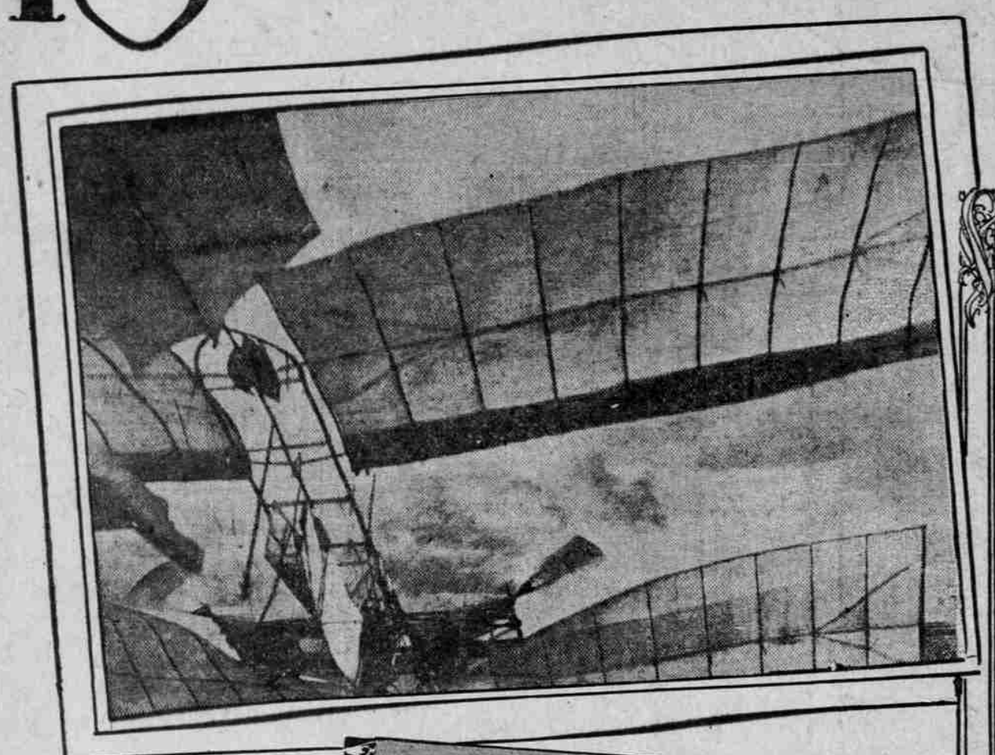
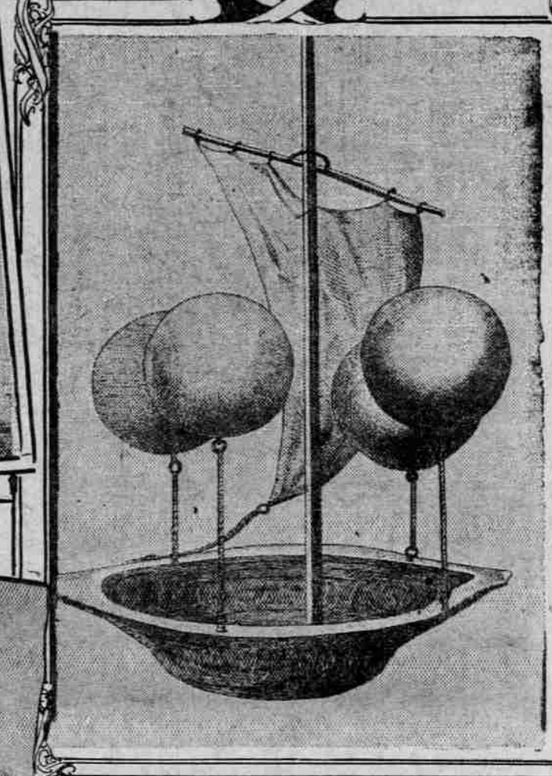
ROMANCE OF THE FLYING MACHINE

Inventions That Have Led Up to Santos-Dumont's Achievements.

This Problem Has Troubled Men For More Than Two Thousand Years.

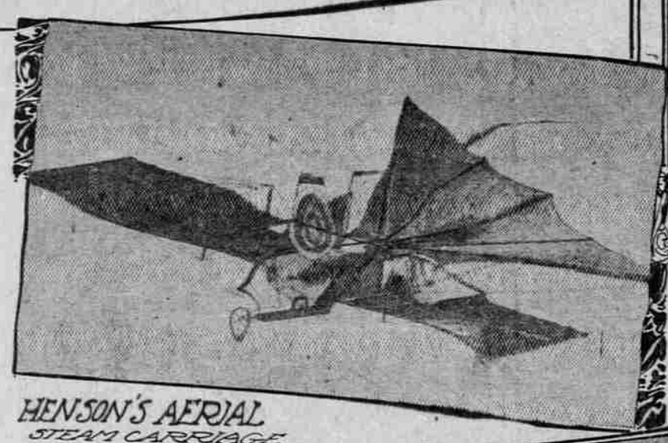


LANGLEY'S LAST AERODROME, UPWARD VIEW DURING LAUNCHING

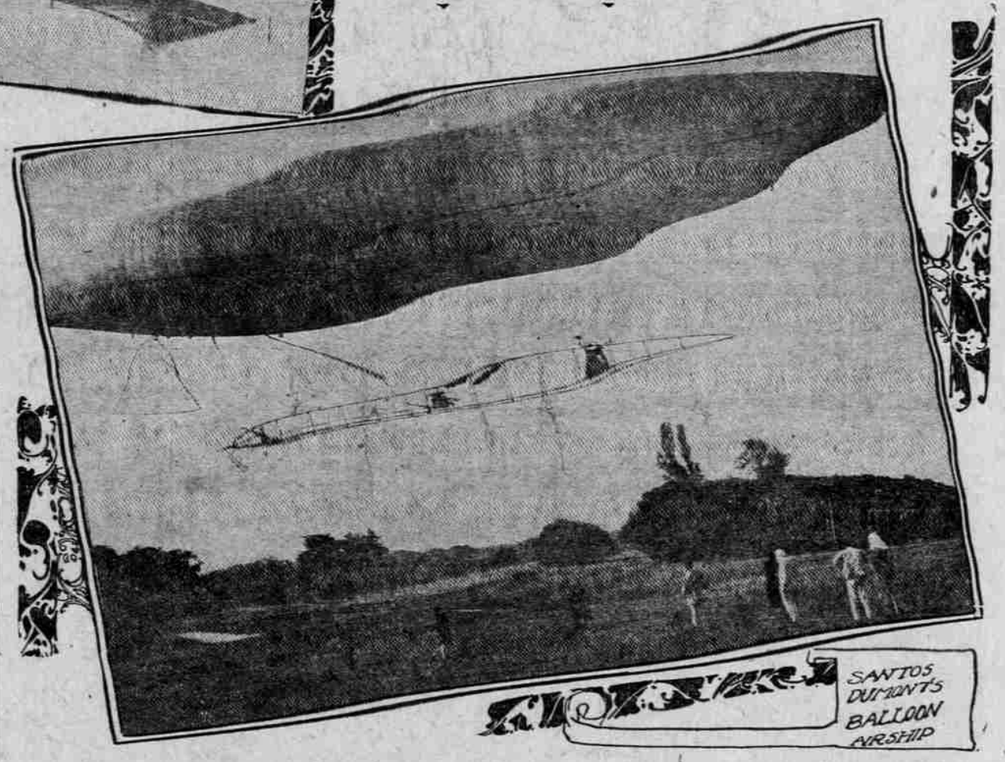


LANA'S AIRSHIP WITH COPPER BALLOONS

MONTGOLFIER'S BALLOON 1783



HENSON'S AERIAL STEAM CARRIAGE



SANTOS DUMONT'S BALLOON AIRSHIP

SANTOS DUMONT is the first man to have performed aerial flight with a self-propelled machine heavier than the air which it displaced. He has solved a problem which has caused inventive scendus to burn the midnight oil and toss restlessly upon their couches since centuries before the dawn of the Christian era. During three millenniums or more ambitious man have broken their hearts and their heads seeking the great goal which this fearless Brazilian has won within the past few weeks.

Although the balloon is commonly regarded as the father of the aerodrome, history bears it out that man took up first the more difficult problems involved in the latter mechanism. Nature gave to the ancient inventor the birds of the air as models after which to build. But the ancients for many centuries regarded the ability of feathered creatures to fly as a supernatural gift.

First Flying Machine 400 B. C.

The first mechanical flying machine of history was the artificial pigeon of Archytas, a Greek geometrician, who flourished about 400 years before Christ. The historian, Aulus Gellius, says that "Archytas constructed a wooden pigeon which could fly by means of mechanical powers and an aura spirit." This "aura," according to the Greeks, was a force emanating from all living things, which it surrounded like an atmosphere. Some of our recent inventors of new religions have applied the term to what others call "animal magnetism." According to fuller descriptions the buoyancy of Archytas' pigeon was effected by magnets, the propelling power only being an occult force.

One writer stated that although the machine could fly, "it could not raise itself up again" if it fell.

During the reign of Nero a man flew high in the air, but lost his life in the descent, according to Antonius Byerlink, who gave some description of the wings and apparatus and attributed the violent death of this pioneer Darius Green to the fact that his evil genius suddenly became displeased while he was aloft and suffered him to fall. This warning appears to have been effective, for not until the fifteenth century does history record another actual flying machine.

Charles V and the Artificial Eagle.

An artificial eagle, which flew out to meet the Emperor Charles V and accompany him back to town, is said by several historians to have been constructed at Nuremburg by Johann Muller, known also as Regiomontanus—a German bishop, astronomer and mathematician. About the same period "a certain monk named Elmerus flew about a furlong from the top of a tower in Spain." Another of these early experimenters is said to have attempted flight from St. Mark's steeple, in Venice, and still another at Nuremburg, while "by means of a pair of wings a person named Dante, of Perouse, was enabled to fly, but while amusing the citizens with his flight he fell on top of St. Mary's Church and broke his thigh."

Leonardo da Vinci practiced flying successfully, according to Cuperus' "Excellence of Man." How the celebrated Italian artist, musician and mechanician accomplished this feat four centuries ago is not, however, stated. Busbec, ambassador of Ferdinand I at Constantinople, also speaks of a Turk in that city who attempted to fly.

Soaring Machines of the Sixteenth Century.

John Wilkins, Bishop of Chester, a celebrated English scientist of two centuries and a half ago, said: "I have heard from credible testimony that one of our nation hath succeeded so far in this experiment that he was able, by the help of wings, in such a running pace to step constantly (off the ground) 10 yards at a time." This appears to be the first suggestion of the soaring machine, such as used in recent years by Lilienthal, Chanute and the Wright brothers.

A flight with wings, consisting of four rectangular surfaces, one at each end of two rods passing over the shoulders of the operator, was made by Besnier, a locksmith of Sable, France, according to the Journal des Savans, 1678. Besnier, it was further stated, progressively raised himself from one height to another until he reached the top of a house, from which he passed over the neighboring houses. He could thus cross a river of considerable breadth. His first pair of wings were purchased by a Mr. Baldwin of Guibre, who was said to have used them with remarkable success.

The world's first flying machine patent was issued in 1709 to Bartholomew Lourence de Guzman, friar of Lisbon. He presented to the King of Portugal an address representing himself as having invented a swift flying machine capable of carrying passengers and requesting prohibition against all imitators. The king, delighted that his subject had won the great goal, issued a decree ordering "the pain of death" against any one who should infringe on the friar, who was also rewarded with an annual pension of 600,000 reis, the first professorship in the University of Coimbra and the first vacancy in the College of Barcelona. In the absence of wind the sail of this machine was to be filled by a pair of bellows assisted by two powerful magnets and several pieces of amber. How long this wily friar enjoyed his pension and patronage is not stated, nor does history state what the king did to him after discovering the extent to which his majesty had been "buncoed."

First Balloon Carried a Menagerie.

Students of mechanical flight shortly afterward paused to behold at last a vehicle which could mount the air to a great height and carry human freight long distances. Somewhat extravagant suggestions of an airship on the balloon principle had been first made by Roger Bacon, the celebrated English philosopher of five centuries ago, who proposed "a large, hollow globe of copper" to be "filled with ethereal air or liquid fire and then launched from some elevated point into the atmosphere." About four centuries later Francis Lana, a Jesuit, had further proposed to prepare four hollow globes of thinnest copper, each 20 feet in diameter and suspending a boat for the aeronaut. But during the stormy days just preceding the French revolution there dwelt at Avignon Stephen Montgolfier, who had observed that a light paper bag filled with smoke would rise in the air. He concluded that if the bag were made large enough it would not only rise of itself, but lift one or more men. So he and his brother Joseph set to work to experiment with several large paper envelopes in the shape of the "balloon"—a short-necked vessel used in chemistry. They at last perfected "an immense bag of linen lined with paper," its parts "joined together by means of buttons and holes." It measured 117 feet around and had a capacity of 23,000 cubic feet. To the great delight of their countrymen they sent it high into the air, but did not attempt to mount with it. Finally, however, Stephen Montgolfier appeared in Paris, where the Royal Academy requested him to repeat his experiment. He at once constructed a still larger balloon, 72 feet high and 41 feet in diameter. In September, 1783, it was placed over a pit containing burning chopped straw and wool and was thus inflated in the presence of King Louis XVI and the royal family at Versailles. In its basket of wickerwork it carried a sheep, a cock and a duck to a height of 1500 feet, and then let these surprised creatures gently down upon the earth. A still larger balloon was soon afterward constructed by Montgolfier and under the opening he hung an iron brasier into which he could introduce fuel to keep the vehicle afloat. On November 21, 1783, to the great delight of the people of Paris, this balloon arose, carrying with it two Parisian gentlemen longing for a new sensation. They rose 3000 feet and remained in the air 25 minutes and landed safely five miles from where they had started.

The first American balloon was flown a few months later at Philadelphia by a Dr. Rittenhouse and a Mr. Hopkinson. They connected together four balloons inflated with hydrogen gas and which lifted a man into the air. Taking alarm, he cut a hole in one of the envelopes after he had risen several hundred feet.

The hydrogen balloon has since developed in all sorts of forms and shapes. It was soon recognized, however, that the ball-shaped balloon was the sport of the wind and that it was necessary to elongate it.

One of the first balloons propelled by machinery was devised about 1820 by Rufus Porter, an American, who built it as a model about 1833. It was cigar-shaped and driven by a screw. A larger one with a car for passengers was exhibited in New York and Washington about 1835-40. The newspapers described it as flying rapidly. In 1852 Henri Gifford, a Frenchman, attached to a cigar-shaped balloon, 144 feet long, a 463-pound steam engine which drove the propeller, and in 1884 Tissandier, another Frenchman, was the first to use an electric motor for propelling balloons. The value of steerable balloons for warfare was at once recognized by the French War Department, which in 1885 built the first navigable war balloon, "La France," whose 1124-pound electric motor drove it 14 miles an hour. But with the advent of the automobile came motors more and more compact.

In 1900 Count Zeppelin built his monster dirigible balloon 420x39 with a 22-horsepower gasoline motor. Then came Santos-Dumont, who was shown to the Parisians his ten or a dozen dirigible balloons driven by compact gasoline motors. In one of these he circled the Eiffel Tower on July 12, 1901, and since then has performed many feats well known to the public. His greatest rival in the perfection of dirigible balloons has been M. Julliot, who built the "Lebaudy" airship containing 80,000 cubic feet of gas and a 40-horsepower engine, the whole airship weighing 5700 pounds. The French government, assured of the success of this dirigible balloon, has just completed what is almost a duplicate, and is said to have ordered a fleet of eight or ten similar machines. Our Army has so far gone no further than the "kite balloon" bought some time ago in Germany. M. Julliot, by the way, has been commissioned to build the much-heralded Wellman airship.

Reaction Against Balloon Machines.

The practicability of the aerodrome without buoyant gas was denied by Santos-Dumont during the Langley experiments. But by 1903 a decided reaction against balloon airships had set in among the aeronauts of Paris, who realized that the limit of their speed had been about reached and that the great gas bags were too unwieldy, too expensive and too much the prey of the wind. About that time the French commenced to turn their thoughts to the Langley idea and Santos-Dumont himself made a compromise by reducing the gas in his machines and adding aeroplanes. And now he appears in the limelight as the chief disciple and successor of Langley.

From the success of the Montgolfiers in 1783 until the Langley experiments the advocates of purely mechanical flight did not lose heart, and the world heard of many aerodromes which, however, never flew. Notable among these was the "aerial steam carriage" of one Henson, an Englishman, alleged about 1841 to have invented a steam engine of extreme lightness which was to wave the machine's great bat-like wings after it had been launched down an inclined plane. Many Englishmen enthusiastically believed that Henson had solved the problem of flight without buoyant gas, but the contrivance never flew.

Our first flying machine patent was issued in 1844 to Muzio Muzzi, an Italian. In the next 50 years 150 airship patents were granted by our Government, the most remarkable being that of Wulff, a Frenchman, for propelling balloons with condors harnessed to a horizontal wheel which was to be turned by a pilot, according to the desirable direction.

Langley's "Whirling Table."

There should be no forgetting of the fact that there was no exact science of mechanical flight until Professor Langley gave it to the world. In 1886 when he commenced to study the problem there was not even any reliable literature to aid him. "I went to work then to find out for myself, and in my own way, what amount of mechanical power was requisite to sustain a given weight in the air and make it advance at a given speed," he once wrote. He commenced his work while director of the Allegheny Observatory with aeroplanes and stuffed birds attached to arms of a whirling mast revolved by a powerful steam engine. The aeroplanes traveled at the rate of nearly 100 miles an hour about a circle 60 feet in diameter.

He moved this apparatus to the Smithsonian, after taking charge of that institution in 1887, and in 1891 he gave to the world the facts on which all later experiments in mechanical flight have been based. At the time these experiments began the only existing mechanism which could sustain itself in the air for even a few seconds was a toylike model made by Penaud, a Frenchman, the motion power being twisted rubber bands. In May, 1896, Langley's steam aerodrome flew 3000 feet over the Potomac in one minute and a half. The following November it flew three-quarters of a mile.

In 1898 the Army Board of Ordnance and Fortifications allotted to Professor Langley $50,000 for the construction of a larger aerodrome, capable of carrying a man, and Professor Langley offered his services to the board without compensation. He scoured both continents for a suitable gasoline engine, and finally had to build his own, which weighed two and one-fifth pounds per horsepower, or one-half the weight of the lightest engine thought possible by the best engine builders of the world. He completed the new machine, and in August, 1903, its quarter-size model, launched directly on the face of the wind, flew ahead on an even keel, with perfect balance. Later while the full-sized machine was speeding along the launching track, with the engineer in his seat, the front caught on the defective launching apparatus, and the aerodrome was precipitated into the Potomac, the machine never having had a chance to fly. Professor Langley shortly afterward fell into ill-health and died. He took with him to the grave the assurance that the machine when repaired and given a perfect launching gear would fly. But while he had been experimenting other geniuses had been at work.

Soaring Machines.

The nearest approach to human flight of modern times had been made in 1894 by Otto Lilienthal, of Berlin, who imitated the buzzard by aid of a soaring machine on which he was able to "slide" down hill, with his feet above ground, fifty yards or so at a time. But in 1896 he met his death while thus experimenting. Meanwhile, A. M. Herring, of Chicago, had taken up the soaring experiments in this country, and in 1896 he was engaged by Octave Chanute to improve upon Lilienthal's aeroplanes. Experiments with varied apparatus were made near Chicago in the Summer and Autumn of that year. One of these machines had movable wings, used in sustaining equilibrium, but not for propulsion. Since that time Messrs. Wilbur and Orville Wright, of Dayton, O., with improved machines, have dared to perform feats which neither Lilienthal nor Chanute attempted. But all of these were soaring rather than flying machines. Although aeroplanes not buoyed up by gas, they had no artificial motors, and their problem was not as complicated as that of the aerodromes of Langley and Santos Dumont.

JOHN ELFRETH WATKINS.
Washington, D. C., Jan. 5.

Photographing in Colors One of the Fine Arts

Results Achieved Are Beautiful, but the Process Is Very Difficult.

A. F. Collins in New York Tribune.

OF the thousands of photographers, amateurs and professionals alike, who have viewed with unalloyed pleasure the beautiful, fleeting images produced in the colors of nature on the ground glass screens of their cameras, probably not one since the beginning of the art a century ago has failed in the desire that these might be permanently fixed and preserved.

Very different, indeed, are the final prints obtained, for instead of the tints and shades produced by the exquisite blending of the primary colors, there are only the graduations of light and shade produced by white and black, and these are therefore colorless, for white is the result of superimposing the primary colors, while black is the absence of light.

The great desire to photograph direct in colors, and which has come to be known as color photography, is as old as the making of pictures by light itself, for Niepce, who was one of the first, if not the very first, who experienced the joy of seeing the marvelous pictures nature could depict with the aid of a lens and light upon a ground glass screen, became so imbued with its significance and his own ability to fix the fugitive image that he declared to a friend that he would "soon be able to reproduce his image as he saw himself in the mirror."

When we consider that this startling statement was made by the bold Niepce before a method had been found for permanently fixing the images on a photographic plate, as well as in view of the fact that color photography is a recent accomplishment, it would seem that this pioneer was carried away with an optimism that must have been induced by the hypnotic beauty of what he saw and his great desire to capture it—a worthy ambition.

Doubtless this same intense desire, this belief that there must be some solution of the problem, has kept persons seeking to solve it from that day to this, a period of 80 years, and yet it is only within the last 12 months that a really practical method of color photography has been put upon the American market.

To follow in sequence the most important steps that have caused this great advance to be made we must go back almost to the time of Niepce's prediction. Photographs had been obtained by the chemical action of light on the salts of silver, but on exposing to the light they promptly faded away. After a long search Sir John Herschel discovered that hyposulphite of soda would fix them against the further effects of light. This brought photography to a working basis, though it was not yet a commercially practical art, for it required an exposure of from six to ten hours.

It was Daguerre, whose name will be forever linked with those beautiful images he produced upon the surfaces of highly polished silver plates, and known a couple of generations ago as daguerreotypes, who reduced the exposure to eight or ten minutes. Then Talbot, a contemporary of Daguerre, invented the glass plate negative, which enabled him to obtain as many positive prints on silver paper as he desired with a single exposure of the subject, a wonderful process that gave photography its first great impetus.

So much for monochrome photography, and now for color photography. Every one knows that it was Sir Isaac Newton who analyzed sunlight by passing a beam of light through a glass prism, splitting it up into its original component parts, as he supposed, of seven colors.

Then Thomas Young, a later physicist, deduced the conclusion that there were only three primary colors, instead of seven, and that these colors were red, green and violet. By experimenting he found that if red light and green light were superimposed on each other they would make yellow light; that green and violet would produce purple light, and, further, that red, green and violet light when blended, would result in white light. Finally, by varying the proportions of the colors, any tint or shade, however delicate, could be produced.

This knowledge was the first active advance looking toward the realization of color photography. The next important move was made by James Clerk Maxwell, in the early '60s, when he succeeded in demonstrating the truth of Young's color theory by obtaining a color record on negatives of a bright bit of ribbon by photographing it three times—first through a red glass or color screen, then through a green glass, and lastly through a violet glass. The three-part negatives thus obtained were, of course, without color, but when positives on glass were made from them—also without color—and the pictures were projected upon a screen by means of a proper lantern having red, green and violet glasses interposed to supply the color, the ribbon was reproduced in its original tints and shades.

In this country in the past 20 years Frederic Ives has done much to perfect the three-color process, which has attained a wide popularity in the graphic arts. His invention consists of cameras for making triple negatives simultaneously and different optical devices for viewing direct, as well as for projecting the pictures on a screen. In any case, however, it is necessary to have three positives on glass, one for each of the primary colors, and to interpose the color screens between these and the light.

This is what was meant by the term "color record" mentioned above, for these pictures on glass are not colored, but merely represent color, and, just as a phonograph cylinder must be placed in a phonograph before it can be made to reproduce the sounds previously impressed upon it, so these color records must be placed in a kind of stereoscope or a magic lantern before it will select and reproduce the colors.

Beautiful as are these color photographs, it is not the ideal color photography—the fixing of nature's colors on a sheet of sensitized paper as in ordinary photography. Like wireless telegraphy and mechanical flight, many schemes have been evolved to produce the desired result, but, like the foregoing processes proposed, have been found sadly wanting. The very latest development in color photography, and one that seems to come well within the limits exacted by the photographic cult, has recently been brought out in Germany.

In this new process three negatives are made, one through red glass, another through green glass and the third through violet glass. Having obtained the triplicate negatives, the preparation of the paper comes next. The first step is to cover a sheet of paper with a colorless solution that turns blue on exposure to the light. The paper thus coated is placed in an ordinary printing frame over the negative that was made through the red color screen—for blue is the complementary color of red; the frame is set in the sunlight and printed until the paper is a bright blue, when it is taken out, fixed and washed. When the print is dry it is covered with a colorless solution that turns yellow in the light; again it is printed, this time over the negative made through the violet glass; again it is fixed, washed and dried, and then for the last time it is covered with a colorless solution that turns crimson in the light, when it is printed over the negative taken through the green color screen. After being fixed, washed and dried the resulting picture is a beautiful photographic print in natural colors.

These color prints are not so easy to make as the ordinary velox prints, nor as durable as silver prints, but the beauty of the pictures and the simplicity of the process certainly commend them to the amateur who practices photography for the sake of art.

Following the Furniture.

An Irishman, whose wife was fond of moving from one house to another, was met by a friend the other morning while walking behind a van load of household goods and saluted with: "Hallo, Mick! Shifting again? Where might you be going this time?"

"I don't know, begorra," said Mick. "I'm following the furniture to find out!"

Whistle Heard for Twenty Miles

Steam Siren in East St. Louis That Tells the Time to 100,000 People.

St. Louis Post-Dispatch.

East St. Louis now has the biggest steam whistle in the world. It is a remarkable triple machine with three voices—a three-chime whistler, whose capacity for the annihilation of peace is extraordinary. This whistle blows a ten-mile blast at half-steam and with favorable wind has a disturbing power of 20 miles. It costs $1 every time it is blown.

But this great whistle is not all noise. It is an idea in economy, a whistle trust, a noise combine. Almost all the little noises, yelps, toots and whines of similar mechanical throats in East St. Louis are now dumb. The giant whistle trust whistles for them. The independent whistles have to whistle off time to be heard.

Within the range of this whistle are said to be 100,000 people who tell time by it.

This remarkable whistle has been installed by the East St. Louis & Suburban Electric Railway Company at the Belt power-house, State and Twentieth streets, where the company's machine shops and car barns are located.

The greatest modern siren comprises three whistles. The largest is almost six feet in height and nearly as big around as a man. On each side of the main one is a smaller whistle. The three units combine to make one noise with which even Babanne, miles away, across the Mississippi River, in the west end of St. Louis, is well acquainted.

This big triple whistle was also set up at the railway company's electrical generating station "as a feature." It is connected with an electric clock, which is regulated by the Government standard time sent out from Washington on the dropping of a ball at exactly noon each day.

The electric clock which connects with the whistle is guaranteed not to vary five seconds in time a year, and the clock's record to date is satisfactory. Almost every man looks at his watch when the first blast is sounded by the big whistle at 7 o'clock in the morning. Almost every housewife in East St. Louis glances at her mantel timepiece when the siren wooes noon—the second blast of the day. The third blast is an hour later and the last is at 6 in the evening.

Chums.

Milwaukee Sentinel.

As older and older I grow,
And waning I find is my sight,
I am gradually coming to know
That it's best to slack up in the fight.
And I find, as the years keep a-creeping
And my age is what many call ripe,
That I care more for dozing and sleeping
And the pleasure I get from my pipe.

I care not for dreaming romantic,
For that passed away with my youth;
I have naught of the manner pedantic,
My tongue I keep silent, forsooth.
Let youngsters just turned out of college
Bear the palm, I was once of their type;
But now I don't prate of my knowledge,
I cogitate here with my pipe.

There isn't much left when a fellow
Is whitening fast o'er the brow,
And he gets easy going and mellow—
A diff'rence 'twixt Then and the Now!
I plue not, nor am I regretful
For lost hopes—I'm not of that stripe—
And when I get restless and fretful,
It's me to my chummy old pipe!

De Profundus.

Ethel Edwards.

I have been down with sorrow in the deep,
Where never a ray of light can pierce the gloom,
Where is no respite, and where falls no sleep—
Where is Life's tomb.

There lie the buried hopes of all the years,
Lost lives, and broken hearts and loves laid low;
There falls a long monotony of tears—
Falls swift and slow.

I have been long with sorrow . . . If the day
Should ever dawn when I am free from pain,
And love lead gently back to life again.
Can I forget that I have passed this way?