting qualities. The one is a large white perch, known as the king fish, and the other is the little black carp, or devil fish. Such antipathy exists between these two species of fish that they attack each other on sight and battle to the death.

A kingfish could readily dispose of one or two of the little devilfish, but their methods or tactics are so agile and they work together so harmoniously that three of the little fellows would just equal one of the big ones, and they would battle for hours without any results. So cleverly and scientifically do they carry on their line of attack that four of the little fellows would kill a large one in just three minutes and five would administer the coup de grace proportionately quicker.

These combinations of adverse forces are so accurate and reliable that the feature of a fish tournament is to calculate upon the exact time it will take a given number of one kind to vanquish a certain number of the enemy.

By way of illustration a problem is presented in simple puzzle form with four of the kingfish opposed to thirteen of the little fighters.

Who should win? And how long should it take one side to annihilate the other?

This problem was presented to me at Bangkok and, while owing to the peculiar complications of the case, it took me quite a long time to figure out the correct solution from a mathematical standpoint, I found that any Malay youth would give the same answer off hand, either by intuition or from knowledge obtained from practical experience. But it is an actual fact that everyone seemed to know to a second the time required for a certain number of fish to destroy another given number of opponents with but a small margin of deviation contingent upon the better quality of the fishes or the accidental fortunes of war.

Why are married men like steamboats? Because they are sometimes blown up.

What ship contains more people than the "Great Eastern?" Courtship.

Why do women make good post-office clerks? Because they know how to manage the mails (males).

Why is lip-salve like a chaperon? Because it is intended to keep the chaps away.

What is worse than raining cats and dogs? Hailing omnibuses.

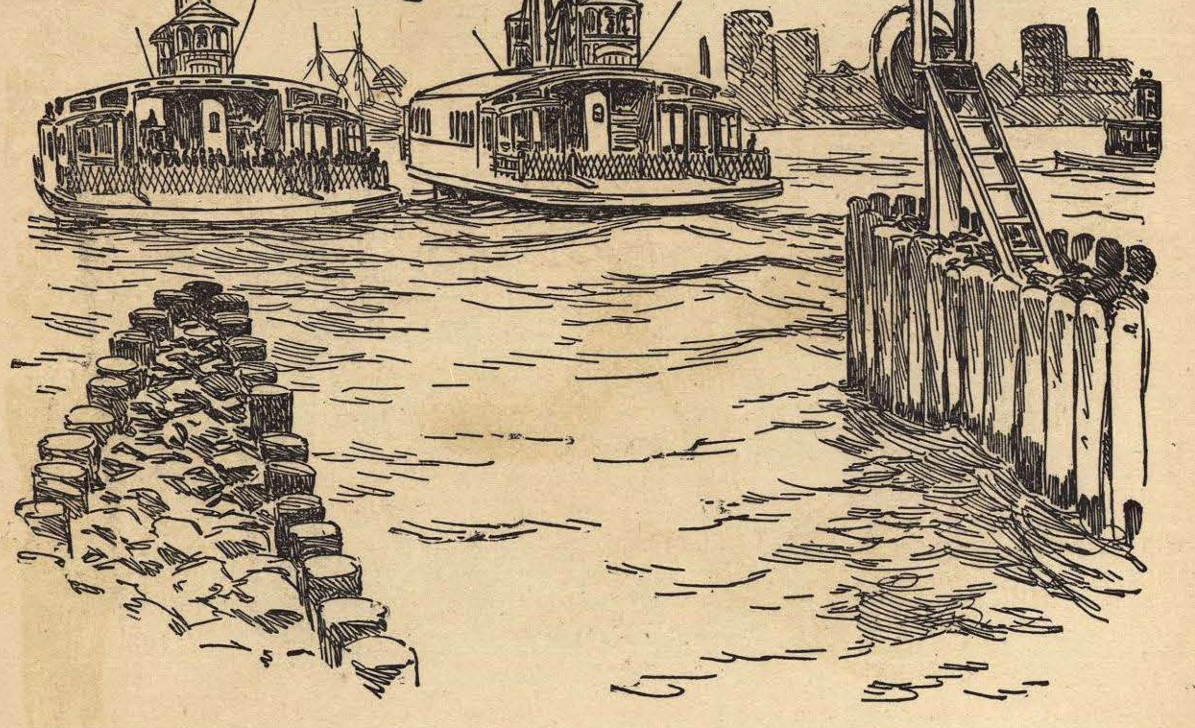
Why is an umbrella like a pancake? Because it is seldom seen after Lent.

What is that which every living person has seen, but will never see again? Yesterday.

What is the difference between dead soldiers and repaired garments? The former are dead men, and the latter are mended (dead).

THE FERRY BOAT PROBLEM

BY SAM LOYD



PROPOSITION—Two boats start from opposite sides of a river at the same instant, and meet 720 yards from the shore. They remain in the slips ten minutes, and on the return trip meet 400 yards from the other shore. How wide is the river?

JUST TO SHOW HOW the average mortal follows the cut and dried rules for doing ordinary calculations and will be puzzled by simple problems which call for original lines of thought, attention is called to this practical example which requires only a slight knowledge of the most elementary arithmetic. By a kindergarten process it can be explained in a few minutes so that any child can do it, and yet I hazard the opinion that ninety-nine out of every one hundred of our shrewdest business men would fail to figure it out in a week. So much for learning mathematics by rule instead of common sense which teaches the reason why!

I went to a ferry a short time ago to investigate the relative speeds of two boats, and by calculation evolved the following information:

The two ferry boats started from opposite sides of the river at the same instant. One boat, however, was faster than the other, so they met at a point just 720 yards from the shore. Each boat remained but ten minutes in the slip to change passengers and then started on its return trip, when, by careful calculation, I found that they now met at a point just 400 yards from the other shore.

From the data given, our puzzlists are asked to show a simple way of determining the exact width of the river.

A Parlor Trick.

Robert Heller had the happiest faculty of showing a card trick to its best advantage of any performer I ever met.

Writing the name of a card on a piece of paper, he would fold, without showing or naming, and handing it to one of the spectators, tell him to stow it safely in his vest-pocket.

Let us suppose he has determined to make you choose the deuce of diamonds, which he has written upon the paper. Holding the pack in his hand, he says: "Here are fifty-two cards—twenty-six red and twenty-six black. Which color do you prefer?" If you say black, he throws down the black, and says, "That leaves me the red." But if you had said red, he would throw down the black cards all the same, and would say, "All right, here are the red." Then he would say. "There are thirteen hearts and thirteen diamonds. Which do you want?" If you say "hearts," he throws them down as before, and says, "I will keep the diamonds," and he would have worked the game as previously described if you had preferred diamonds.

Then he would say, "Here are six cards, and here are seven, Which shall we keep?"

Of course he keeps the six low cards, and dividing again, asks, "Do you select the low cards or the high ones?'

Discarding as before, he places the ace, deuce and tray together and asks, "Which card do you select?"

The second is chosen, and he says, "Look at the paper!" But if the others had been chosen, he would say, with equal effrontery, "All right, that leaves me the deuce. Look at the paper!"

THE POTATO RACE PUZZLE

BY SAM LOYD.

IN THE GOOD OLD days of our daddies no country fair was complete without a potato race, and in some localities the pastime, with certain innovations which make it closely allied to a puzzle, is still popular with the rustic lads and lassies. A hundred potatoes are placed on the ground in a straight line, just ten feet apart, which are to be picked up one at a time and placed in a basket which stands ten feet back from the line. Sometimes when two boys compete, the elder or quicker one is handicapped and has to give his opponent the odds of one or more potatoes. In other words, if Harry and Tom compete in a potato race and Tom gives the odds of one potato, Harry has the right to pick up one potato and drop it in the basket before Tom begins.

It is a sufficiently interesting problem for the average mathematician to figure out how far a person has to travel to pick up the hundred potatoes and bring them in one at a time to the basket. That is one of grand father's old-time puzzles, with which we are all so familiar that in place of being caught by guessing a distance which is miles too short, the modern puzzlist is apt to give an estimate many miles too long. There is a simple rule for solving problems of this kind, so we will also ask our young students to calculate how far the lad must travel to pick up 100 potatoes placed 10 feet apart and carry them one at a time to the basket placed ten feet back?

The real potato race puzzle, how ever, which will tax the cleverness of our solvers turns upon the relative speed of two lads and the question of handicapping by giving the odds of one potato.

Now, in the present case the lads are very evenly matched, nevertheless, as it was found that Tom was 2.04 per cent. quicker than Harry, it was agreed that he should give him the odds of just one potato! So, in order to win the race, Tom, who moves 2.04 the quickest, must bring in fifty potatoes before Harry can get his forty-nine. The sketch shows Harry dropping in the potato which he has selected out of the 100, which starts the race.

It will be found that the result of the race varies according to which one of the potatoes Harry elects to receive for his handicap. The second and more difficult proposition, therefore, is for you to tell the exact result of the race if Harry selects the most favorable potato, always remembering that Tom runs 2.04 per cent. the faster.

Deeply Injured.

Her eyes were wild, her hair was in disorder, her face was flushed, her hands were clenched. She was a deeply injured, desperate woman.

"Oh, cruel one," she cried, in anguished tones, "I have borne with you too long! You have injured the very foundations of my being. Day by day you have tortured me, and yet I could not bear to give you up. When first we met, how your ease and polish attracted me! When you became my own, how many friends envied me! Yet your understanding is too small for my large soul. You are opposed to my advancing myself. You have ruined my standing in society. If we had never met I might have walked in peace. So begone. We part forever"

There was a moment's convulsive breathing, a gritting of teeth and a sharp sigh. It was all over. By a supreme effort she had removed her ——?

THE MOVING DAY PUZZLE

BY SAM LOYD.

PROPOSITION—In how rew moves can you transpose the position of the whisky flask and the scrubbing brush.

HERE IS A PRETTY little study, presented as a seasonable souvenir for the consideration of the rank and file of veterans who will march on May Day to new quarters.

The sketch shows a migratory couple, who, having had their worldly belongings landed by contract into their cozy little six-room flat, have been wrestling for several hours with the domestic 14-15 block puzzle. They have five large articles, the bedstead, table, sofa, ice box and bureau, which are so bulky that no two can be placed in any one room at the same time on account of the close packing of the other small articles, which minor belongings, however, need not be mentioned, as pertaining to the problem.

It so happens, however, that the ice box and the bedstead were placed by the furniture wreckers in the wrong rooms, and the man and his good wife have been struggling for several hours to transpose them.

Being one of the many who solved my old 14-15 puzzle, the man has marked out a diagram of his flat on the table, with the connecting doors as shown, and has placed five articles on the squares to represent the pieces which are to be moved.

It is only necessary to mention that the whisky flask represents the bedstead and the scrubbing brush may be taken for the ice box, and that you are to transpose the positions of these two articles by moving one piece at a time in a sequence of plays in which the flat-iron, peppper box and mouse trap may be used to advantage.

Of course there are a thousand and one ways of performing this sim ple trick, but on Benjamin Franklin's well-known axiom that "three moves are as bad as a fire," the feat must be performed in the fewest possible numbes of moves, and as there is never more than one vacant square to move to, correspondents or others who wish to record their answers can write out the same as concisely as possible by merely mentioning the article moved, viz: "I perform the feat in thirty moves, as follows: Whisky flask, scrubbing brush, flat iron, mouse trap, etc., etc Solve the puzzle by the use of small pieces of paper for counters placed on the diagram of the flat.

Why is a book your best friend and companion? Because when it bores you can shut it up without giving offense.

Why is playing chess a more reputable occupation than playing cards? Because you play chess with two bishops, and cards with four knaves.

When may ladies who are enjoying themselves be said to look wretched? When at the opera, as then they are in tiers.

Why should a minister be believed? Because he is nearly always accurate (a curate).

Why is a mad bull like a man of convivial disposition? Because he offers a horn to everybody he meets.

What should be looked into? A mirror.

Why is the map of Turkey in Europe like a frying pan? Because it has Greece on the bottom.

How many young ladies does it take to reach fiom New York to Philadelphia? About one hundred, because a miss is as good as a mile.

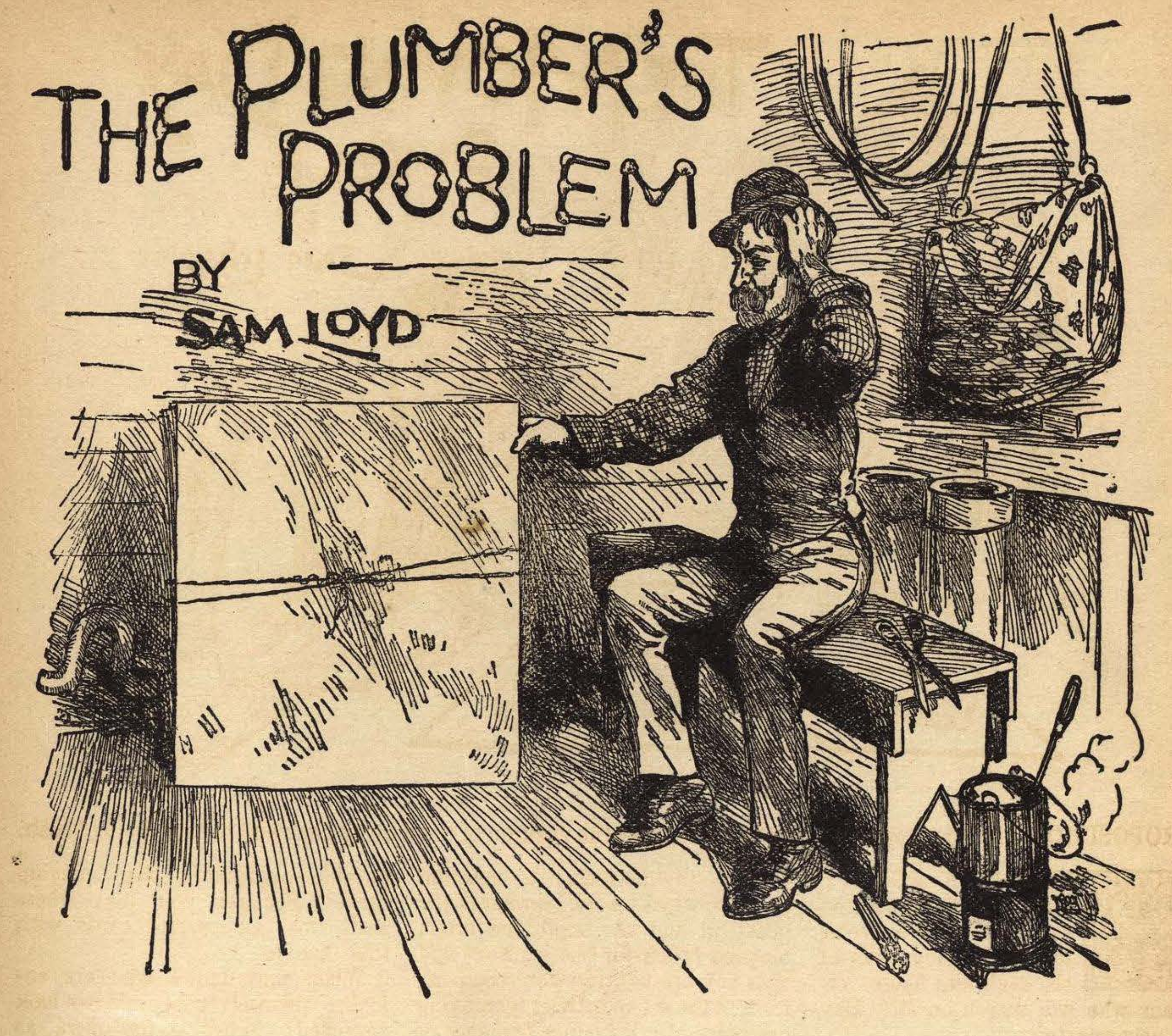
Why should a colt avoid exposure? Because it might take cold and become a little horse (hoarse).

In what respect is matrimony a game of cards? Why, a woman has a heart, a man takes it with a diamond, and after that her hand is his.

What word of one syllable, if you take two letters from it, becomes a word of two syllables? Plague. ague.

THE PLUMBER'S PROBLEM

BY SAM LOYD



PROPOSITION—What is the most economical form of a tank designed to hold 1000 cubic feet?

HERE IS A PRACTICAL plumbing lesson which will interest those of a mechanical turn of mind. Plumbers, boilermakers and tank builders estimate in cubic feet, reckoning seven and a half gallons to the cubic foot, which is close enough for all practical purposes. Of course a mathematician would tell us that there are 1,728 cubic in. to a cubic foot, because 12×12×12 =1,728, while to seven and one-half gallons there are 1,732½, but then plumbers are a liberal set of fellows who cheerfully throw in the extra four and a half inches. A plumber wanted to estimate the lowest possible cost of a copper tank to hold 1,000 cubic feet. Copper comes in sheets three feet square, worth $1.00 per square foot, so the problem is to determine the most economical dimensions of a square tank capable of holding 1,000 cubic feet.

It is self evident that if the bottom of the copper tank is ten feet square, 10 multiplied by 10 gives 100 as the area of the bottom, which multiplied by 10 for the depth, gives the correct dimensions of a tank which will hold 1,000 cubic feet,

Mathematically speaking, 10 is here shown to be the cube root of 1,000, and by reversing the proposition we get a clear understanding of what is known as the square and cube of a number. A number multiplied by itself gives its square or 2nd power, like 10 multiplied by 10 equals 100; while if we multiply it once more by the first power, viz: 10 multiplied by 100, we get the cube or third power. The third power is always a perfect cube, but when we multiply it again by 10, which would make 10,000, we have raised the product to the fourth power, and may continue with the fifth, sixth, seventh, etc.,

A cube ten feet square will hold 1,000 cubic feet it is true, but as that would require 500 feet of copper, (100 on the bottom and each of the four sides) it shows that the real point of our problem is to determine the most economical form of a tank: viz: to hold 1,000 gallons and use the least possible amount of copper.

It is a simple every-day piece of shop work which any mechanic would tackle in a way satisfactory to himself, but which a mathematician will discover involves "the duplication of the cube" which has baffled the world for countless centuries.

The "unsolved problem of the duplication of a cube" is to give the dimensions of a cube twice as large as another, viz.: If a cube ten feet square contains 1,000 cubic feet, what would be the size of a cube containing 2,000 cubic feet?

TELL MOTHER'S AGE PROBLEM BY SAM LOYD.

PROPOSITION---The ages of the three amount to 70 years and the father is just six times as old as the boy. When their combined ages amount to twice 70 years the father will be only twice as old as the boy. What is the age of the mother?

AGE PUZZLES, AS they are termed, are always interesting, and possess a certain fascination for the young folks who are at all mathematically inclined. As a rule, they are extremely simple, but in he present case the data is so meagre, and the proposition so different from what is expected, that the query actually appears startling.

It was sprung in the family circle the other day, and gave rise to a discussion which taxed the mathematical ingenuity of all present to the full limit.

One of the trio as represented in the picture was having a birthday anniversary, which aroused Master Tommy's curiosity regarding their respective ages, and in response to his queries his father said:

"Now, Tommy, our three ages combined amount to just 70 years, and, as I am just six times as old as you are now, it may be said that when I am but twice as old as you, our three combined ages will be twice what they are at present. Now let me see if you can tell me how old is mother?"

Tommy, being bright at figures, readily solved the problem, but then he had the advantage of knowing his own age, and could guess pretty closely to the ages of the others. Our puzzlists, however, have merely the data regarding the comparative ages of the father and son, followed by the startling proposition as to "how old is mother?"

A man had twenty-six (twenty sick) sheep and one died, how many remained? Nineteen.

Why is it easy to break into an old man's house? Because his gait (gate) is broken and his locks are few.

Where can one always find happiness? In the dicionary.

When will there be but twenty-five letters in the alphabet? When U and I are one.

What was Joan of Arc made of? Maid of Orleans.

I went out walking one day and met three beggars; to the first I gave ten cents, to the second I also gave ten cents, and to the third I gave but five—what time of day was it? A quarter to three.

What is that which by losing an eye has nothing left but a nose? Noise.

What is that which is full of holes and yet holds water? A sponge.

What is that which is put on the table and cut, but is never eaten. A pack of cards.

How can you by changing the pronunciation of a word turn mirth into crime? By making man's laughter manslaughter.

A DAISY PUZZLE GAME BY SAM LOYD.

REFERRING TO THAT oft-repeated query as to the origin of certain puzzles, occasion is taken to say that I have fashioned quiet a number of Swiss puzzles, from flags to Sweitzerkase and Alpine roses, and believe my penchant in that direction may be traced to a little incident which occurred over a quarter of a century ago.

With a party of tourists who were doing the Alps in the summer of '65, and who had undertaken the long tramp over the snows from Altdorf to Fluellen, to see the historic spot where Tell used to shoot apples, we were enjoying a rest, after a long day's journey, when spying a little peasant girl gathering daisies, and, thinking to amuse the child, I showed her how to prognosticate her matrimonial future, by plucking off the petals of the flower to determine whether she would be a bride of the "rich man, poor man, beggar man or thief." She said that the sport was well known to the country lassies, with the slight difference that a player was always at liberty to pluck a single petal or any two contiguous ones, so that the game would continue by singles or doubles until the victorious one took the last leaf and left the "stump" called the "old maid" with your opponent.

To our intense astonishment the pretty madchen, who could not have been more than ten years of age vanquished our entire party by winning every game, no matter who played first.

I did not study out the trick until we were back in Luzerne, but I was so bantered by the party that I made quite a point of investigating it, but never had the satisfaction of beating the little mathematician at her own game. I will say, incidentally, however, that I returned to Altdorf some years later and visited the locality of my previous defeat, and it would give me pleasure and add to the romance of the story if I could say that I found little Gretchen developed into a beautiful mountain fraulein, with a phenomenal mathematical bent. I doubtless saw her, however, for the entire female population of the little dorf was preparing to sow the fall crops. They were all prematurely old and exactly alike, and I imagined I recognized my former friend harnessed up with a cow to a plow, which was guided through the rocky soil by her noble husband.

The game is shown in the picture in the form of the daisy, and is played by two persons, who in turn cover the petals by placing upon them small markers, until all are covered. The one who covers the last petal wins, leaving the old" maid" stump to his opponent.

It is evident that the one who begins a game must lead off by covering one or two leaves, so the puzzle question which you are to answer is to tell the best replies in case he begins with one or two leaves, and incidentally to discover the winning system or principle which the little Swiss maiden worked so successfully.

Why is a nobleman like a book? Because he has a title.

What class of women are most apt to give tone to society? The belles.

Why is a very amusing man like a bad shot? Because he keeps the game alive.

Where are two heads better than one? In a barrel.