

HOW PAIN WAS MASTERED.

The Introduction to Practical Use of Anesthetics.

A Veteran Surgeon Tells of the Great Discoveries of Only Fifty Years Ago—Surgeons Before Ether Had Become Known.

So busy with new discoveries in every branch of science has been this latter half of the nineteenth century, that to turn back to the time when our familiar things did not exist almost dislocates our memories—it is like going back to older centuries. One of the most common occurrences of to-day is the use of "laughing gas," or of some other anesthetic; yet surgeons now living and practising can remember the time when operations were performed on persons absolutely and entirely conscious of each stroke of the lancet; for it is not yet fifty years since Horace Wells of Hartford experimented upon himself with "laughing gas," and made the first breach which has enabled the surgeons and chemists of to-day to complete the mastery of pain.

Dr. Benjamin Ward Richardson of London, who was present at the introduction to Great Britain of practical anesthetics, has contributed his recollections of the wonderful event, indicated for centuries, yet stunning in its effect when finally it occurred, and momentous in its power to change the destiny of human life. Before the introduction of anesthetics operations were simple, comparatively few plastic operations could be performed; but the introduction of ether, chloroform, nitrous oxide, and cocaine has broadened the powers of the surgeon as much as the subjugation of electricity has extended the power of the business man.

In the oldest days of medicine, says Dr. Richardson, mandragora was used as a potion to reduce or remove the pain of surgical operations, and Pliny gave a prescription for a wine of mandragora—a prescription which Dr. Richardson himself followed with success. Ice, applied to the skin, had been found to produce local anesthesia, and compresses applied before an operation had been tried by Ambroise Pare and others.

TO LESSEN PAIN.

In 1799 Humphry Davy discovered that nitrous oxide gas rendered him who inhaled it oblivious of the common sensibilities. But after Davy came a delay of over forty years until Wells of Hartford experimented with that same gas; and, treading on one another's heels, came after him Morton, Jackson, and Bigelow of Boston, with their discovery of the properties of sulphuric ether.

The first operation in England in which ether was given occurred on Dec. 19, 1846, when Dr. Booth and Mr. Robinson extracted a tooth from the jaw of a Miss Lonsdale. On Dec. 21 or 22 the great surgeon Liston administered ether for the first time in the theatre of the University College Hospital. "Among those present on that occasion," writes Dr. Richardson, "was my old friend, Dr. (afterwards Sir John) Forbes. He described to me that he never felt so near to falling on the floor in all his life as he did when he witnessed the great surgeon Liston amputating a thigh while the patient was in deep sleep. In those days, in order to save pain, the surgeon cultivated rapidity of action, and such an adept was Liston that he completed the removal of the limb within the minute. This, combined with momentous result of the annihilation of pain, was the cause of the sensation experienced by Forbes. It was not fear, it was not faintness; it was an emotion painful, as he expressed it, from its overwhelming surprise and pleasure. Everybody seemed pale and silent except Liston, who was flushed, and so breathless that when he broke the silence with the word 'Gentlemen' he almost choked."

We who take everything for granted simply because we are accustomed to it do not understand readily what the introduction of anesthetics meant both to operator and patient. Dr. Richardson indicates to some extent the changes produced on the minds as well as the actions of men; and a history of surgical operations, could one be made, would show the effect more clearly. Says the doctor:

"I remember, still even with pain, what operating day meant as each week came round. When I asked my first practical teacher how he thought I should get through the ordeal of seeing and taking part in an operation, he replied that, as in learning to smoke, time brought tolerance, but that a man must keep his hand in if he meant to retain his firmness and

PRESENCE OF MIND.

I recall that when I had to witness the first capital operation I sought the companionship of a student much older than myself; but it turned out that he was more nervous than I was, and prudently left the operating theatre as the patient entered it. I made up my mind to face the ordeal bravely, and for a time I was quite taken out of myself by seeing the consummate calmness and dexterity with which the operator—the late Prof. Lawrie of Glasgow, 'one of the most splendid operators' (I am using his distinguished rival, Sir William Ferguson's own word) 'this century, or any century, ever knew'—proceeded in his painful task.

The quicker the surgeon, the greater the surgeon, was then the order of the day, and such was the rapidity in this case the operation was actually over, in so far as the major part of it was concerned, before the patient uttered a single cry. If all had stopped there, all had been well; but just at that moment, as if giving vent to a long suppressed agony, the patient uttered a scream that went through me, and, in spite of the tenderness and firmness with which the nurses assured him it was all over, continued to scream and struggle, so that he had to be held while the final steps of the operation were performed. Some of my new comrades became faint and some left the theatre. I turned over, but kept my legs, saw in a kind of haze the man being carried away, and came back to thorough consciousness listening to the short lecture which Dr. Lawrie was delivering in relation to the reasons for the operation, the manner in which it had been conducted, and the chances for and against recovery.

"Unless a man kept at work in the operating theatre, he never, in those days, became hardened to the business. Even then the hardening was not permanent, and Dr. Lawrie told me that he never woke on operating day without feeling a load of care and anxiety that would not wear off until the labors of his day were ended.

"In this he was not alone, for Cheselden, the leading surgeon of the reign of Queen Anne, and the first to restore sight to the blind by an operation, to whom one of his grateful patients addressed the couplet,

So swift thy hand, I could not feel
The progress of the cutting steel.

never undertook an operation without being blanched, and experiencing a sensation of anxiety that was like a seizure, which all his moral courage could scarcely control."

If the introduction of anesthetics made this change for the operators, what did it do to the patients? Speaking generally, we know that it put them beyond the reach of pain. Dr. Richardson says that the patients approached the table sometimes in a sort of trance, always nerved up for their ordeal. The women faced the operations

BETTER THAN THE MEN.

as a rule, and two facts impressed themselves on his mind, that he rarely knew a person whose mind was made up to undergo the operation shrink from it at the last through fear of pain, and that he rarely, if ever, saw a patient shed tears during the operation. Submission to the necessity of the ordeal was followed by a sort of holy courage, which lasted until the operation began. Then came an almost certain change of view, and insistence that the operation should be stopped at all risks; and then a request for the proceedings to finish as rapidly as possible. These different pleadings, says Dr. Richardson, "frequently repeated, became stereotyped on the minds of the observers so distinctly that the actual stage of any operation might be calculated from them by those accustomed to the proceeding."

Besides few cases of weeping there were few faintings during those old operations, unless from loss of blood. The patients were too much occupied in mind to faint, and the pain seemed to be a stimulating antidote. This fact actually stood in the way of the progress of anesthetics; for some surgeons declared that it was bad practice to annul pain, because it was a good stimulant and kept the patient up to the mark.

To nitrous oxide succeeded almost immediately chloric ether, and then chloroform; after that came methylene, introduced by Dr. Richardson; and now, to produce local anesthesia, coca and its products are used. Meanwhile has sprung up a new school of surgery. In January, 1847, Dr. (afterwards Sir James) Simpson administered ether in a confinement case; and since then have occurred those wonderful achievements of abdominal surgery, so common nowadays that the ignorant know not how wonderful they are.

One objection offered by a surgeon to the use of anesthetics has been mentioned. Another objection was that man was born to suffer, that pain was a part of the course of Adam, and that the annulment of pain was sinful and opposed to the divine decree. In answer to this, Dr. Simpson showed that the first operation performed on man was the excision of a rib from Adam, out of which to make man, and that before beginning to operate God Himself cast the man into a deep sleep. We can laugh now at the objection and the argument; but fifty years ago it was on such objections and arguments that hung the question of the continuation or cessation of the conquest of pain.

A Dakota Pioneer.

"Winter pretty cold?"
"Winter? Don't have any winter here, stranger."

"How's that?"
"Only have three seasons—spring, summer, and early fall."

He was a Dakota pioneer, and lived, as he said, "fifty miles from any place."

"What do you do for a doctor when you're sick?"
"Never get sick."

"But you can't help it sometimes, can you?"
"Certainly. 'Taint possible. We won't get sick, and there's no two ways about it."

"How far is it to your nearest neighbour's?"
"Fifty miles."

"You don't have much society, then, do you?"
"Don't need it. There's five of us—mother 'n me 'n the kids. That's society enough, ain't it?"

"How far must you go to church?"
"Have it right in the shack every Sunday. Got an organette, Joe has, and he turns a crank and grinds out any hymn you ever heard tell of just as nice as you please. Then Marthy and all the rest of us sing, then I read something from the Bible, then we sing again, an' pray—an' church is out."

There was something pathetic in this, and it went to my heart.

"How about crops?"
"They're big, I tell ye—that is, when we get 'em. Three years ago had every promise of a splendid crop. Had lots of snow that winter—ground was plenty wet an' the wheat was lookin' fine when, all at once, we had a hot south wind that burnt everything 'up slick an' clean."

"And the next year?"
"Things looked just as promisin'. Wheat was waist high, yellor as gold, an' I was going to cut it in a few days when along came a hailstorm and beat the whole field down."

"Then the next year?"
"Got nipped by the frost."

"And the next?"
"That's this year, stranger, and just look at the wheat around ye. Nothing could be finer than the outlook. Guess I'll have a good crop this year, but if I don't—"

"Well?"
"Well, if I don't," he said with a quiet smile, "I'll mortgage my horses to get seed and try again. It'll be hard pinchin', but I didn't have anything when I came here, and I'll stick to the country as long as I can live in it. A man can't have hard luck always, you know. Things are bound to turn. It's a long lane that hasn't a crook somewhere."

I wrung his hand warmly and rode away.

A Modern Husband.

He had married well, extremely well, yet there were times when he would have preferred paying his own expenses and remaining at home. This night she wanted to drag him to the theatre and he was stubborn.

"What's the play?" he inquired.

"A Modern Husband," she told him curtly.

"What's it like?"
"I don't know," she replied, putting on her gloves; "but if it is anything like its title I presume the women constitute the leading support."

Then it was the iron entered into his soul and he entered a solemn vow that if ever he married again he'd get a woman so poor that she would even have to borrow trouble of him.

ACROSS THE CONTINENT.

From Tideway to Tideway.

Rudyard Kipling, who took a run across the continent in the early spring, thus describes the trip:—

There is considerable snow as we go north, but nature is hard at work breaking up the ground for the spring. The thaw has filled every depression with a sullen gray-black spate, and out of the levels the water lies six inches deep in stretch upon stretch as far as the eye can reach. Every culvert is full, and the broken ice clinks against the wooden pier guards of the bridges. Somewhere in this flatness there is a refreshing jingle of spurs along the cars, and a man of the Canadian mounted police swaggers through with his black fur cap and the yellow tab aside, his well-fitting overalls and his better set up back. One wants to shake hands with him because he is clean and does not slouch or spit, trims his hair, and walks as a man should. Then a Custom House officer wants to know too much about cigars, whiskey, and Florida water. Her Majesty the Queen of England and the Empress of India has us in her keeping. Nothing has happened to the landscape, and Winnipeg, which is, as it were, a centre of distribution for emigrants, stands up to her knees in the water of the thaw. The year has turned in earnest, and somebody is talking about the "first ice shove" at Montreal.

They will not run trains on Sunday at Montreal, and this is Wednesday. Therefore the Canadian Pacific makes up a train to Vancouver at Winnipeg. This is worth remembering, because few people travel in that train, and you escape any rush of tourists running westward to catch the Yokohama boat. The cars are your own, and with it the services of the porter. Our porter seeing things were slack, beguiled himself with a guitar, which gave a triumphant and festive touch to the journey ridiculously

OUT OF KEEPING.

with the view. For eight and twenty long hours did the bored locomotive trail as through a flat and hairy land, powdered, ribbed, and speckled with snow, small snow that drives like dust shot in the wind—the land of Assinaboa. Now and again, for no obvious reason to the outside mind, there was a town. Then the towns gave place to Section So and So; then there were trails of the buffalo, where he once walked in his pride: then there was a mound of white bones supposed to belong to the said buffalo and then the wilderness took up the tale. Some of it was good ground—very good ground—but most of it seemed to have fallen by the wayside, and the tedium of it was eternal.

At twilight—an unearthly sort of twilight—there came another curious picture. Thus: A wooden town shut in among low treeless rolling ground; a calling river that ran unseen between scarped banks; barracks of a detachment of mounted police; a little cemetery where ex-troopers rested; a painfully formal public garden with pebble paths and foot-high fir trees; a few lines of railway buildings; white women walking up and down in the bitter cold with their bonnets off; some Indians in red blanketing with buffalo horns for sale trailing along the platform, and, not ten yards from the track, a cinnamon bear and a young grizzly standing up with extended arms in their pens begging for food. It was strange beyond anything that this bald telling can suggest; opening a door into a new world. The only commonplace thing about the spot was its name—Medicine Hat—which struck one instantly as the only possible name such a town could carry.

The next morning brought us the Canadian Pacific Railway as one reads about it. No pen of man could do justice to the scenery there. The guide books struggle desperately with descriptions adapted for summer reading of rushing cascades, lichen-covered rock, waving pines, and snow-capped mountains; but in April these things are not there. The place is locked up—dead as a frozen corpse. The mountain torrent is a boss of palest emerald ice against the dazzle of the snow; the pine stumps are capped and hooded with gigantic mushrooms of snow; the rocks are overlaid five feet deep, the rock, the fallen trees, and the lichens together, and the dumb white lips curl up to the track out in the side of the mountain and grin there, fangled with gigantic icicles. You may listen in vain when the train stops for the least sign of breath or power among the hills. The snow has smothered the rivers, and the great looping trestles run over what might be a lather of suds in a huge wash tub. The old snow near by is blackened and smothered with the

SMOKE OF THE LOCOMOTIVES.

and dullness is grateful to aching eyes. But the men who live upon the line have no consideration for these things. At a halting place in a gigantic gorge walled in by the snows, one of them reels from a tiny saloon into the middle of the track, where half a dozen dogs are chasing a pig off the metals. He is beautifully and eloquently drunk. He sings, waves his hands, and collapses behind the shunting engine, while four of the loveliest peaks that the Almighty ever moulded look down upon him. The landscape that should have wiped that saloon into kindlings has missed its mark and has struck a few miles down the line. One of the hillsides moved a little in dreaming of the spring and caught a passing freight train. Our cars grind cautiously by, for the wrecking engine has only just come through. The deceased locomotive is standing on its head in soft earth thirty or forty feet down the slide, and two long cars loaded with shingles are dropped carelessly out of it. It looks so marvellously like a toy train flung aside by a child that one cannot realize what it means till its voice cries: "Any one killed?" The answer comes back: "No; all jumped," and you perceive—with a sense of personal insult—that this slovenliness of the mountain is an affair which may touch your own sacred self. In which case the train is out on a trestle again, and out on a trestle again.

It was here that every one began to despair of the line when it was under construction because there seemed to be no outlet. But a man came, as a man always will, and put a descent thus, and a curve in this manner, and a trestle so; and behold the line went on. It is in this place that we heard the story of the C. P. R. told, as men tell many times repeated tale, with exaggerations and omissions, but an imposing tale none the less. In the beginning, when they would federate the Dominion of Canada, it was British Columbia that saw objections to coming in, and the Prime Minister of those days promised it for a bribe an iron

band between the tidewater that should not break. Then everybody laughed, which seems necessary to the health of most

BIG ENTERPRISES.

and while they were laughing, things were being done. The C. P. R. got a bit of line here and a bit of line there, and almost as much land as it wanted, and the laughter was still going on when the last spike was driven between East and West at the very place where the drunken man sprawled behind the engine, and the iron band ran from tideway to tideway, as the Premier said, and people in England said, "How interesting!" and proceeded to talk about the "bloated army estimates."

Incidentally the man who told us—he had nothing to do with the C. P. R.—explained how it paid the line to encourage immigration, and told of the arrival at Winnipeg of a train load of Scotch crofters on a Sunday. They wanted to stop then and there for the Sabbath, they and all the little stock they had brought with them. It was the Winnipeg agent who had to go among them arguing (he was Scotch, too, and they couldn't quite understand it) on the impropriety of dislocating the company's traffic. So their own minister held service in the station and the agent gave them a good dinner, cheering them in Gaelic, at which they wept, and they went on to settle at Moosomin, where they lived happily ever afterward. Of the manager—the head of the line from Montreal to Vancouver—our companion spoke with reverence that was almost awe. The manager lived in a palace at Montreal, but from time to time he would sail forth in his special car and whirl over his 3,000 miles at fifty miles an hour. The regulation pace is twenty-two, but he sells his neck with his head. Few drivers cared. A mysterious man he was, over the road. A mysterious man he was, "who carried the profile of the line in his head," and more than that, knew intimately the possibilities of back country which he had never seen or travelled over. There is always one such man on every line. You can hear similar tales from drivers on the Great Western in England or Eurasian station masters on the big Northwestern in India.

A FELLOW TRAVELLER.

spoke, as many others had done, on the possibilities of Canadian union with the United States; and his language was not the language of Mr. Goldwin Smith. It was brutal in places. Summarized, it came to a pronounced objection to having anything to do with a land rotten before it is ripe, a land with 7,000,000 negroes yet unwelded into the population, their race type unevolved, and rather more than crude notions on murder, marriage, and honesty. "We've picked up their ways of politics," he said mournfully. "That comes of living next door to them, but I don't think we're anxious to mix up with their other messes. They say they don't want us. They keep on saying it. There's a nigger in the fence somewhere, or they wouldn't lie about it."

"But does it follow that they are lying?"
"Sure. I've lived among 'em. They can't go straight. There's some damn fraud at the back of it."

From this belief he could not be shaken. He had lived among them—perhaps had been baten in trade. Let them keep themselves and their manners and customs to their own side of the line.

This is very sad and chilling. It seemed quite otherwise in New York, where Canada was represented as a ripe plum ready to fall into Uncle Sam's mouth when he should open it. The Canadian has no special love for England—the Mother of Colonies has a wonderful gift for alienating the affections of her own household by neglect—but perhaps he loves his own country. We ran out of the snow through mile upon mile of snow sheds, braced with twelve-inch beams and planked with two-inch planking. In one place a snowslide had caught just the edge of a shed and scooped it away as a knife scoops cheese. High up the hills men had built diverting barriers to turn the drifts, but the drifts had swept over everything, and lay five feet deep on the top of the sheds. When we woke it was on the banks of the muddy Fraser River, and the spring was hurrying to meet us. The snow, had gone; the pink blossoms of the wild current were open, the budding alders stood misty green against the blue-black pines, the brambles on the burned stumps were in the tenderest leaf and every moss on every stone was this year's work fresh from the hand of the Maker. The land opened into clearings of soft black earth. At one station one hen had laid one egg and was telling the world about it. The world answered with a breath of the real spring—spring that flooded the stuffy car and drove us out on the platform to snuff end sing and rejoice and pluck squashy green marsh flags and throw them at the colts, and shout at the wild duck that rose from a jewel-green lakelet. God be thanked that in travel one can follow the year.

This, my spring, I lost last November in New Zealand. Now I shall hold her fast through Japan and the summer into New Zealand again.

Here are the waters of the Pacific, and Vancouver (completely destitute of any decent defences) grown out of all knowledge in the last three years. At the railway wharf, with never a gun to protect her lies the Empress of India—the Japan boat—and what more auspicious name could you wish to find at the end of one of the strong chains of Empire?

The Pedlar's Courtship.

A pedlar, well known in the Scotch Highland districts, lately buried his second wife. Being one of those who think it no part of wisdom to embitter the present with the recollections of the past, he soon turned from bewailing the dead to addressing the living. He picked out a neighbouring spinster as well suited for being his third mistress, and lost no time in making his desires known.

Jenny, it seems, turned up her nose at the offer; and John, leaving her to her fancy, departed, saying, "Weel, weel, a' the world does not think like you," which was quite true.

Before reaching home, the pedlar met a more compliant fair one. Jenny, in the meantime, reflected on the dangerous consequence which would probably result from her refusal, and resolved in future to be more kind; alas! in vain.

Next day, as the pedlar was passing by, Jenny called him in, and stated her contrition for the hard words of yesterday.

John heard her through, then replied, "Weel, weel, I'm owre far on wi' another ane now to think o' gaen back, but if she happens to be nae lang liver, I'll no forget to make you my fourth wife."

FURIOUS WITH JEALOUSY.

Warsaw is Shocked by the Crime of a Woman of Noble Birth.

A recent despatch from Warsaw, says—a terrible murder has been committed in this city by a woman of noble family named Boguslawa Czezicka. The victim was a ballet dancer named Josephine Gerlach, and the motive, as might be surmised, was furious jealousy on the part of the high-born criminal.

Josephine Gerlach had the reputation of being the most beautiful ballet girl in Warsaw, and ever since her advent on the stage here she has been the craze among the Polish nobility. Josephine encouraged and profited by these attentions and seemed to enjoy the unhappiness of the noble young ladies who found themselves deserted for the star of the ballet. A few days ago the town was shocked by the announcement that Josephine Gerlach had been found murdered in her lodgings. The condition of her room showed that she had been taken by surprise by some visitor. Her skull was beaten in, evidently with some blunt instrument, and her hair was matted with blood and brains. There were evidences of a struggle and the girl's disordered attire showed the clutch of bloody hands. The finger marks left by the murderer were slight and indicated to the police that a woman had done the deed. The apartment had been ransacked and jewels and money were missing. This was taken as evidence that robbery had also been a motive. The police ascertained that a lady, finely attired and apparently somewhat disguised, had called upon Josephine.

Inquiry brought out the fact that Boguslawa Czezicka had been heard to utter threats against the ballet girl. She was jealous of Josephine, and this fact was well known throughout Warsaw. The police took her by surprise, and were astonished to find upon her conclusive evidences of her guilt. She still carried with her a hammer and a dagger. On the hammer was blood and hair, and the dagger was stained with fresh blood. The lady confessed both the crime and the motive.

Josephine Gerlach, she said, had ruined her happiness and she resolved upon revenge. She went to the girl's room as if upon a friendly visit and watching her chance struck her with the hammer. The girl attempted resistance, but Boguslawa struck her again, this time breaking her skull and braining her. She then stabbed her repeatedly with the dagger. After committing the deed she robbed the room of the jewelry and money she found there. The news of the arrest caused extreme excitement among all classes, and crowds flocked to the magistrate's court to see Boguslawa arraigned for her crime. It is believed that she will be sent to Siberia for life.

TWO WARS ON FRANCE'S HANDS.

Samory and Behanzin are Giving Her a Handful of African Trouble.

The French have two little wars on their hands in West Africa. We have heard recently of the purpose of the King of Dahomey to force the French again into hostilities. The French have accepted the challenge, but it is not likely that we shall hear of hard fighting for some time yet, as this is the rainy season along that coast and the time is not auspicious for military movements. A month or two from now we may hear of some very lively doings in Dahomey and King Behanzin is likely to learn a lesson he will never forget.

The other war is now going on further northwest. The French are making a great effort to dispose finally of the Sultan Samory, their enemy in the upper Niger region. Samory has been fighting the French a good deal of the time since 1882. A few weeks ago The Sun reported that the French had driven him from his capital, Bissandagu, and they thought then that Samory was nearing the end of his rope. But he does not relinquish the game so easily, and the French career of success has not been unbroken.

Since he lost his capital Samory has been in the hill country south of his former stronghold. The French sent a force after him to insure his defeat, but he has lately scored at least one little victory over his pursuers, and he took a few French prisoners. It is hoped that he has not such faith in his ultimate success as will lead him to treat his prisoners with the terrible cruelty to which he is said often to have subjected other prisoners of war. Gen. Faidherbe, who fought Samory for years in the western Soudan, describes him as a monster of cruelty. Faidherbe says he owed the rapidity of his conquests to the terror produced by his practice of burning his prisoners of war by the hundred in fiery trenches filled with blazing wood and oil. We have not had Samory's side of this story.

One reason why he is now able to offer formidable resistance to the French is because he has quite a quantity of repeating rifles in his army. The French say he has 2,000 repeating rifles, and they blame the English for permitting him to purchase these improved weapons through agents in British territory on the coast.

It is probable that the French will not put an end to their troubles with Samory until they succeed in killing him. Nearly all the troops Senegal can muster are needed in the war with this prophet of the western Soudan, and so France is likely to have her hands very full when King Behanzin of Dahomey assumes the offensive, as he is certain to do as soon as the weather permits. In the end, however, it is quite certain that Samory will be defeated and his country turned into a French protectorate.

Advancing Backwards.

"Come here, Pat, you truant, and tell me why you come to school so late this morning," said an Irish schoolmaster to a ragged and shoeless urchin, whose "young idea," he had undertaken for a penny a week to teach "how to shoot."

"Please, your honour," replied the ready-witted scholar, "the frost made the way so slippery, that for every step forward I took two steps backward."

"Don't you see, Pat," was the rejoinder of the pedagogue, "that at that rate ye would never have reached school at all."

"Just what I thought to myself, your honour," replied the boy, "so I turned to go home, and after a time I found myself at school."

In Indiana and New York the statutes take no account of the extra day in February in leap year.