



**I** STARTED two watches at the same time and found that one went two minutes an hour too slow, and the other one minute an hour too

fast, so that when I looked at them again the faster one was exactly one hour ahead. Can you figure out from the dial at what time before noon the watches must have started?

Here is another one which will puzzle you: How soon will the hour, minute and second hands again appear the same distances apart, as shown above?

Such problems are built upon the immutable laws of the divisions of time and are therefore purely mathematical and mechanical. There are 60 seconds to a minute, and 60 minutes to an hour, therefore there are 3,600 seconds to an hour, and that is all there is to it, although there are many clever and very puzzling problems connected with watches and clocks. When I was a very little lad I learned that a pendulum 39.1 inches long would beat a true second. I was very fond of running so I used to carry a bullet attached to a string of that length, which would swing from a pin stuck in the fence so that I could time the boys racing. I became infatuated with the sport and have run many races in all quarters of the globe and in innumerable cases can thank the early training of my legs for saving my skin, and at times my life.

I may say, while upon the subject, that to run 100 yards in 9 seconds is the limit of speed. I have seen it run in that time, but there is no professional living who can do it. Amateurs and smart boys, with the aid of a bullet and string will find their

speed to be somewhere between ten and twenty seconds, and may derive great pleasure, as by constant practice they reduce their record down the fraction of a second at a time.

For practical use the bullet and string may be 9.8 inches long then it will count half a second in its swing from right to left, or one whole second in the swing of forward and back; this enables one to count the half and quarter seconds.

The remarkable fact of a 39.1 pendulum beating a true second in its swing, whether it travels two feet each time, or one foot, or only one inch, is the principle which regulates all clocks, and even watches. The hair spring connected with the escapement of a watch utilizes the elasticity of the spring in place of gravity.

The only obstacle to perfect time indicating is that the pendulums lengthen when the temperature is warm. This fault is overcome by ingenious compensating devices for correcting the length of the pendulum by the use of two metals of different expansive power.

I once constructed a clock out of wood which kept excellent time. Here is how I utilized the "grid-iron" principle to regulate the centre of oscillation. The rods A A are made of wood which expands but little from heat, B is made of metal which expands twice as much, so where A lengthens the pendulum a little, B expands twice as much and shortens it again.

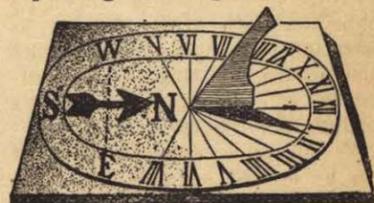
Pendulums must be of different lengths in different parts of the



earth on account of the variable attraction of gravitation. The rule for getting the length of a pendulum is known by mathematicians as "pi times the square root of the length of the pendulum (in inches) divided by gravity."

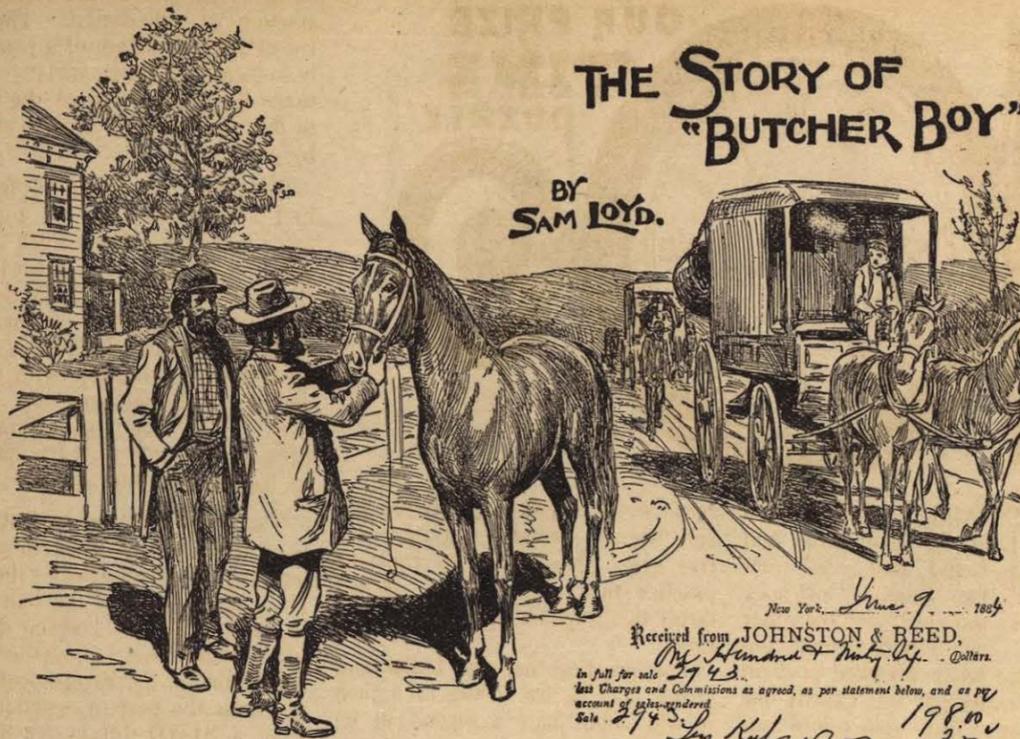
A falling body goes 16 feet the first second; 3 times 16 the next second; 5 times 16 the third second, and so on increasing according to the odd numerals, 7, 9, 11 times as fast, and by this rule we make our clocks and watches! Here is a pretty problem to conclude with for the expert mathematicians to ponder over: If a pendulum vibrates as often in a minute as it has inches in its length, how long is it?

The watch was invented at Nurnberg at the end of the 15th century, but was of no practical value until Dr. Hooke invented the hair-spring in 1658. The time-keeping qualities of a watch depends altogether on the perfection of the escapement which performs the part of a pendulum. I have a \$1,000 Jorgenson repeater which rings the hours, quarters and minutes; times the horses and does all sorts of stunts. The manufacturer of an American watch presented me with a time-piece and asked me to keep a careful tally on the two watches for three months; I did so, and cheerfully give credit to the American product which beat the other out by one minute and ten seconds. To show my sporting blood, I offer to put up that watch against the best chronometer in the world, the one which keeps the best time for three months to take both watches. As a boy I remember reading about the days when they depended upon hour glasses and sun-dials, so I constructed a sun-dial which kept perfect time. Here is a pattern for the clever lads to follow after, which calls for no particular directions: Just paint the dial, as shown, upon a piece of board; let the pointer run up about at an angle of 45 degrees; set the dial very level with 12 pointing exactly north and the shadow indicates the hour. In the sketch it is pointing to half past one.



# THE STORY OF "BUTCHER BOY"

BY SAM LOYD.



New York, June 9, 1884  
 Received from JOHNSTON & REED,  
 My Alexander & N. Y. - Dollars.  
 in full for sale \$294.30  
 less Charges and Commissions as agreed, as per statement below, and as per  
 account of sales rendered  
 Sale \$294.30  
 Mrs. Fred Grant 198.00  
 Mr. M. H. Grant 196.00

**N**OTICING THE HIGH price recently paid at auction for an autograph of General Grant reminds me to say that I am the proud possessor of what I believe to be the last signature made by General Grant.

The story connected with it introduces a somewhat pretty problem, and induces me to pay a tribute to Grant's mathematical ability, at the expense of the many who have no love for figures. I take occasion here to say that while journeying through life and jostling up against all manner of people, the fact has been impressed upon my mind that with few exceptions all successful men were those who endowed with a ready faculty for correct mental arithmetic. On the other hand, there is a class of never-do-wells who guess or jump at conclusions in a reckless way, and cannot even figure up how much to pay on the dollar when the inevitable smash comes.

I could mention a dozen incidents connected with great men as illustrating their aptitude for correct calculations, but this one will suffice to call attention to Grant's aptitude for figures.

We all remember the story of how he figured his way into West Point, after that memorable journey for a pound of butter, when he

he heard of the chance for a competitive examination. Professor Agnell, the master of mathematics at West Point, with whom I used to play chess, used to say that "Grant had a great love for mathematics and horses."

Grant did love a horse and could pick out the good qualities at a glance, and, oh, my! how he despised a man who would abuse a dumb animal!

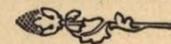
My story turns upon an incident as told by Ike Reed, of the old horse mart of Johnson & Reed, who gave me the autograph from their sales book of 1884, as photographed in the picture. During the last term of his Presidency General Grant returned from his afternoon drive and in a humorous but somewhat mortified way told Colonel Shadwick, who kept the Willard Hotel, that he had been passed on the road by a butcher cart in a way that made his crack team appear to be standing still. He said he would like to know who owned the horse and if it was for sale.

The horse was readily found and purchased from an unsophisticated German for half of what he would have asked had he known the purchaser was the President of the United States. The horse was of light color and was none other than Grant's favorite horse, "Butcher Boy," named after the incident

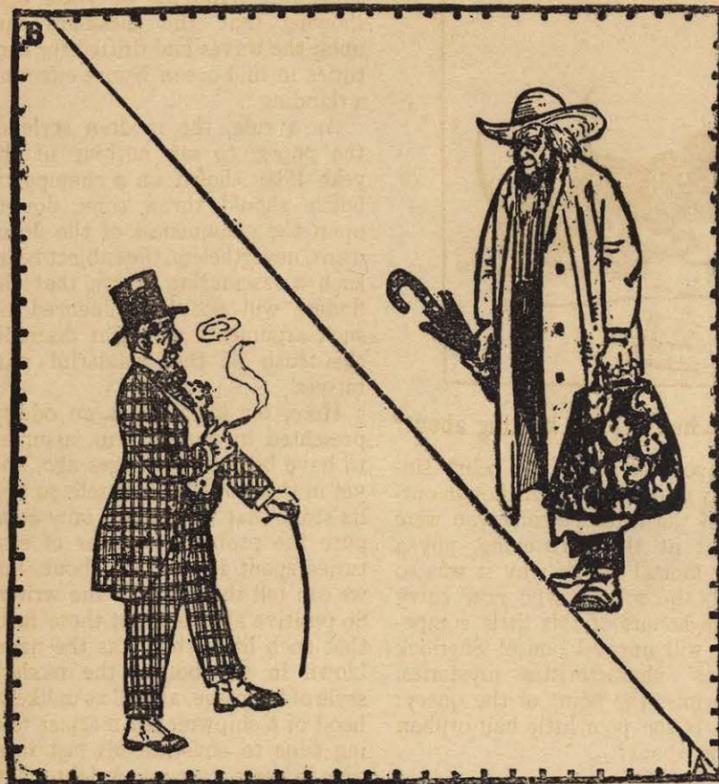
mentioned. Well, some years later, after the Wall street catastrophe, which impaired the finances of the Grant family, Butcher Boy and his mate were sent to the auction rooms of Johnson & Reed, and sold for the sum of \$493.68. Mr. Reed said he could have gotten twice as much for them if he had been permitted to mention their ownership, but General Grant positively prohibited the fact being made known. "Nevertheless," said Reed, "you come out two per cent. ahead, for you make 12 per cent. on Butcher Boy and lose 10 per cent. on the other."

"I suppose that is the way some people would figure it out," replied the General, but the way he laughed showed that he was better at figures than some people, so I am going to ask our puzzlists to tell me what he got for each horse if he lost 10 per cent. on one and made 12 per cent. on the other, but cleared 2 per cent. on the whole transaction?

It may be mentioned incidentally that General Grant stated that he had presented one of the horses to Mrs. Fred Grant, and as shown in the receipt signed for her.



## THE GOLD BRICK PUZZLE



This puzzle shows how easily a person may be deceived in buying gold bricks. Things are not always what they seem. For example, take the accompanying picture for a pattern, and cut any size piece of paper exactly square. Then mark off 24 points on each side, microscopically correct if you can do so. This, for the time being, we suppose to be the gold brick, which is commonly purchased from the affable stranger whom one meets at the hotel.

Each side of the border being divided into 24 equal spaces; note that if the small lines were continued across from border to border in both directions, there would be 24 times 24, or 576 small squares. If these marks were one inch apart, then Mr. Hayseed would be buying 576 square inches of gold! Do you see that diagonal line, running from the corner *A* up to the second mark near *B*? Now, cut on that bias line end. Move the top piece up one space on the incline and snip off the little triangular piece *A*, so as to fill in the top left hand corner. Now re-measure the sides of the gold brick by counting the number of spaces along each side, and see if there are

as many small squares as there were before. In other words, see if it is not 23 inches wide by 25 long. That would make but 575 inches of gold that Rubens got and he thought he was buying 576, so it is safe to say that it is not even gold that he purchased, but only brass, worth about 20 cents a pound!

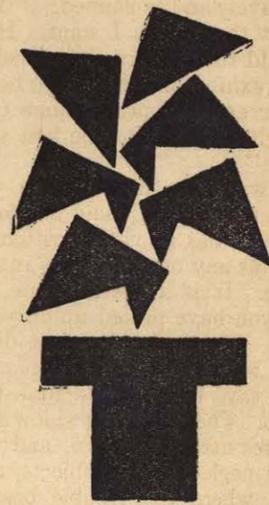
Now, put on your serious thinking cap and study it out: The first measurement was actually 24x24 and contained 576 square inches. Now measure off those points as carefully as possible, the more accurate your measurements are the more inexplicable will be the mystery, then give me the correct dimensions of the rectangle so as to tell what has become of that missing square! This puzzle which I promulgated in my early youth, is a decided improvement upon the time-honored problem of the cut-up checker-board which I have already discussed and presented in modern form.

Euclid, the famous mathematician of Alexandria, who flourished 300 years before the Christian era, with his great work upon geometry which formed the groundwork of all that is known of the sciences. The first

volumes contained elementary rules and theorems, accompanied by rigid proof of their accuracy; but the last volume, which was devoted entirely to problematical fallacies, was unfortunately lost. That work, which might be looked upon as the culmination of his labors, must have been the grandest book ever attempted by the author. It has been described as a collection of problems or puzzles, wherein the student was to test his knowledge of the subject by detecting the fallacy concealed in the puzzle.

The gold brick problem is given as an illustration of a series of puzzles which I have planned to carry out Euclid's line of teaching, and which will be found to be scattered lavishly through these pages, always accompanied by explanations which will prevent the student from being misled.

### The Hindoo Flower Trick.



Here is an illustration of the famous Hindoo Flower-trick. The fakir plants a seed in the hat and a beautiful flower at once appears; then he asks you to take the several pieces and arrange them so as to form a Greek cross.

### A Rebus

To thee my first in days of yore,  
A king has kneel'd with feeling sore;  
His loss my next will bring to view  
But hope my whole rests not on you  
Cipher Answer.—2, 12, 15, 3, 11,  
8, 5, 1, 4.

## THE HALF-ORPHAN.



### PROPOSITION—What is the poor little half-orphan kicking about?

ACCOMPANIED BY Sherlock Holmes, the famous detective, I dropped into Dauber's studio one morning and found that talented young artist putting the finishing touches to a bit of canvas. He welcomed us effusively and exclaimed: "You are just the fellows I want. Here is an odd thing I have just finished for the exhibition, and am so bothered for an appropriate name that I will give a prize for the best suggestion."

"It would be like robbing you to take the money," said Sherlock, "the piece has its name written all over it, as any one with half an eye can see. It is a sketch from life which you have picked up on your travels. The father has just died, so, if it were not vulgar to pun, I should say the child's loss was apparent. The gay young widow contemplates marrying again, and the child is neglected and objects, and that is where the trouble begins. That, as well as many other points as plain as the nose on your face, are too simple to mention. It would be too commonplace to suggest that the child is crying over spilled milk, for his grief is deeper rooted than that. The only question worth discussing is to tell what the kid is kicking about, so I suggest it be called the half orphan, and for the best answers to that conundrum, it might be interesting to offer some valuable prizes.

The picture carried off the honors of the exhibition of course, and is now quite noted for having brought fame and fortune to the artist. The name "Half-Orphan" in itself was a happy hit, which the public for some inexplicable reason seems

to have interpreted as being singularly appropriate. Although outside of the three persons who were present at the christening, not a living mortal knows why it was so called, the solvers who now carry off the honors of this little competition will unravel one of Sherlock Holmes' characteristic mysteries. Don't miss the point of the query: What is the poor little half orphan kicking about?



### A Message in a Bottle.

Among the specimens of flotsam and jetsam which the tides and drifting sands cast at times upon the beach, nothing compares in interest with bottled messages, supposed to be the farewell words of shipwrecked humanity, giving a graphic description of the fate which had befallen some long lost and almost forgotten vessel.

Such messages from the sea, in times past have told wonderful tales of shipwreck, privations and narrow escapes in a way that suggested the possibilities of the writers being still alive in Arctic regions or on unknown islands, which, in some instances, have been fully confirmed. In the British collection of such tales as have been officially investigated and authenti-

cated are many proven to be true, which furnish clues to the fate of ships lost hundreds of years ago, showing that the messages cast upon the waves had drifted for centuries in mid-ocean before effecting a landing.

As a rule, the modern style of the paper, to say nothing of the year 1905 shown on a champagne bottle should throw some doubts upon the genuineness of the document, nevertheless, the subject bears such a fascinating charm that the finders will not be influenced by such arguments as might discredit the truth of the wonderful narratives.

Here, for instance, is an oddity presented in puzzle form, assumed to have been written ages ago, and yet in these brief lines it tells so well its story that we can not only compute the probable number of centuries spent in drifting about, but we can tell the name of the writers. So positive are we about these facts that such little things as the name blown in the bottle; the modern style of language, as well as unlikelihood of a shipwrecked mariner taking time to construe his last message in verse, carry no weight whatever. All we have to consider is the paradoxical or unnatural statements of the writer, which from their very unreasonableness furnish "confirmation strong as holy writ." Now, who wrote it?

A mighty ship I now command,  
With cargo rare from every land.  
No goods have I to trade or sell;  
Each wind will serve my turn as well;

To neither port nor harbor bound,  
My greatest wish to run aground.

What would you call a boy who eats all the green melons he can get? He is what we call a pains-taking youngster.

What is an eaves-dropper? An icicle.

Why is a neglected damsel like a fire that has gone out? Because she has not a spark left.

Why are bells used to call people to church? Because they have an inspiring influence.

What is that which goes up the hill and down the hill and yet stands still? The road.

What becomes of the chocolate cake when your only son eats it? It vanishes into the empty heir (air).

When is a bill like a gun? When it is presented and discharged.

# THE CHEESE PROBLEM

—BY—  
SAM LOYD.



**S**PEAKING ABOUT the way that puzzle ideas come to us it may be said that the theme for a good puzzle can be suggested by anything striking or novel that one chances to see, but the application or proper working out of the scheme may require considerable time and study. Something in the ordinary affairs of life puzzles us a little by its oddity, and the thought naturally occurs, "If this thing perplexed me in its accidental form, when no feature of difficulty was intended, how would it be possible to increase the difficulty by dressing it up in true puzzle form so as to conceal the principle involved?"

The problem must be posed in pleasant shape, so that the picture aids in explaining the terms and at the same time conceals its real difficulty by imparting what Bret Harte would term a "childlike and bland" simplicity to the whole story. The very name may be utilized to draw attention away from the trick, for, as an old philosopher remarked several centuries before they spoke United States, "Ars est celare artem," by which he meant to inform puzzle-makers that the true art is to conceal the art. Therein lies the main difference between modern and old time puzzles.

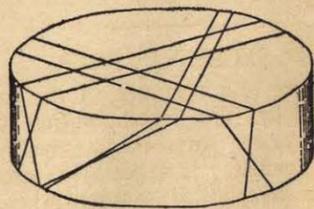
Chancing one day to be in a com-

missary department when an assistant was portioning out cheese, I was struck by the ingenious way in which he divided it, and the more I thought it over the more firmly I became convinced that I was indebted to the visit for a happy suggestion which would eventually crystalize into puzzle form. I complimented the quartermaster upon the skill of his assistant, to which he replied: "Oh, that is nothing! You should see him cut pie!"

I never had the opportunity of witnessing his proficiency in the dispensation of pie, but it seemed as if a piece of pie and cheese had got stuck in my crop and disturbed my mental digestion from that moment, until one day being called upon to produce an original puzzle, I drew a circle and called it the legend of the boarding house pie, which has since become famous.

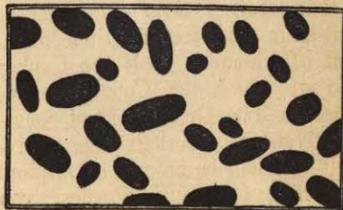
The cutting of a piece of pie pertains only to the superficial surface, as it goes no farther than square root or the second power, as the mathematicians would say. In the portioning of cheese we go below the surface into cubic equations known as the third power, for we have to consider the feature of depth.

Can you tell how many pieces are produced by the following six straight cuts?



Passing the Japanese Mines.

The section of a chart of Japanese mines placed at the entrance to the harbor of Port Arthur is presented for the benefit of the young puzzlists, who are asked to show how a vessel might pass from the bottom to the top of the picture by changing her course but once. Draw a straight line from the bottom of the picture to a certain point, from which you can draw another straight line to the top, so that the two lines will indicate a safe channel through the twenty-eight mines or torpedoes.



Here is the patch quilt which the scholars presented last Christmas to their teacher in puzzleland. You will find the names of all of the boys hidden among the letters. Just spell from one letter to any adjoining one on the square or bias as the ladies say. Beginning with J you can spell JAMES as shown, but how many scholars do you think there were in all?

### SECRET CYPHER.

Here is a specimen of the code used by Washington during the Revolution, with which some may be familiar. It appears to pertain to a complicated system wherein the words are numbered and not spelled out. In the translation the 11, 15, and 26 words are *of*, and yet they appear in the cypher as 420, 248 and 570. It was a letter written by Governor Morris to Gen. Nathaniel Greene, at the very time that Washington has been accused of winning American Independence by questionable strategy. It was publicly asserted that Clinton was to be attacked in New York, which prevented assistance from being sent to Cornwallis in Virginia. The letter it may be seen, is dated just before the grand coup:

Phila., 11 Sept., 1781.

Dr General: The enclosed Cypher is that referred to in my Letter as well as in that from the Superintendent of Finance. It is the Cypher also of which the Commander-in-Chief has one Duplicate, and consequently when you shall have received it you will be able to correspond with him, for which Purpose you will let him know that you have it.

In order to explain more fully the Use take the following sentence: "Sir Henry Clinton threatens an attack on Philadelphia by way of Diversion in favor of Lord Cornwallis; this has a little intimidated some few Ladies of my Acquaintance."

This being put into Cypher will stand thus:

### A Cipher Dispatch Puzzle.



Of course there are a thousand and one different kinds of secret cipher codes for sending written or telegraphic messages. Some are difficult, while others yield readily to systematic or experimental analysis. The one most generally employed is the mixing up or transposition of the letters, which may be easily guessed, however, by finding from an ordinary column of reading matter the average frequency of the occurring of the different letters. To test your ability in deciphering that well known method, we give the following puzzle and ask for the answer.

Qdt kj jkssbjd teft gefwqdj rj bid terwn wrgedw tefi dqddi teedi eba hkge sbbwdw rj dqddi tefi gefwqdj?

It will be found to involve an arithmetical proposition, which you may answer if you have deciphered it correctly.

13, 53, 64, 530, 555, 140, 290, 319, 225.

613, 430, 248, 530, 24, 248, 225, 23, 613.

239, 500, 137, 436, 556, 85, 570, 114, 563, 500.

319, 491, 570, 34, 556, 438, 376.  
118, 346, 290, 341, 524, 405, 169.  
615, 341, 225, 225, 290, 319, 603.  
263, 331, 581, 63, 539, 423, 406.  
85, 556, 180, 23, 537, 319, 225.  
650, 184.

I am very truly yours,

Gouv. MORRIS.

### A Rebus

My first beneath my second's seen,  
And moves at pleasure there;  
My whole's an arch of beauteous mien,  
Set up without a pier.

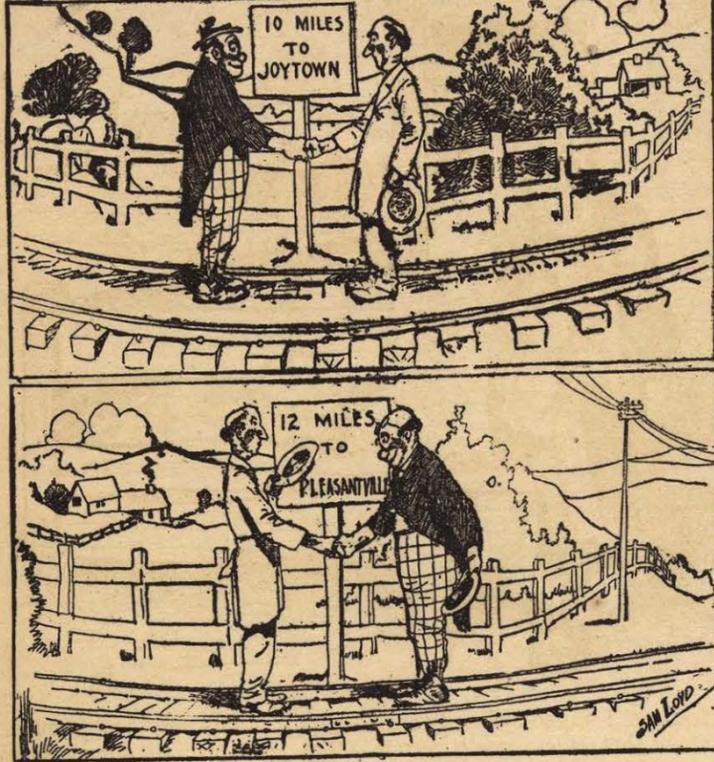
Cipher Answer.—5, 25, 5, 2, 18, 15, 23.

### A Rebus.

My first's the heart of honest trade,  
When 'tis judiciously displayed;  
But when 'tis of its head bereft  
It then becomes a public theft.

Cipher Answer.—19, 16, 5, 3, 21, 12, 1, 20, 9, 15, 14.

## WEARY WILLIE AND TIRED TIM PUZZLE



"As showing how valuable knowledge, improving to the mind, may be learned from incidents which may occur to a gentleman of leisure during a summer's outing," murmured Weary Willie, during one of his reminiscent moods, "I recall a chance meeting with Tired Tim on an urban branch of the D. L. & W. We exchanged the sign, password and fraternal grip and became acquainted at once. It appeared that a change from Joytown air was recommended for him at the same time that I was persuaded that it would be better for my health to leave Pleasantville. That is how we came to meet at a point ten miles on the road."

"We fraternized just long enough to become chummy and swap diaries according to rule and then jogged on to our different destinations.

"Both towns proved to be overworked, and secret association marks showed the people to be so mercenary and uncongenial that it would be waste of time to tarry.

"Accepting the escort of the attentive policeman who invariably recommended traveling gentlemen to return by the same route to where

they came from, we started as it appears, simultaneously on our return trips.

"That is why, as shown in the sketch, that I again met my erstwhile acquaintance, at a point twelve miles from Pleasantville, but I'll go you the beers that from the data given you can't figure out how many miles it is from Joytown to Pleasantville."

Of course, it is assumed that each of the pedestrians maintained his own respective gait, both in going and coming from one town to another.

### A Pictorial Charade



When I was traveling through Puzzle Land, where every sign is a puzzle, every question a riddle, and you must guess the name of everything you eat, I saw this sign over a livery stable. Can you tell me what it meant?

### A PROBLEM FOR A JURY.

JUDGES are sometimes called upon to solve knotty points of law, which would bother the average puzzlist. Here for example is an old-timer which, so far as I am aware, has never been answered satisfactorily:

Polus instructed Ctesiphon in the art of pleading, and it was agreed between teacher and pupil that the tuition fee should be paid when the latter should win his first case. Some time having passed by, and the young man being without clients and evincing no ambition to secure business, Polus, in despair, brought the matter before the court. Each party pleaded his own case, and Polus, speaking first, said: "It is indifferent to me how the Court may decide this matter, for, if the decision be in my favor, I recover my fee by virtue of the judgment; but, if my opponent wins the case, it being his first, I obtain my fee according to contract."

Ctesiphon, who was evidently an apt scholar, replied: "The decision of the Court is even of less importance to me, for if the verdict is in my favor I am thereby released from my debt to Polus. But if I lose the case, the fee cannot be demanded according to the contract."

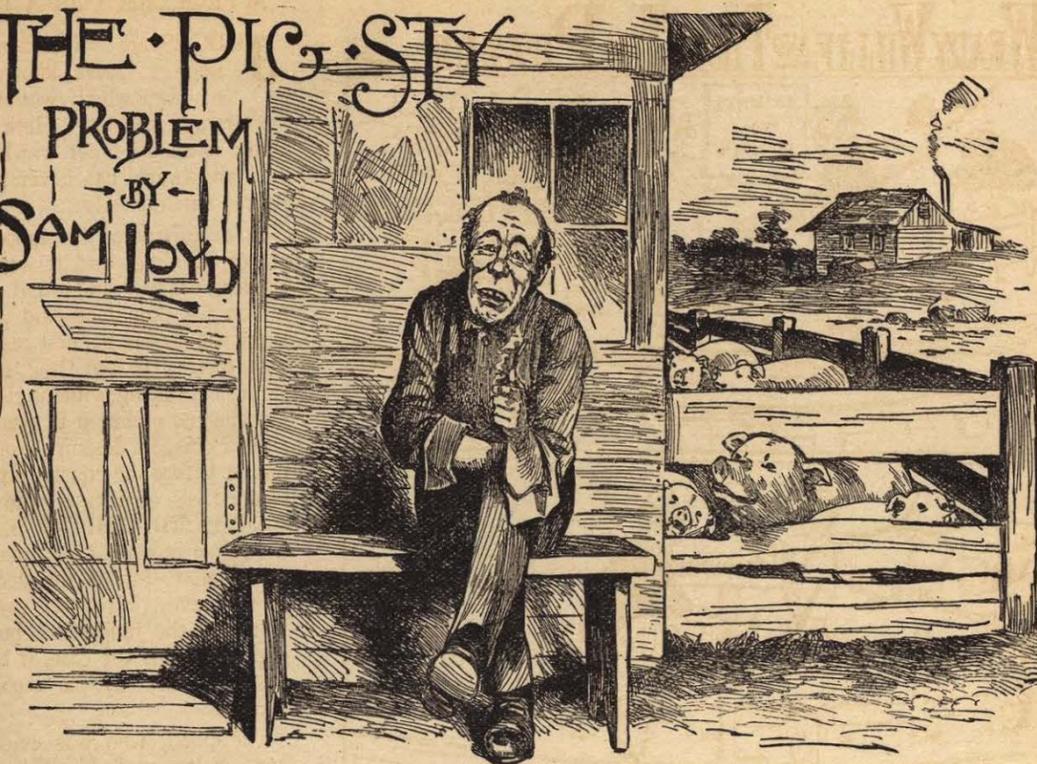
A still more interesting case is said of a certain king who built a bridge and decreed that all persons about to cross it should be interrogated as to their destination. If they told the truth they were permitted to pass unharmed, but if they answered falsely they were to be hanged on a gallows erected at the centre of the bridge. One day a man about to cross was asked the usual question, and replied: "I am going to be hanged on that gallows!"

Now, if they hanged him, he had told the truth and should have escaped, whereas if they did not hang him, he had answered falsely and should have swung for it.

### A Rebus

My first's possessed by all mankind,  
My second skims the wave;  
My whole will dash through wave and wind.  
In hopes my first to save.  
Cipher Answer.—12, 9, 6, 5, 2, 15, 1, 20.

## THE PIG-STY PROBLEM BY SAM LOYD



**R**EPLYING TO THE oft-repeated query as to how puzzles are originated; whether they come spontaneously like sudden inspirations or as the result of long and careful study, I would say that like the development of any other inventions, they come either way; from a happy thought or from hard work, although in either case the idea is generally suggested by some chance incident.

By way of illustration I will say that during my summer's outing, while scouring the country en-wheel, I ran up against a good-natured Hibernian whose apple orchard and spring of cool water made his little shanty a veritable Mecca for weary bicycle pilgrims. He was a unique character, and few of us ever came out first best with him in a passage of wits, as he had an inexhaustible stock of replies at his tongue's end ready for anything that could be fired at him.

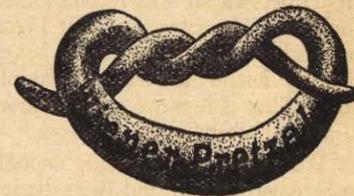
It will be interesting to know how he takes to the idea of being immortalized in print when he sees the sketch I made of him seated in characteristic pose at the door of his domicile. The original picture, neatly framed, has been sent by express to grace his "drawing room" in acknowledgment of "one on the puzzler."

You see, I was so foolhardy as to intimate that there was a certain bond of fellowship between us because we both made our living by the pen, which seemed to touch him in his most tender spot, for he asked in his earnest way if I knew why an Irishman always builds a pig pen under the drawing room window? Then, after I had suggested every practical explanation and completely exhausted my repertoire of conundrums, appropriate or otherwise, he told me in a confidential whisper which could be heard a mile that "it was built there to keep the pigs in." He begged me not to tell the reason to the rest of the party, who might think it a joke. During the journey home there was not one of that party who did not fall off his bicycle a dozen times in thinking over Pat's problem. Of course I thought of it as well, and there was one statement concerning his pigsty which struck me as being so "odd" that I utilized it to get even on the rest of the crowd. I can not tell it in Pat's own language, but it appears that, believing with Rory O'More in "the luck of odd numbers," he had made it a rule to "bring up," as he suggestively termed it, just twenty-one pigs every season. To accommodate them he built the pen under the drawing room window, dividing his

happy family into four groups, so that each pen contained an even number of pairs and one odd pig. It looks like an easy little problem to divide twenty-one pigs in that way if you say it quick, but just try it!

If you understand the mystery of Shakespeare's "divinity of odd numbers," show how Pat placed his twenty-one pigs in four pens so that each pen contained that odd little porker.

### Peterchen's Pretzel.



Here is a simple little marking problem for the juveniles who have found the other problems somewhat difficult. Little Peterchen had a Vienna twisted pretzel, as shown in the drawing, and asks his young friends to guess into how many pieces he divided it with one straight cut with a knife. Supposing it to be a real pretzel, draw a straight line which would divide it into the greatest possible number of pieces.