THE MAKING OF MOVING PICTURES.—I.

HOW THEIR FANTASTIC EFFECTS ARE OBTAINED.

BY GUSTAVE BABIN.

Few inventions have made, in the beginning, an impression equal to that produced by the cinematograph, or moving picture apparatus. Not one, perhaps, has enjoyed so great and so long a popularity. Every one remembers the amazement which he experienced when for the first time he saw projected in successive quivering pictures on the white screen movement, life itself, caught, fixed, and then revived by the cinematograph. For myself the memory of my first acquaintance with this marvel will always be ineffaceable. It was in an improvised theater in a basement, a few days after the first public exhibition of moving pictures in France. The programme was ridiculously simple. Employees leaving the Lumiere factory, the start of a railway train, the debarkation of

passengers from a steamboat; and the comic relief was given by the "Sprinkler sprinkled," which soon became very popular. Since then the moving picture has progressed with remarkable rapidity. The moving pictures have moved from the basement and conquered the theaters in all parts of the world. For a few cents one can witness miracles.

A milliner's apprentice taking a nap on a bench is suddenly transformed into a fashionably-dressed lady; in the middle of an avenue a sleeping sot is cut in two by an automobile and then put together again; clowns mount stairs backward and make amazing leaps; an omnibus goes backward, dragging the horses after it; pumpkins roll up a hilly street and bound into upper windows; a ski runner darts through the

The Automobile Accident.

The Cripple Brandishing the False Legs After the Accident.

Substitution of the Cripple and the Artificial Legs for the Other Actor.

The Severed Legs Are Replaced and Healer and Healed Shake Hands. The Left-Hand Scene is Enacted by the Cripple; the Right-Hand Scene by the Other Actor.

The Two Actors "Making Up" for a Moving Picture Episode.

The Cinematograph at Work at the Critical Moment.
THE AUTOMOBILE ACCIDENT.

air, strikes against a factory chimney, knocks it down and continues on his course, skating over the clouds. From a bunch of scattered roses springs a swarm of imps or of dancing girls; in a shady park under willows quivering in the wind a column of vapor arises and becomes transformed into a radiant vision which smiles, dances, in short, lives. In a wall or in the silky tissue of a Persian rug appears a vague spectral feminine form, which gradually becomes definite, advances, performs a pantomime, a dance, and then melts into thin air.

How is all this done? We cannot here explain all these marvels in moving pictures. Every establishment has its own peculiar methods, but there is no great secret, and the artifices by which the astonishing effects are obtained are really few and simple. When he has learned the principal and commonest devices, any attentive spectator ought to be able to understand nearly all the mysterious effects of moving pictures. The details here given were furnished by M. Léon Gaumont, the director of one of the largest establishments for the production of moving picture fixtures.

Moving pictures may be divided into two great classes. First, scenes taken directly from nature, reproductions of festivals, processions, views of various countries, etc.; secondly, theatrical scenes, dramatic or comic pantomimes, fairy scenes, constructed according to the rules of dramatic art. But the combination of these two classes, the transference to a natural scene of theatrical compositions interpreted by actors, mingling the real with the factitious, giving to fairy tales a background of real fields, forests, mountain and surf, and also the employment of means which are peculiar to the apparatus itself, allow us to obtain most wonderful effects, quite impossible and unknown until now. The reproduction of actual scenes constituted at first almost the entire domain of the cinematograph. By constantly improving the methods, astonishing results have been obtained in this class of work. For example, the funeral of King

Snapshot Showing How the Policemen's Swords Are Pulled Toward Him With Cords.

Pursued by a Manhole Cover. The Cover is Made of Wood and Moved by Cords. (From a moving picture film.)

Attacked by a Lamp Post. The Post is Moved by Cords. (From a moving picture film.)

THE MAGNETIC GENTLEMAN.

THE TRAVELING BED.

Carlos of Portugal took place at Lisbon on February 8, 1908; three days later, on the 11th, spectators in Paris and London saw moving over the screen the painted and gilded coaches of the ambassadors, the gorgeously-clad red archers, and the black funeral cars of the King and the Prince. Most of this delay was due to the slowness of the locomotive. At Lisbon the spectacle might have been produced on the same evening, an hour after the termination of the ceremony. With the processes of developing and printing which are now used, it is possible to project a film twenty minutes after it was taken. But the field

Removal of the Box Cover and Part of the Back Scene During a Stoppage of the Apparatus.

The Dancing Girls as They Appear from the Back of the Stage.

The Dancing Girls Take Their Positions at the Back of the Deep Stage and Are Seen Through the Hole Which Represents the Box Cover. Their Distance Makes Them Appear Very Small.

THE LITTLE MILLINER'S DREAM.

The Old Beau Comes Out of the Milliner's Box, Followed by Fairies Offering Rich Garments and Gems. (From a moving picture film.)

for this class of work is very limited, for it is necessary to wait for events to happen. The theatrical field, on the contrary, is unlimited, being incessantly extended by the imagination of librettists and the ingenuity of mechanicians and operators. The public, which delights in seeing the scenes of a comedy or tragedy projected on the screen in a few minutes, has no idea of the amount of work and of money that the smallest of the dramas thus represented has cost.

A new career has opened for ambitious budding dramatists, who are generally very well received by the picture makers, for who knows that they may have in their minds the unknown masterpiece, the inspiration, the subject of a film, which will be sold throughout the world by thousands of miles? On the other hand, the aspirant is often cut short with the curt remark: "Oh, that's old."

The idea having been accepted, the next thing to be done is to mount it, exactly as in an ordinary theater, and to enact it as well as possible. The theater of Belleville, where all this work is done, has its actors and actresses, its scene painters, and the entire personnel of a theater. It has also all the mechanical devices of a complete theater, with numerous stage galleries, and three stories below the stage. Here the writer saw the preparation of the moving picture film entitled "The Little Milliner's Dream." In the first scene appears a little milliner's apprentice, cheaply but coquettishly dressed; she has left her suburban home in the morning and is now hard at work, with the inevitable immense box under her arm. But as she stops to look into a jeweler's window she suffers, as so many others have done, the delicate attentions of an elderly gallant. She shrugs her shoulders and goes on her way, forgetting the sparkling jewels. However, she cannot banish the memory of this incident. As she walks on, she keeps thinking of this engaging gentleman, and when, overcome with heat and fatigue, she sits down on a bench and falls asleep, she has a dream in which he plays the principal part. Her box lying on the bench beside her has mysteriously opened, and from the top, lined with black plush, suddenly appears a little figure, hat in hand, bowing and smiling, the miniature image of the old beau of the street. He comes forward, increasing in size, bows very low, and renews his homage. The girl cannot believe the evidence of her eyes, and the spectators experience a similar difficulty.

This miracle is accomplished by very simple means. In the first place, the background is of an artificial and theatrical character. The back of the bench is not real, but is painted on canvas. Immediately over the box a hole is cut in this canvas of the exact size and shape of the box cover. At the beginning of the dream the moving picture apparatus is stopped; then two men take away the box cover, exposing a window opening upon a black background, formed by an immense black canvas at the back of the deep stage. Because of the perfect similarity of surface and color, the spectator has no idea that the box cover has been removed. In this rectangular field, in the extreme background, the old beau has taken his position during the stoppage of the apparatus.

The apparatus is now started again, and the action is resumed. The girl is now all attention and the gallant all attention. The apparatus takes up the action at the exact point of the scene and of the film at which it had stopped, so perfectly that there is not the slightest indication that any interruption has taken place. Here, then, we have an artifice peculiar to the apparatus, namely, the pause; and the applications of this are innumerable. The entire action and effect of the milliner's dream are based upon this device.

Taking advantage of a second pause, the old beau comes in front of the back scene, walks forward, and attains life size. At a gesture of his a flock of miniature dancing girls now appears in the box cover, from which he has just emerged. They appear very small because they are in the extreme background. As they dance they move forward and gradually increase in size, owing to the effect of perspective, exaggerated by the distortion of the lens as in all photographs; and when at last they have become near enough to fill the opening, the apparatus is stopped again and the girls come in front of the scene, repeat the pantomime of the gentleman, and kneel at the feet of the astonished apprentice. One presents her with a hat of the latest fashion, another with an elegant costume, and still others with jewels. In another instant we behold her adorned with these works of art; her shoulders gleaming with pearls, her wrists encircled with bracelets, in short, appareled for the ball. This metamorphosis was accomplished by means of another pause, apparently instantaneous.

The little milliner, captivated by all this, goes off with the gentleman, who very politely takes the big box under his arm, but very wisely drops it at the next corner. As it strikes the pavement it is transformed, by means of another pause, into a fine automobile, in which the couple take their seats. The following pictures show the little milliner surrounded

by a gay company, dining and wining. Suddenly part of the scenery changes to that of the first act, and she sees a vision of her parents, seated before the lighted lamp, anxious and weeping because of her non-appearance at this late hour. She starts to speak to them and embrace them, when they suddenly change into two of her fellow guests. Finally we see her on her bench in the park, rudely awakened by a policeman.

This artifice of the pause, which we have seen used so often in this single film, is the means of producing the most surprising effects. The transformation of a flower into a woman, in general the substitution of any person or object for another, is accomplished in this way, and the illusion is so perfect that the older stage devices of gauze and mirrors, the vision of Marguerite in Faust, for example, appear very crude in comparison.

A pause followed by a substitution of persons is the chief machinery of the "Automobile Accident," one of the most startling of all the series. Here the action takes place, not in the theater but in the highway. The difficulty is to obtain the principal actor, and it is more difficult to induce him to play his part than it is to find him. Here is the story:

A gentleman much the worse for wine is tacking up the road when he comes to a sudden stop, falls down, and falls asleep. Along comes an automobile at high speed, which runs over the sleeper and cuts off his legs above the knees. He wakes up, lifts up his legs, one in each hand, and drags himself, like a wounded frog, after the vehicle. This finally stops, and a stolid passenger dismounts. He calmly takes out of the car the repair kit, in a few seconds he replaces the severed legs, and he and the patient shake hands and part excellent friends. Now all this is easily done with the aid of the pause and a legless cripple. The legless cripple, as I have said, is hard to find and still harder to engage. This principal actor having been obtained, a second actor with perfect legs makes up in exact imitation of the cripple. With these two men and two artificial legs we proceeded to the Park of Vincennes. The apparatus having been set up, the second actor began the scene by staggering along the road and falling down. The apparatus was then stopped, and during the pause the automobile moved very slowly until the front wheel touched the sleeper's legs, leaving on the road a trace of its path.

The place where the drunkard had lain was also marked, the cripple was substituted for him and completed by the addition of the false legs, disposed as ingeniously as possible. The automobile, which had been removed, now returned, following exactly in its former tracks, the cinematograph having now been started. As the car ran swiftly up to the man I think all of us shuddered, but everything went well, and the cripple sat up, brandishing his severed legs. The rest of the scene was not photographed that day, and for this reason the pictures of it here reproduced show different actors. Of course, the automobilist applies the artificial legs to the cripple's stumps, and then another pause allows the second actor to be substituted for the cripple.

The very lively impression which this scene produces results in large part from the environment in which it takes place, the real landscape which surrounds it, and which at first prevents us from imagining the possibility of deception. This is the case, also, with the "Magnetic Gentleman," of which, however, some scenes occur in the theater and some in the street. The hero of the story, having been attacked by "Apaches" (Parisian thugs), resolves to provide himself with a suit of mail. The boys who were sent to take it home, unfortunately stop at an electrical establishment and lay the package on the frame of a dynamo. The armor becomes magnetized, and is removed with difficulty. Tin cans and the cars containing them pursue the boys as they carry it away. When the gentleman puts on the armor, his breakfast platter leaps from the hands of the maid and sticks to his shoulder; he goes out of the house, and misfortune pursues him. He cannot pass near an iron object without attracting it; milk cans, tin signs, etc., rain upon him, a manhole cover jumps up and rolls after him, and the lamppost descends upon his head. He is arrested and taken to the police station, where the sabers of the gendarmes spontaneously turn against him. In this series no tricks peculiar to the apparatus are employed. The objects are moved by wires or directly by human hands.

The mystery of the moving bed in which the evicted tenant is conveyed from street to street is still more simple, for it is merely pushed along by two men concealed behind it. The mystery and interest consist in the appearance of the bed in the middle of a crowded street.

In the following article we shall see other examples of effects of this kind, produced by the combination of natural scenes with theatrical actions, and we shall learn that still stranger effects can be obtained by special methods of taking the pictures and treating the

films.—Translated for SCIENTIFIC AMERICAN SUPPLEMENT from L'Illustration.

(To be concluded.)

A STATISTICAL STUDY OF MIDSUMMER BIRDS OF ILLINOIS.

S. A. FORBES, of the University of Illinois, has prepared a paper which contains a preliminary statement of some of the more general results of a census of summer resident birds of Illinois, giving the entire bird population of a strip 150 feet in width and 428 miles long (12 square miles), one-third of this area being in southern, one-fourth in central, and two-fifths in northern Illinois. The method of the enumeration was such as to give the numbers of each species found on measured areas, taken at random, of each crop or other distinguishable kind of surface. The responsible observer, Mr. A. O. Gross, determined 7,740 birds belonging to 85 species—an average of 645 birds to the square mile, of which 18 per cent were English sparrows. On this basis, the total summer population of the State numbers about 30,750,000 birds, of which five and a half millions were English sparrows. Eighty-five per cent of these birds belonged to one-fourth of the species. The ten most abundant species, and the numbers seen of each, were as follows: English sparrow, 1,414; meadow-lark, 1,025; bronzed grackle, 900; mourning-dove, 461; dickcissel, 393; red-winged blackbird, 347; prairie horned lark, 296; flicker, 197; robin, 194; and field sparrow, 186.

The English sparrows decreased in numbers per square mile from north to south (perhaps because of a diminishing population southward and a consequent progressive diminution of their breeding areas), 100 sparrows in northern Illinois being represented by 77 in central and 56 in southern; but the native birds increased from north to south, apparently for climatic reasons—100 in northern Illinois being represented by 116 in central and 129 in southern. The same gradation was still more pronounced in winter residents, which averaged 384 birds to the square mile in northern, 582 in central and 832 in southern Illinois. The general average for the whole State and the entire year, as represented by 1,591 miles of travel and a census area of 44¼ square miles, was 722 birds to the square mile.

By comparison of the midsummer numbers with the average for the fall migration period, a wave of denser population was detected, running from north to south and rising with the progress of the migration. The central Illinois average for October was 2.3 times that for July, August, and early September.

The original relation of the Illinois bird fauna to prairies was still discernible in the fact that half of these summer birds were found in pastures and meadows, although only a little over a third of the area inspected was in grass. Corn fields, on the other hand, which covered 32 per cent of the area, contained but 15 per cent of the birds, and these most largely English sparrows.

As an example of the local and numerical distribution of species, that of the meadow-lark was given, and as an example of the composition of the bird fauna of an ecological situation, the birds of the pasture were separately discussed. Meadow-larks, while numbering 85 to the square mile for the whole area covered, were very unequally distributed, averaging 266 to the square mile in fields of stubble, 205 in meadows, 144 in pastures, and 10 in corn fields, and not occurring at all in forests or among shrubbery. They increased notably in number from north to south—100 in northern Illinois being represented by 175 in central and 215 in southern.

Pasture lands were the preferred resort of the most abundant midsummer species, and contained 27 per cent of all the birds seen. In average density of population, however, they were surpassed by meadows, which contained 920 for each square mile, to 878 in pastures, 562 in stubble and small grain, and 300 in fields of corn. The commonest pasture birds were the English sparrow, the crow-blackbird, the meadow-lark, the horned lark, and the field sparrow, abundant in the order named, and together making more than half the summer residents of the pasture lands of the State.

The impression made by this general examination of the present bird population of the State of Illinois was that of a remarkable flexibility and tenacity of the associate and ecological relationships of birds in the face of revolutionary changes in their environment. Apart from the results of the introduction of the English sparrow, and the direct destruction of game birds and birds of prey, the main effect of human occupation seems to have been the withdrawal of most of the prairie birds from the area devoted to Indian corn, and their concentration in pastures, meadows, and fields of small grain—situations which most nearly resemble their original habitat.—Science.

In lieu of a cedar chest, pieces of wood soaked in cedar oil and laid in drawers and closets will be almost as satisfactory.—Good Housekeeping.