HOW TO MAKE ANIMATED CARTOONS

by NAT FALK

FOREWORD BY PAUL TERRY
PRODUCER OF TERRY-TOONS

HOW TO MAKE
ANIMATED CARTOONS

THE HISTORY AND TECHNIQUE

By

NAT FALK

Illustrated by the author
and the cartoon studios

Foreword by

PAUL TERRY

Producer of "Terry-Toons"

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FOREWORD

By Paul Terry
Producer of Terry-Toons

Most makers of animated cartoons have been fairly modest men. The pioneer from whom I drew the inspiration to make my first picture a quarter of a century ago—Winsor McCay—was one of the most modest of all. He had a vision of animation as ultimately becoming the medium for a great, new, fine art, a vision which is only now beginning to show signs of being realized, a vision which even we in the business are only now able to comprehend, with a clearer view of the greater heights to which it may still lead us.

But McCay, at the start of the history of the animated cartoon, and most of those who followed for years afterwqrd, sought only to amuse. Their pictures made no attempt to "carry a message." If they brought laughs from an audience, that was enough.

And so, while the vision was always there, the immediate product was of modest proportions. It was quite natural, I suppose, that the critics and other commentators on things cinematic should write about the existing picture and not about the vision, and that consequently they did not take animated subjects too seriously until fairly recently. Finally sound and color, added to a maturing of the genius and talent that produce animation, carried the cartoon to such a high point of charm and of delight to its audiences that the recognition of critics was commanded.

The medium at last was recognized as more than just a plaything; the fantasy as a valid contribution to screen art. Frequent and rather serious commentaries on the cartoon have appeared in newspapers and periodicals over the last few years. These writings, however, have so far been limited largely to these mediums. The student of the cinema, or the ambitious young artist eager to learn more of the technique of animation, could find little in book form in the libraries to help him.

This dearth of source material for the student has given Mr. Falk an almost wide open field for his book, and the need for a comprehensive study of this branch of motion picture production should

make this a welcome addition to the literature on the screen, for the author has explored his open field with utmost diligence.

Cartoon makers will assuredly welcome this work. Scarcely a business day passes without the mail bringing to my office requests for information about animated cartoons—how are they made?—where and when did they start?—how should a young artist go about studying to prepare himself to work in this field? There should long ago have been authentic works to which these curious fans, eager students and ambitious artists could be referred. But I knew of none, and have long been at a loss to know just how to answer many of these letters in the way the writers deserved without consuming impossible amounts of time. My sincere personal thanks to Mr. Falk for supplying the first really satisfactory answer!

INTRODUCTION

Ever since animated cartoons first appeared on the screen they have been wrapped in a cloak of mystery. People see these pictures, enjoy them and go on wondering how drawings can be made to move, to act and to do all sorts of impossible things. In this book an attempt has been made to dispel the mystery and to show how to make animated cartoons. This is based on the actual work done in the cartoon studios and is illustrated with examples from these studios.

For the artist or cartoonist who would like to apply his talents to cartoon films, this book will be a guide. For the beginner just learning to draw, a simple system has been worked out which will help him advance rapidly. And for the writer, the idea man or the gag man, who is anxious to join the creative department of a cartoon studio, here is a very easy way to sketch cartoons. A knowledge of drawing to the writer is very important, for all cartoon gags must be visual.

Many artists are turning to animated cartoons. In the studios are men and women who formerly painted portraits, murals and landscapes; comic artists who drew newspaper strips and others who contributed to the humorous magazines; men who formerly worked at commercial art; advertising artists and magazine illustrators.

Today there are seven cartoon studios turning out about 200 pictures a year. Combined these studios employ about 2500 people in all the various jobs connected with the making of animated cartoons. And the opportunities in the industry are ever increasing, for with the coming of television more and more cartoon films will be demanded. Tests made recently prove that of all the subjects capable of projection none can equal the cartoon in clarity of transmission. This will mean, not only the increase in personnel in the present studios, but the creation of more studios—for television eats up material very rapidly.

For wide-awake artists and students who are eager to get ahead in the field of animated cartoons the opportunities are many. And the industry offers the same opportunities to women as it does to men. While hundreds of women are employed in the studios doing the tracing and opaquing, a number have worked their way up to positions in other departments where their earnings have kept pace with their advancement.

Each studio employs an army of artists who are divided into several groups, each group doing a special job. Following is a list of various jobs and the approximate salaries paid in each classification: Directors, from $150. to $300.; Animators, from $50. to $250.; Background artists, from $50. to $150.; Story sketch artists, from $50. to $150.; In-betweeners, $30. to $75.; and Tracers and Opaquers, $17. to $35. The artist with imagination—who has ideas—can add to his income by helping to create pictures, for in most studios a bonus is paid to any member of the staff for ideas and gags that are used.

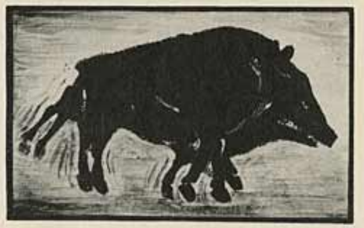
Animated cartoons also offer opportunities for the "Fine Artist," the man who paints landscapes in water colors and oils. For him there is place in the background department where all the settings are painted, backgrounds against which all the action in the film will take place. In some short films only a few backgrounds are needed, but in others as many as 50 or 75 different backgrounds may be necessary. This makes quite a job for a staff of painters.

There is always room in this industry for new blood, an industry the materials of which are anything the brain can imagine and the hand can draw—all human experience: the real world and dream worlds, color, music, sound and above all, motion.

It is a new and continually expanding field for those with imagination and creative ability—this animated cartoon industry.

THE HISTORY OF ANIMATED CARTOONS

1. EARLY ATTEMPTS TO OBTAIN MOTION IN DRAWINGS.



Wild Boar of Altamira

The idea of animated cartoons (a series of drawings which give the illusion of movement) is centuries older than the moving picture. It is, in fact, a dream which artists in all ages have been striving to realize—from Stone Age man, who scratched the figures of running and jumping animals on the walls of caves, to the illusionists of a hundred years ago, who invented mechanical toys in which lots of funny little drawings were used to create the illusion of movement. Its realization, however, was not to be achieved until comparatively recent times.

The first crude attempts at animated drawings were made at least 20,000 years ago. Archeologists have discovered wall sketches made by pre-historic man in the caves at Altamira, Spain, which clearly show an effort to put motion in still pictures. A wild boar, painted in one of the caves, is drawn with four pairs of legs. A quick glance at the beast and he seems to be galloping. Definitely, in this ancient effort, is nurtured the germ of the animation idea.

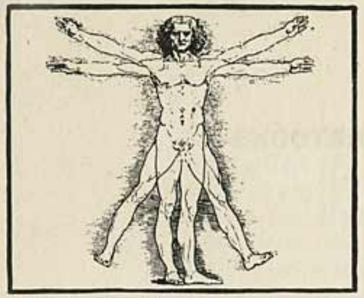
Other discoveries in ancient ruins, unearth additional attempts man has made to put motion into pictures. There is, for example ,the ingenious method used on the columns of the temple of the Egyptian Goddess Isis, built in 1600 B. C. by Rameses II. Around this temple there were 110 columns, on each of which was painted the figure of the goddess in a progressively changed position, this gave the illusion of motion to the charioteers racing by.

The Temple of Isis

The Greeks, too, experimented with movement in pictures. On vases that have survived the rough usages of time, we can see paintings of horses in progression around the sides, so skillfully depicted that the legs of the animals seem to be prancing nimbly, as the heads move up and down.

An ancient Chinese scroll showing geese in flight reveals an early Oriental attempt. The wings, moving from upward to downward positions, realistically depict bird animation.

On the American continent, there is an interesting early attempt in a plaser fresco at Chichen-Itza, Mexico, showing in a group of five pictures the dance of a Mayan warrior. The five



da Vinci's Attempt

pictures develop a complete sequence of the entire action, from start to finish.

Leonardo da Vinci, famous Italian Renaissance painter, architect, sculptor, scientist and inventor, also experimented with animation. In his drawing, shown here, the figure seems to have several pairs of arms and legs. The movement he attempts to achieve with this one drawing is today obtained, in the animated cartoon, with several individual but related drawings.

Not long after da Vinci's experiments, Anthonasius Kircher, a German, evolved the "magic lantern." This was the world's first picture projector, introduced in 1640. Kircher made his drawings on glass which he placed in the apparatus and projected on the wall. One of these showed a man and a mouse. The man asleep, opened and closed his mouth. As the mouth opened the mouse ran in. Kircher accomplished this piece of comedy by drawing each figure on separate pieces of glass and operating them, from above, with strings. His is the first known attempt to get animation into drawings projected on the wall.

Artists in all ages, from pre-historic time down to the present era, have tried in one way or another to get animation in drawings. However, no real progress was made in the art until 1824, when Peter Mark Roget discovered a vital principle: the "persistence of vision." This principle, of basic importance in the art of animation, rests on the fact that the eye retains the image of anything just seen. Were this not so, we could never obtain the illusion of an unbroken connection in a series of pictures and neither motion pictures nor animated cartoons would be possible.

One of the first devices utilizing Roget's principle in an attempt to make pictures move was the thaumatrope. This was a cardboard disk mounted on a top. On each side of the disk there was a different picture. As the disk twirled the two pictures seemed to merge, appearing as one. A favorite design for the thaumatrope was a bird cage on one side of the disk and a bird on the other. When twirled the bird seemed to be in the cage.

Still other devises were perfected about this time to show motion by a series of cartoon pictures. While these early contraptions were nothing more than mechanical toys, they nevertheless attracted widespread interest, fore-shadowing the later popularity of the modern animated cartoon.

In 1831, Joseph Antoine Plateau invented a contrivance called the Phenakistoscope. Motion was attained by a sequence of drawings, each blending with the next in the series to show some simple bit of action. The device was made up of two disks mounted on a shaft, the front disk having a series of slits around its edge, while the rear disk carried the drawings. The drawings were aligned with the slits, and on looking through the openings as the two disks revolved, the illusion of motion was achieved.

Kircher Draws On Glass

The Daedaleum, invented three years later, by the Englishman William George Horner, was another nineteenth century contribution. It consisted of a wide shallow cylinder, mounted on a stand. The cylinder had a number of narrow slits near the top, and the drawings, made on a strip of paper about two and a half feet long, were inserted on the inside of the cylinder. When a strip was put in place it was adjusted so that the drawings, one at a time, could be viewed through a slit on the opposite side. As the cylinder was revolved, the drawings appeared to move and a sense of action was realized. Improvements on this device were made in the eighteen-sixties, in France, by Desvignes, who called his machine the zootrope, later to be known as the "Wheel of Life" because of its lifelike presentation of everyday happenings.

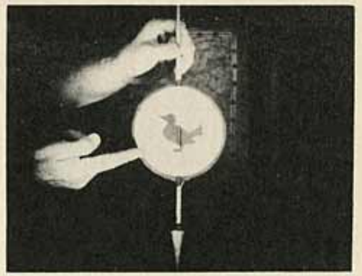
William Lincoln patented a similar "Wheel of Life" in the United States in 1867. His device, called the Zoetrope, marked the introduction of animated cartoons into this country. For many years his apparatus was sold as a toy, and strips of paper with cycles of drawing were prepared to be used with it.

Of these pre-photographic inventions, the Praxinoscope, devised in 1877 by Emile Reynaud, in France, was the most notable. To him goes the credit of being the first man to draw short bits of dramatic action in the form of plays and projecting them on a screen. These animated pictures were drawn on a thirty-foot strip of transparent substance, called "crystaloid," and smoothed the way for the great technical advances of more recent times.

In connection with all these early experiments it is interesting to note that only drawings were used to create the illusion of moving pictures.

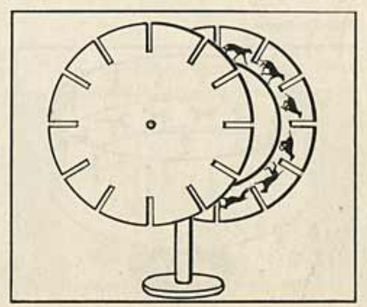
Drawings were also used for a little optical novelty called the Kineograph, which, introduced about 1868, later became popular as the Flipper Book. It was made up of a pad of drawings bound in book fashion along one edge. The book was held in one hand, along the bound edge, while the other hand flipped the pages. As they slipped from under the thumb, the drawings, all in sequences, passed quickly before the eyes and gave the illusion of continuous action—the animated cartoon.

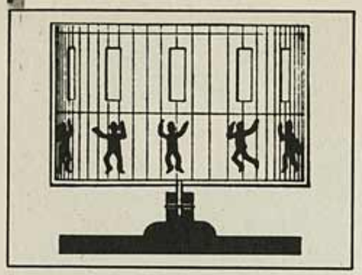
Numerous pioneers thus joined in the age long struggle to make pictures move long before photography was made available to them. Some of them spent a lifetime at the work. One man continued grimly to peer into his devices until he sacrificed his eyesight. Another, even after he lost his sight, continued working with the assistance of his wife. To these persistent men and women the world is deeply indebted. Their early devices cannot be minimized. While they may seem crude now, they underlay all of our modern successful methods, and in their day provided entertainment for thousands and received the same enthusiastic acclaim accorded the modern cartoon movie.



Roget's Top

The Phenakistoscope





The "Wheel of Life"

2. PHOTOGRAPHY SMOOTHS THE WAY

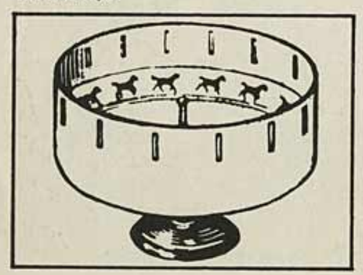
Just before the turn of the century James Stuart Blackton, destined to play an important role in the development of pictorial animation, worked as a cartoonist on the New York Evening World. On March 12, 1896, he was assigned to interview Thomas A. Edison who was then experimenting with the movies. As they talked, Blackton made some quick sketches of the famous inventor. Edison became very much impressed with his dexterity and asked if he could draw large pictures as quickly as he did the small sketches. Blackton assured him that he could. Later, collaborating with Edison, the artist drew the cartoons which Edison photographed. This was the first experimental cartoon film, the first to combine the skill of the artist with the technique of photography and the first of ten that Edison made.

For his role in this drama, the honor of having made the first animated cartoon on motion picture film, goes to Blackton. The film was made in 1906 and released under the title: "Humorour Phases of Funny Faces." It showed such cartoon bits as a man smoking a cigar and blowing rings at his sweetheart, the girl rolling her eyes; a dog jumping through a hoop; a juggler; and ended by showing Blackton doing a chalk-talk. In all there were about 3000 drawings necessary to make possible this first cartoon picture—the daddy of them all.

Exhibited publicly, it scored an instantaneous hit and provoked gales of laughter in every audience, especially the sequence of the man blowing smoke-rings at his sweetheart. That, somehow, was a side-splitting, hilarious bit, evidencing that animated cartoons have improved in content as well as in form.

One year later, the Frenchman, Emile Cohl, made his first of a series of animated cartoons, and exhibited it at the Folies Bergéres in Paris. The figures, drawn in white on black, were in the style of children's drawings. But the story was a quite sophisticated treatment of a girl, a jealous lover and a policeman, who received a decoration for saving the lady. A number of Cohl's cartoons were later exhibited in this country.

The Zoetrope



Though Cohl's drawings were extremely simple, no cartoons before Disney, exhibited the same inventiveness, nor applied the same imagination in handling inanimate objects. To houses, lamp-posts and machines he gave intelligence and a movement of their own. Dramatizing these lifeless objects and giving them moods, emotions and action, he thereby pioneered in a method to be more fully exploited by later artists; while his story content contained elements of realism developed subsequently by Fleischer in Popye and Disney in the fabulous characters of his rich imagination.

Winsor McCay, a newspaper artist and creator of many well known comic strip characters, was another of the early adventurers in the field of animated cartoons who took advantage of the motion picture camera. His most successful picture was "Gertie, the Dinosaur," which he exhibited on a vaudeville tour, explaining how he had created Gertie, and putting her through her clumsy antics. McCay did much to arouse public interest in this new form of entertainment.

Writing about his animated cartoons in the "Cartoon and Movie Magazine," April, 1927, McCay stated: "The part of my life of which I am proudest is the fact that I was one of the first men in the world to make animated cartoons. It came about in this way: Winsor Jr., as a small boy, picked up several flippers of 'Magic Pictures' and brought them home to me. From this germ I evolved the modern cartoon movies in 1909. I made 4,000 drawings of 'Little Nemo' move. They were flashed on the screen of Hammerstein's Theatre in New York. Then I drew 'How a Mosquito Operates.' (These he rated only as experiments). While these made a big hit, the theatre patrons suspected some trick with wires. Not until I drew 'Gertie, the Dinosaur' did the audience understand that I was making the drawings move. I lectured in connection with the screen presentation, inviting 'Gertie' to eat an apple, which I held up to her. 'Gertie' would lower her long neck and swallow the fruit, much to the delight of the audience . . . I went into the business and spent thousands of dollars developing this new art. It required considerable time, patience and careful thought—timing and drawing the pictures . . . This is the most fascinating work I have ever done—this business of making cartoons live on the screen."

Among his later animated cartoon efforts was "The Centaur." Taken from the sources of fantastic mythology, this picture remains today as fresh, as charming and as timely as when it was created. Then followed "The Pet," a whimsical story of a house pet, which grew into a gigantic, all-devouring monster.

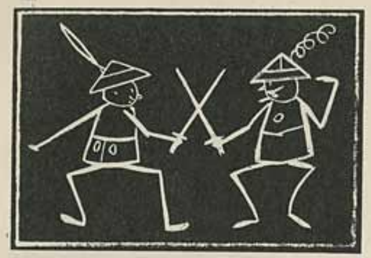
In all he made ten cartoons. It is interesting to note McCay's technical methods, for on each of his drawings he also drew the background. Thus each drawing was complete, character and background all on one sheet.

To McKay also goes the credit of attempting the first serious production of a feature-length dramatic cartoon. This he called "The Sinking of the Lusitania," releasing it in August, 1918, as a war propaganda picture. According to the "Motion Picture News," "it was made from 25,000 drawings on gelatin and required 22 months of work." The picture attracted a great deal of attention and, until Disney made "Snow White," was the longest cartoon ever made.

Paul Terry, head of "Terry-Toons," pays unstinted tribute to McCay, not only as the man who inspired him to start in the anima-

The Flipper Book

"Humorous Phases of Funny Faces"



From Cohl's First Cartoon

tion field, but as the artist whose knowledge, ability and keen vision were responsible for launching this new art.

In a recent statement to the author Terry declared, "Cartoons have come a long way in the last twenty-five years, but they have not yet attained McCay's vision of what they might be. Their greatest days are still to come."

3. CONTRIBUTIONS OF THE EARLY TWENTIETH CENTURY

McCay's interest in the devolpment of animated cartoons approached the zealousness of the missionary and he rarely missed an opportunity to interest other artists in this novel medium as a new outlet for their talents. Frequently he would lecture before groups of artists, exhibiting "Gertie," and explaining how it was done. Among the men he influenced was John R. Bray who had been a newspaper cartoonist and a staff artist on "Judge," the humorous weekly.

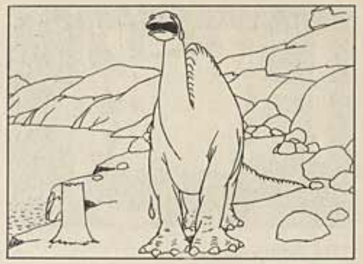
The history of animated cartoons as a practical form of entertainment really dates from Bray's first cartoon, "The Artist's Dream," which was released in June, 1913. Up to this time cartoons had been little more than a novelty, used only at the end of newsreels or vaudeville acts. But after seeing this film there was a change in the public's attitude toward cartoons, and this picture must be hailed as the forerunner of the prevailing public vogue for animated cartoons.

For the introduction to his film the audience watched Bray draw a picture of a dog and then fall asleep, whereupon his drawing came to life, showing the mischievous antics of his canine star. The humorous sequences left its audiences almost hysterical from laughter, and more cartoon pictures of a similar nature became the demand.

Another Bray cartoon, "Col. Heeza Liar," even exceeded the popularity of his first picture and must be rated easily as the most popular of the early cartoons. The first of the series, "Col. Heeza Liar in Africa," was released in December 1913. Thereafter the series ran uninterruptedly for about five years, receiving a warm welcome wherever it was shown. Discontinued then for a short period, it was revived in 1922.

Bray, during his experimental period of 1913-'16, had been granted several patents for animated cartoons. The first described a method of registration so as to hold each picture in correct relation to every other for photographing. Crosses were printed in the upper corners of each sheet of drawing paper through which pins were inserted. But the most important part of this patent was the use of a translucent background placed over the character

drawing and illuminated from beneath,—a radical departure from the process of drawing each cartoon complete with a background, as had been done up to this time. In this method Bray introduced the idea of making one background serve for all the action taking place in a given scene. In his first experiments with this new idea Bray printed his background on a thin translucent substance which he laid over the figure drawing for photographing. This did not prove satifactory, however, so he gave it up. In another early experiment with this method he used the printed background and drew his figures on the same sheet. He then scratched out that part of the background that showed through the figure. That also proved unsatisfactory and finally he resorted to the "stationary" drawing, which comprises the use of separate sheets of a transparent substance when a part of the character is motionless while other parts are moving. Just one drawing is made for the still part and only the moving part is drawn in action.



"Gertie, the Dinosaur"

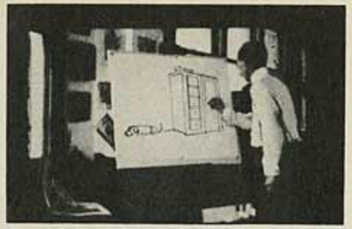
To Bray also goes the distinction of having made the first color cartoon, a hand-colored cartoon released in 1917, which attracted wide attention. However, production of color cartoons by this method was found impractical because of the high costs involved in coloring frames one at a time.

Another of the "early moderns" in the field of animated cartoons was Sidney Smith, who later became nationally famous as the creator of Andy Gump. Smith's cartoon was called "Old Doc Yak." He made a series fashioned on this character, the first of which was released in July, 1913. Still another modern pioneer was Paul Felton who at this period was drawing the cartoons for Lyman H. Howe's "Hodge Podge" series. These pictures were just what the name implies, a hodge podge of newsreel, cartoons, travelogue, comedy and what-not.

But the real history in cartoon making at this time was being made by the Big Four which, beside J. R. Bray, included Earl Hurd who was drawing the "Bobby Bump" series; Paul Terry at work on "Farmer Al Falfa"; and Raoul Barre, who produced the "Mutt and Jeff" pictures.

Earl Hurd, while drawing "Bobby Bump," introduced the modern technique for cartoon making when he used a transparent substance for his action drawings. He used glassine paper, which he laid over the background, patenting the process in 1915. (Previous to this Barre had used a transparent substance for his background, laying this over his character drawings for photographing —just the reverse of Hurd's method.) In 1917, Bray and Hurd combined their patents and formed the Bray-Hurd Process Company.

Outstanding among the Big Four was Paul Terry, who, before joining the New York Press and King Features in New York, had been a newspaper artist and photographer on the Pacific coast. In 1914, with more than a hundred other artists, he attended



"The Artist's Dream"

one of the dinners featuring Winsor McCay and his "Gertie" cartoon. McCay, as usual, was enthusiastic about animation and painted a glowing future for those who adapted themselves to this new medium of expression. A seed was planted in the fertile mind of young Terry, who, the more he thought about the new idea and the more he experimented with it, the more impressed he became. After many long days of work in the small room that was both home and studio, he finally completed his first cartoon film. It was a take-off on the performance of the famous magician Herman the Great, and Terry called the cartoon "Little Herman."

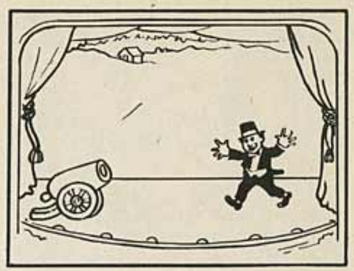
In making this cartoon Terry employed methods not even used in the movies until many years later. One of these was double exposure photography. He made his action drawings on many sheets of paper, using one separate drawing for the background. Then he photographed this background on a roll of film. The background showed the top, sides and footlights of a stage with the stage itself blank. This finished, he re-rolled his film and then photographed "Little Herman" going through his actions. When completed, both exposures appeared on one print, and the result was "Herman" performing on a stage.

The picture finished, he went out to collect his fortune. The first proposal he received came from Lewis J. Selznick, who offered him one dollar a foot for his masterpiece. Terry objected that the raw stock he had used alone cost more than that. To which Selznick replied, "Young man, the raw stock was worth more before you drew pictures on it." Years later Selznick regretted that he had been so blind to the possibilities of this new medium.

Terry finally took "Herman" to the Thannhauser Film Corporation. The idea of animated cartoons was still new and the film heads had not as yet learned to grow excited over these "flickering drawings." However, even these callous executives were impressed by Terry's enthusiasm and agreed to screen the film later that same day. While waiting, Terry went about on the street, gathering all the children he could find. When the cartoon started, the projection room had been filled with these youngsters.

"We have heard a lot about sound in the film business in the last decade," says Terry. "But I never heard any sound so sweet as the unrestrained laughter of those kids that afternoon. Their laughter sold "Little Herman" for me, and set me up in business."

The Thannhauser officials, pleased with the public response to "Little Herman," later asked Terry for more cartoons. He complied with two more, including the first of his "Farmer Al Falfa" series. The leading character of this cartoon still occasionally appears, today, a quarter of a century later, in his "Terry-Toons."



"Little Herman"

At this time everyone connected with the infant industry was searching for some transparent substance on which drawings with India ink might be made, and which at the same time could be fool-proof when photographed against the background drawing. Paul Terry found the answer and so became the first ever to use celluloid for action drawings in the making of animated cartoons.

But Terry's future with animation was still before him. His next job was inspired by Bud Fisher, creator of "Mutt and Jeff," whom Terry had met during his newspaper days in San Francisco. In 1915, after Terry had started making animated films, Fisher asked him to make an animated cartoon out of "Mutt and Jeff." Terry liked the idea, finished the job and won the distinction of having made the first animated cartoon starring these two well-known characters, whose antics were later animated by many other artists.

Shortly afterwards Terry joined the Bray organization where he made a series of twelve "Farmer Al Falfa" cartoons. Later, as a free lance, he made a series called "Terry Cartoon Burlesque," in which he made sport of the feature pictures of that day. This series was just beginning to win popularity when the World War came along. Uncle Sam had other plans for Terry, and before long the young artist found himself in Washington.

During the war he served with the Army Medical Corps, helping to record the medical history of the war in animated form. He spent much time in the surgical departments, witnessed many operations and made sketches of the surgical procedures. These he transformed into animated films which were sent to army hospitals all over the country, to be viewed and studied by physicians and surgeons.

After the war he joined Paramount where he was put in charge of the cartoon department. Here he continued to draw the "Farmer Al Falfa" series until he was approached by Howard Estabrook, now a famous Hollywood writer, who had an idea for cartooning the Aesop's Fables. Terry and Estabrook made three or four of these and then joined the Van Beuren Company, organizing "Fables Pictures, Inc.," which produced and distributed only the "Aesop's Fables."

Most cartoon characters of the present day stem from Aesop's Fables—the dog and the cat, the mouse and the rat, the cow and the horse. But to Terry goes the credit of being the first screen artist to draw animal characters in humanized form.

His influence in other ways, too, makes his name loom large among the oustanding pioneers contributing to the development and progress of screen cartoons. Terry has been responsible for countless revolutionary changes. His keen mind, trigger fast, is always on the alert for new ideas. If a new effect is required, something never used before, he will create it. If an apparatus or machine is needed to do a job better than it has ever been done

"Farmer Al Falfa"

before, Terry will not only design it but he'll build it! It is not surprising therefore, to find that for twenty-five years he has been among the leaders in this uniquely American art-business, a business where anything is likely to happen and usually does.

Our discussion of the contributions made by the Big Four concludes with Raoul Barre, who began his career making the Edison cartoons.

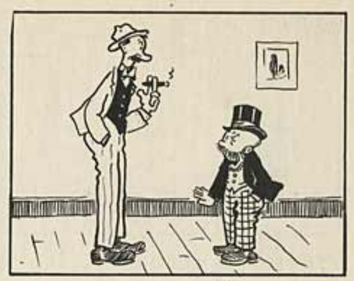
It was Barre who introduced the "slash" system, whereby the motionless parts of the characters were drawn once, and the animated parts of the figure torn away. These moving parts were then drawn on another sheet so as to coincide with the stationary parts. The two were photographed together, one over the other, thus saving unnecessary drawing. He also used the method of drawing the figures on paper and the background on celluloid, which was laid over the character drawing for photographing.

In addition Barre originated the use of registering pegs on the drawing board, and punch holes in the drawing paper to match. This gave him the advantage of knowing that when he placed a drawing over the pegs it would be correctly related to the preceding drawing and to the background. It also provided him greater accuracy in photographing.

In 1914, Barre made a cartoon about two cats on a back fence. Entitled "Romiette and Julio," the picture was distributed by Pathe. Shortly after he made a series of short cartoon subjects for the Thomas Edison Studio. The following year he started producing "Mutt and Jeff" and did one a week for three years. He also produced several cartoons for "Rube" Goldberg, the celebrated newspaper cartoonist.

Another artist of prominence in these early days of animation was Wallace A. Carlson. In 1914, at the age of twenty, Carlson became interested in drawing cartoons for the films. He had been drawing sports cartoons for the Chicago Inter-Ocean, and while working on this newspaper he was commissioned to make an animated cartoon of the World Series Baseball games for the Historical Film Corporation. His cartoon had to be completed in twenty-four hours, as it was to be released just as soon as the series was over—a difficult job because the assignment demanded the incorporation of true incidents of the game. Carlson accomplished his task, however, by drawing two endings, each showing a different team victorious. Just as soon as the game was over he added a few of the spectacular incidents and the film was made.

The following year, while on the staff of Essanay Film Company, he drew "Dreamy Dud in Love." This was the first of the "Dreamy Dud" series. Still later Carlson did "Canimated News" which was a combination of photographs of real people, and cartoons.



"Muff and Jeff"

Carlson's method of work is interesting. First, he drew his background, of which a line cut was made from which he ran off a large number of copies printed on drawing paper. The animation was then drawn, step by step, on these printed backgrounds. Afterward he eliminated whatever part of the background showed through the figures.

Louis Glackens who had been making illustrations for the magazines, was still another artist to become interested about this time in animated cartoons. He did a series called "Glackens' Cartoons." Bill Nolan, one of the artists on Barre's staff and later with other well known studios is another of these early pioneers. He was the first to use the panorama background, an innovation which made a decided improvement in action results.

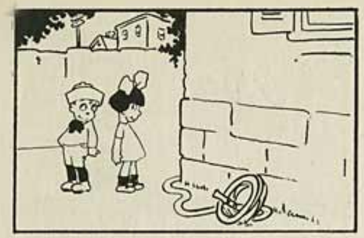
Another early artist in the field whose entry was also influenced by Winsor McCay, is Max Fleischer, the present head of Fleischer Studios, one of the two biggest animated cartoon "plants" in the world. Fleischer as a young man had been working in the art department of the Brooklyn Eagle. Together with J. R. Bray, of the same department, he had seen "Gertie," had listened to McCay's talk, and, like others, had been inspired to follow McCay's ink-and-celluloid career.

Fleischer and Bray talked over their ideas and worked together for about a year at night trying to perfect them, turning out finally a 150-foot cartoon comedy, which Fleischer showed to a movie distributor. The distributor, pleased with the joint effort, quickly agreed to accept one picture a week. But when told how long it had taken to make the 150 footer, he lost interest. That inspired Fleischer to go back to work and devise a more efficent way to produce a hundred feet of film every four weeks.

His experiments for the short cut succeeded and resulted in a new method for superimposing cartoon figures on natural photography. This process Fleischer, together with his brother Dave, patented, using it later very successfully in the early Fleischer films. Their method has come down to us known as the "Out of the Inkwell" type of drawing, since the first of their cartoon series bore that name. The first of this series, released in 1917, was "Koko, the Clown," a character who in each film, climbed out of a bottle of ink and went through his antics on the screen.

While Fleischer is best known for his comedies he also made a number of excellent serious pictures. Among these were several produced for the United States Army—technical military motion pictures designed for the rapid training of troops in the use of firearms. Another was "Evolution" produced for the Museum of Natural History, and made at the time of the famous Scopes trial in Tennessee. He also produced a film called "Relativity," in which he explained the highly abstract Einstein theory through the use of simple, easily understood drawings.

During the 1917 period Leon Searle made what was known



"Dreamy Dud in Love"

as "cutouts." Carl Lederer was another who worked in this medium. The figure, the head, body, arms and legs were drawn on paper separately, cut out and pinned together for animation across a background. When ready to be photographed the artist would move the limbs for each phase. However, their method proved unacceptable as the animation remained always jerky.

Compared by modern standards of excellence, the 1917 crop of cartoons can only be judged as crude affairs exposed to many glaring deficiencies. The characters were imperfectly synchronized; they would either walk too fast or not fast enough; the leg movements seemed to create the illusion that the feet were sliding on the ground. If the character "talked," a bubble emerged from his mouth, slowly growing until it was large enough to hold the words spoken, which appeared at that moment. This conversational device, of course, can be readily understood as a carryover from the newspaper cartoon where the conversation appears in a balloon with a line leading down to the character. As developed on the screen, the figure would pause, face the audience and rapidly open and close its mouth to represent talking. Naturally, action had to be suspended pending this pause, interfering seriously with the continuity of the story.

At this point the International Film Service, a Hearst subsidiary, entered the animated cartoon field with Gregory La Cava, now a big time Hollywood director, placed in charge of production. La Cava had previously worked for Barre, from whom he gained his knowledge of animated cartoons. Leaving Barre he had worked independently for a time and produced several pictures for "Rube" Goldberg. At International, La Cava set about improving the cartoons. First he increased the number of drawings from the 2000 of the average cartoon, of that time, to 3500. This resulted in smoother animation. Then he changed the animation of the figures from the stiff angular movements of the legs and arms, to a more natural animation, such as is used today. He also eliminated the "bubble" conversation device substituting the conventional title that was popular during the silent days of the motion picture.

Beside improving the technical perfection of cartoons, this company was the most prolific of the early cartoon makers. They animated and released, in series, such famous cartoons as "Jerry on the Job," "Katzenjammer Kids," "Tad's Indoor Sports," "Happy Hooligan," "Krazy Kat," "Bringing Up Father" and "Silk Hat Harry." Most of the artists on the staff were former members of the Barre organization, which was really the training school for many artists who went far in the industry and beside La Cava, included Jack King, Frank Moser, Bert Green, John Foster, Walter Lantz, Bill Nolan, Leon Searle, George Stallings, Frank Sherman, N. M. Natwick, Burt Gillette, Ben Sharpstein, Isidor Klein, Al Huerter and a number of others. Also on the staff was John

Terry, brother of Paul, who drew animated political cartoons. A good many of these men are still associated with studios making animated cartoons.

At first International cartoons showed definitely the influence of the methods and principles followed by Bray and Barre. The background was drawn on a transparent medium and the characters on an opaque sheet. The background was then laid on top of the figure drawing. Where any part of the background interfered with the character animation, that part of the background was drawn on the same sheet with the figure. But later this process was discontinued in favor of the "celluloid over background" method.

In 1921, Hearst decided he had had enough of the cartoon business. Pessimistic about its permanent hold on the public he thought it wise to close his studio.

The development of animated cartoons and its increasing hold on public taste, Mr. Hearst's opinion to the contrary notwithstanding, continued merrily on its way. Great achievements, surpassing by far the work of preceding years, still lay ahead. Among these advancements, characteristic of the venturesome 20's, was the introduction of "Felix the Cat" to the galaxy of animated stars.

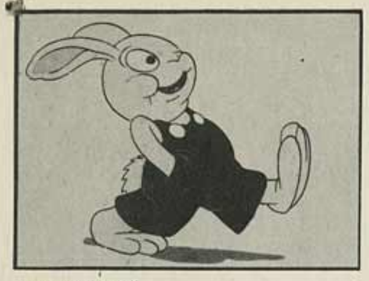
"Felix" was the creation of Pat Sullivan, a newspaper artist who had created "Little Black Sambo," which was running as a strip in the New York Herald. He had also made several animated cartoons, experimental stations on his way to more mature work.

There's an interesting story attached to the birth of "Felix." Shortly after the war, Sullivan, with Otto Messmer, who was an animator, were working together on Charley Chaplin cartoons, and also drawing 200-foot cartoons for Paramount and Universal. One day they introduced in a Paramount cartoon a black cat. Paramount called the film "Feline Follies." It did well, and they were asked to make more films featuring the black cat. By the time a third cartoon had been completed they decided to call this popular new animal character—"Felix the Cat."

Many of the old standbys of the strip cartoon were used in producing the "Felix" series. The primitive use of stars to indicate pain, dotted lines for a glance, question marks to indicate doubt and puzzlement—these and other tools of the newspaper artist frequently appeared on the screen to clarify action.

Another artist of the 20's worth noting was "Hy" Mayer, who did a topical cartoon for the screen, released by Universal. His method was to draw cartoons before the eyes of the spectators. The camera was arranged so that his hand and part of his arm were photographed while at work. Sometimes every line that Mayer drew was reproduced, but often the photographer stopped while the artist filled in a portion of the details, creating a total

"Out of the Inkwell"



"Oswald Rabbit"

impression for the spectators that the pictures were being drawn with lightning-like speed.

With the coming of the 1920's Walt Disney appeared on the screen horizon. He had been doing commercial art work in Chicago and Kansas City, illustrating advertisements for farm products and making advertising slides for theatres. When he conceived the idea to animate his illustrations, fortunately his employer let him take a camera home to experiment.

With a garage for a workshop he began making cartoon films which he sold to local theatres. In 1921, he made the first of the "Laugh-O-Gram" cartoons. This series he made especially for Newman's Theatre in Kansas City, and like many of the early films was an "Out of the Inkwell" combination, which showed the artist as well as his drawings.

Next he tried cartoon fairy tales. Several young artists, learning the trade, helped in the making of "Little Red Riding-hood," a spare-time occupation for all of them. Encouraged by this film, he quit his bread-and-butter job and formed a company, whose history, unhappily was short-lived.

A short time later Disney went to Hollywood and toward the end of 1923 began making the "Alice Cartoons," in which the photograph of a living character appeared against a cartoon back-ground. In all he made sixty "Alice" films.

In 1927, he created "Oswald the Rabbit" for Charles Mintz. "Oswald" is still in existence, but is now being made by Walter Lantz of another studio.

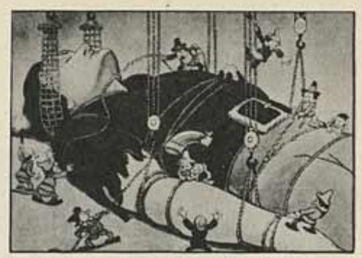
Disney had been trying to work out a new character, when he recalled a mouse that he had once trained—a mouse with a personality. He made quite a number of drawings of this rodent before putting him on the screen with the name of "Mortimer Mouse," later changed to the well known "Mickey," who in the course of time became one of the best known figures of the twentieth century.

"Mickey" was born in 1928, just when the movies were be-ginning to make sounds and find their voice. Disney made two editions of "Mickey" before he discovered the public was no longer interested in silent pictures. His third effort "Steamboat Willie" was made with sound, and was an instant hit. Demands for Disney films became very great, so he introduced the "Silly Symphonies" in order to provide a cartoon for theatres which were prevented by competition from buying "Mickey." The first of the "Symphonies" was "Skeleton Dance," released in July, 1929.

The addition of color was the next improvement in cartoons. Many will remember the cartoon sequence that served as an intro-duction to the Universal picture, "King of Jazz," released in March 1930. It was drawn by Walter Lantz and was colored by the Technicolor two-color process. This was the first cartoon on record to be mechanically colored.

The first complete cartoon story done in color was Ted Eshbaugh's "Goofy Goat," made by Multicolor in 1931. To this cartoon goes the credit of being the first in color, as the earlier Lantz film was only a prologue for a real-life picture.

Disney's first use of color was in a "Silly Symphony," called "Flowers and Trees" and first shown in July, 1932. It employed the Technicolor Cartoon process, a three color process that gives a combination of all spectral colors. This was also used by Disney in his feature length cartoons "Snow White" and "Pinocchio," and is used in all of his other color cartoons. It was employed by Fleischer in the making of his first long picture "Gulliver's Travels" and is used by most studios today in color film work.



"Gulliver's Travels"

The latest step in the forward march of animated cartoons is the feature length picture. Since "Snow White and the Seven Dwarfs" the film industry has discovered that the cartoon is not only a medium possessing vast artistic possibilities but is also a mine of lightly worked ore for which the public seems anxious to exchange its money. Disney and Fleischer have already made full length cartoon features and are now at work on more long pictures. Several other studios are also doing the same, while others are searching for a good story for their first feature.

Today every major film company releases cartoons regularly. The work of Walt Disney is released by R. K. O. Pictures; the output of Fleischer by Paramount; the creations of Paul Terry by 20th-Century Fox. Metro-Goldwyn-Mayer has its own cartoon studio with Harman and Ising as chief producers; Warner Broth-ers releases the films made by the Schlesinger organization; Uni-versal distributes for Walter Lantz and Columbia Pictures releases the work of Screen Gems, which until recently was headed by the late Charles B. Mintz.

The last decade, like the preceding decades of the twentieth century, has witnessed tremendous forward strides in the making of animated cartoons. Today their production is an industry in itself, requiring the abilities of hundreds of artists, writers, pho-tographers, technicians, musicians, sound effects men and others. In all between 175 and 200 cartoons are produced in a year, and there is hardly a theatre in the country which doesn't carry at least one on every bill.

These films are just as popular with grown-ups as they are with children, and there are some observers who hold the opinion that the little imps and fairyland creatures who dwell in the ink bottles, paint pots and the back of puckish brains are beginning to shove and crowd the mere mortal actors from the screen.

CARTOON MAKERS

Walt Disney
Walt Disney Productions

Walter Lantz
Walter Lantz Productions

Paul Terry
Terry-Toons, Inc.

Max Fleischer
Fleischer Studios

Rudolph Ising and Hugh Harman
Metro-Goldwyn-Mayer

THE CARTOON STUDIOS

Seven major studios in the United States are busily at work providing the supply to meet the tremendous public demand for animated cartoons, for nearly every movie theatre has at least one on each program.

Most people who go to the movies do not seem to be aware of the existence of any other studio than that of Walt Disney. But the adventures of his characters contribute only a small portion of the amusing, fanciful cartoons that come regularly from the various American studios devoted to the art of animation.

The following pages describe each of our seven large studios and show typical examples of their work.

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Walt Disney Productions, 2400 West Alameda, Burbank, California

The Disney studio is the largest cartoon organization in the world. Its schedule calls for at least one feature length film a year in addition to 18 shorts. To turn out this vast production job the studio employs a staff of about 1000 artists, writers, technicians, cameramen and others, who do their work in a modern air-cooled $2,000,000 plant.

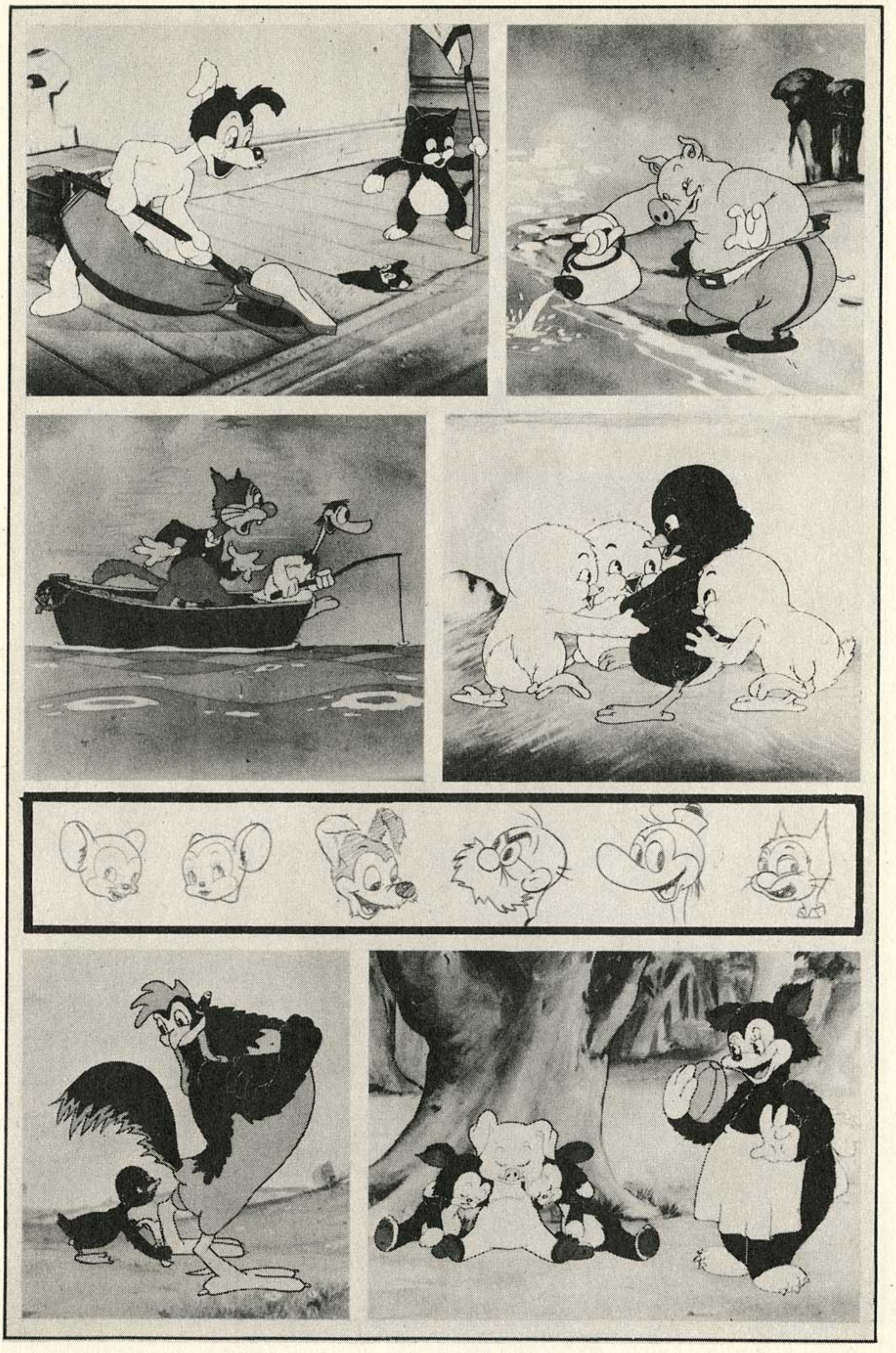
Characters created by Disney are better known than any of those of the other studios. To mention but a few, there are the incomparable Mickey Mouse and his girl friend Minnie; Donald Duck and Pluto the Pup, who are members of his regular stock company and appear frequently. Several other characters have won the public's fancy although they appeared in but one picture—the Three Little Pigs from the picture of the same name, Dopey of "Snow White" fame and Jiminy Cricket from "Pinocchio."

Disney's latest creation, "Fantasia" opens up new vistas in this ever growing art.

Fleischer Studios, Inc., 17th Street and 30th Avenue, Miami, Florida

The Fleischer Studios, second largest unit for the production of animated cartoons in the country, is headed by Max Fleischer, one of the old-timers in the industry, and produces "Popeye" and other well known screen characters. This studio made "Gulliver's Travels," the industry's second full length cartoon in color, produces 30 cartoons a year for Paramount release and is now at work on a $1,000,000 feature length color cartoon to be called "Mr. Bug Goes To Town."

Fleischer employs a staff of over 400 artists and technicians and his new studio, just completed, occupies an entire city block. This building constructed at a cost of $1,250,000 is complete in every detail.



Terry-Toons, Inc., 271 North Avenue, New Rochelle, N. Y.

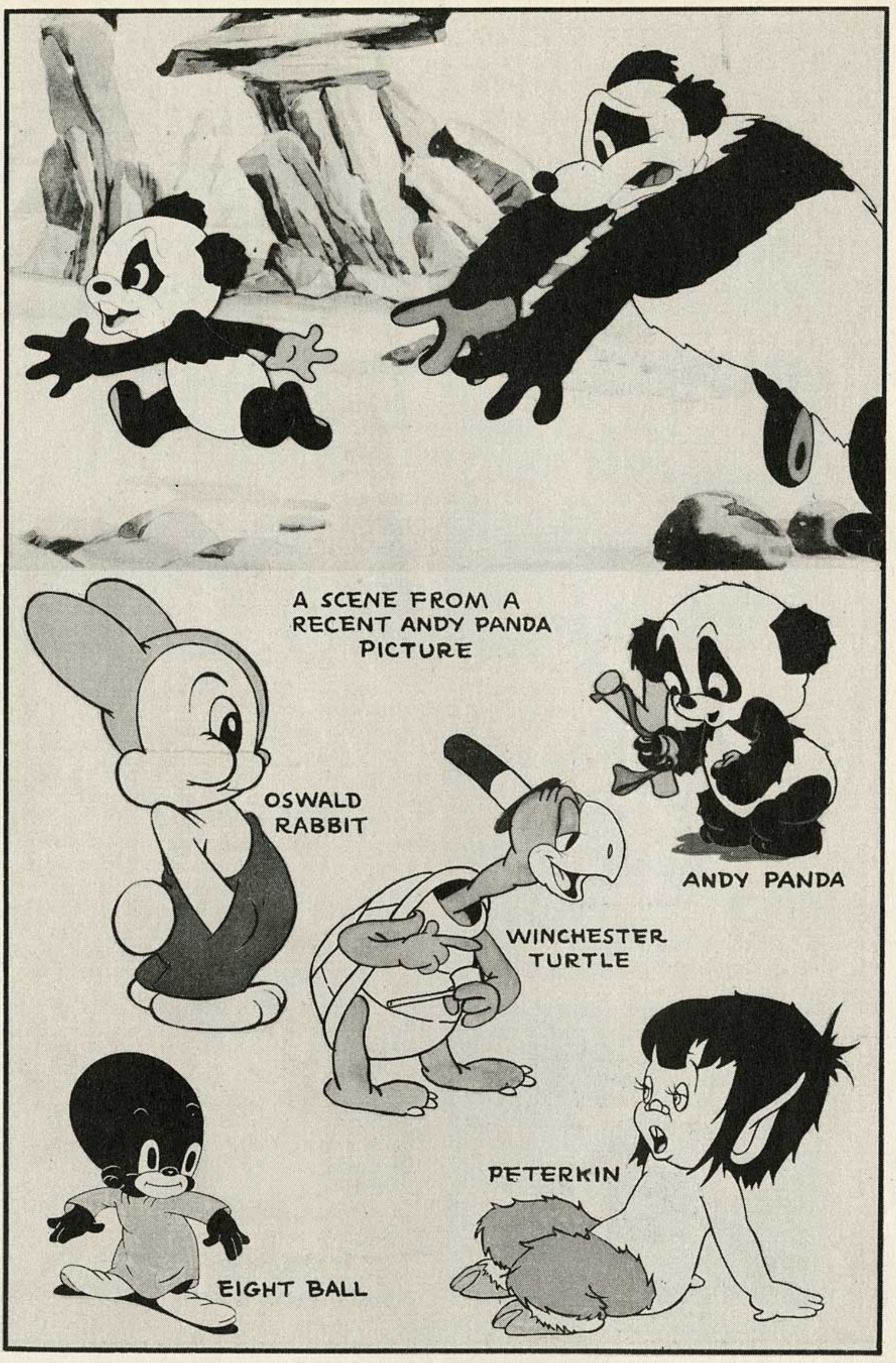
Headed by Paul Terry, the dean of cartoon producers, this studio makes 26 "Terry-Toons" a year which are distributed by 20th Century-Fox and shown in theatres all over the world. Terry is one of the pioneers in the industry. He has been making cartoons for over 25 years and has made more than a thousand films, an outstanding record of accomplishment.

He has witnessed many changes in cartoon making, watching its development from a one-man job to its present state. When he started, he worked alone. When he made Aesop's Fables his staff consisted of 19 men, while today he has an organization of almost 200.

Metro-Goldwyn-Mayer Cartoon Division, Culver City, California

M.G.M. has one of the most modern cartoon plants in the business, equipped with every known aid to cartoon production. In it is a complete theatre with sound projection equipment, quarters for a large staff of artists, cutting rooms, a technical laboratory, music department with recording facilities, writers' and directors' rooms, and a "sweat box," where tests are screened and studied.

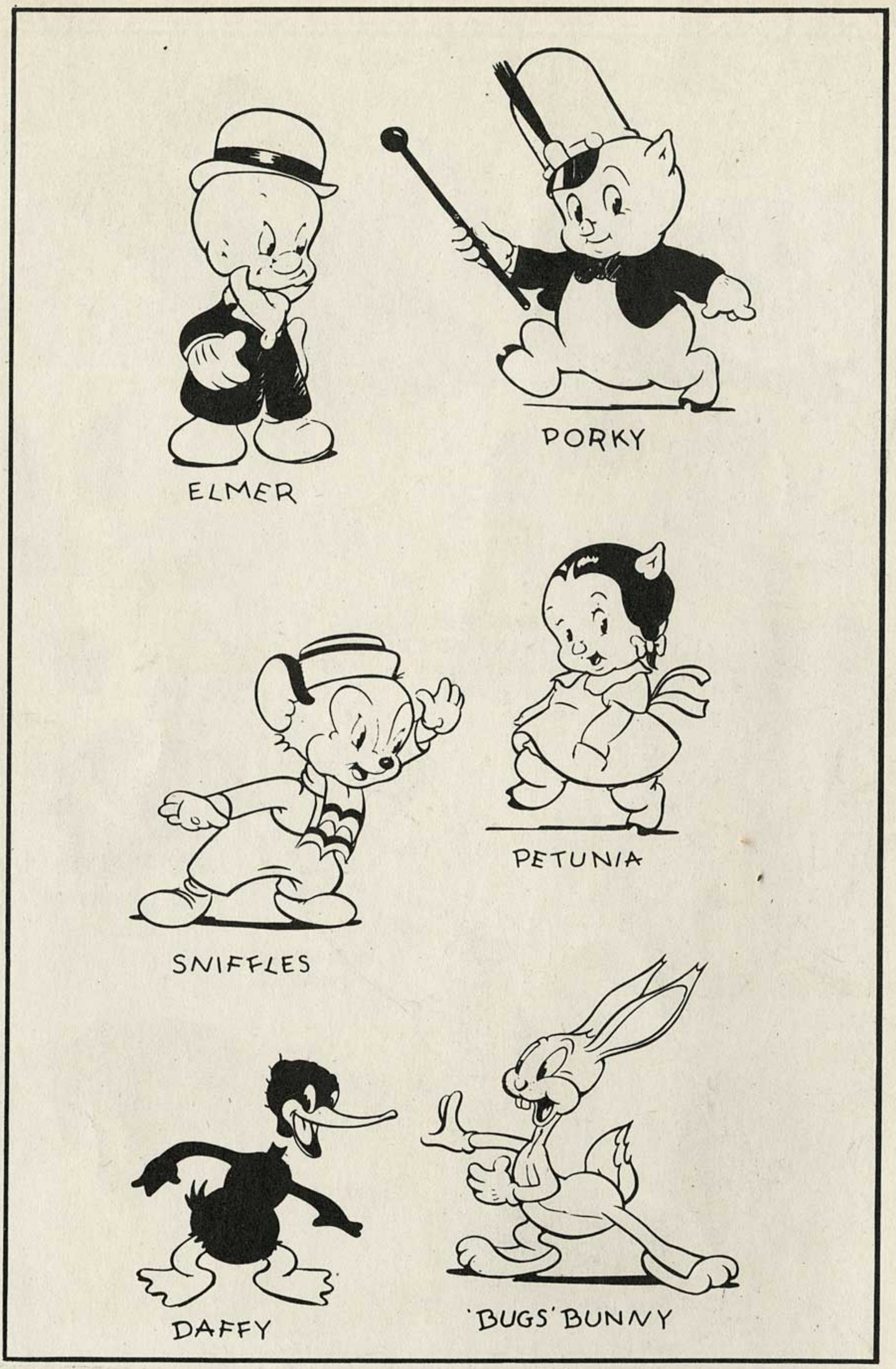
Working under the general supervision of Fred C. Quimby, head of the cartoon division, are Hugh Harman and Rudolph Ising—two of the industry's foremost cartoon producers, who head a staff of 150 and are making at least eighteen films a year in improved Technicolor.



Walter Lantz Productions, Universal Studios, Universal City, California

Walter Lantz, head of the company bearing his name, employs a staff of about 100, and produces twenty-six pictures a year which are released through Universal Pictures Company.

Although he is still a young man, Lantz has been making animated cartoons for a long time. Following an apprenticeship with Barre, he joined the International Film Service in 1917. Heading this department was Gregory La Cava, and it was under his guidance that Lantz learned all about film cartoons, working on such subjects as "Katzenjammer Kids," "Silk Hat Harry," "Jerry on the Job," and many other favorites of that period.

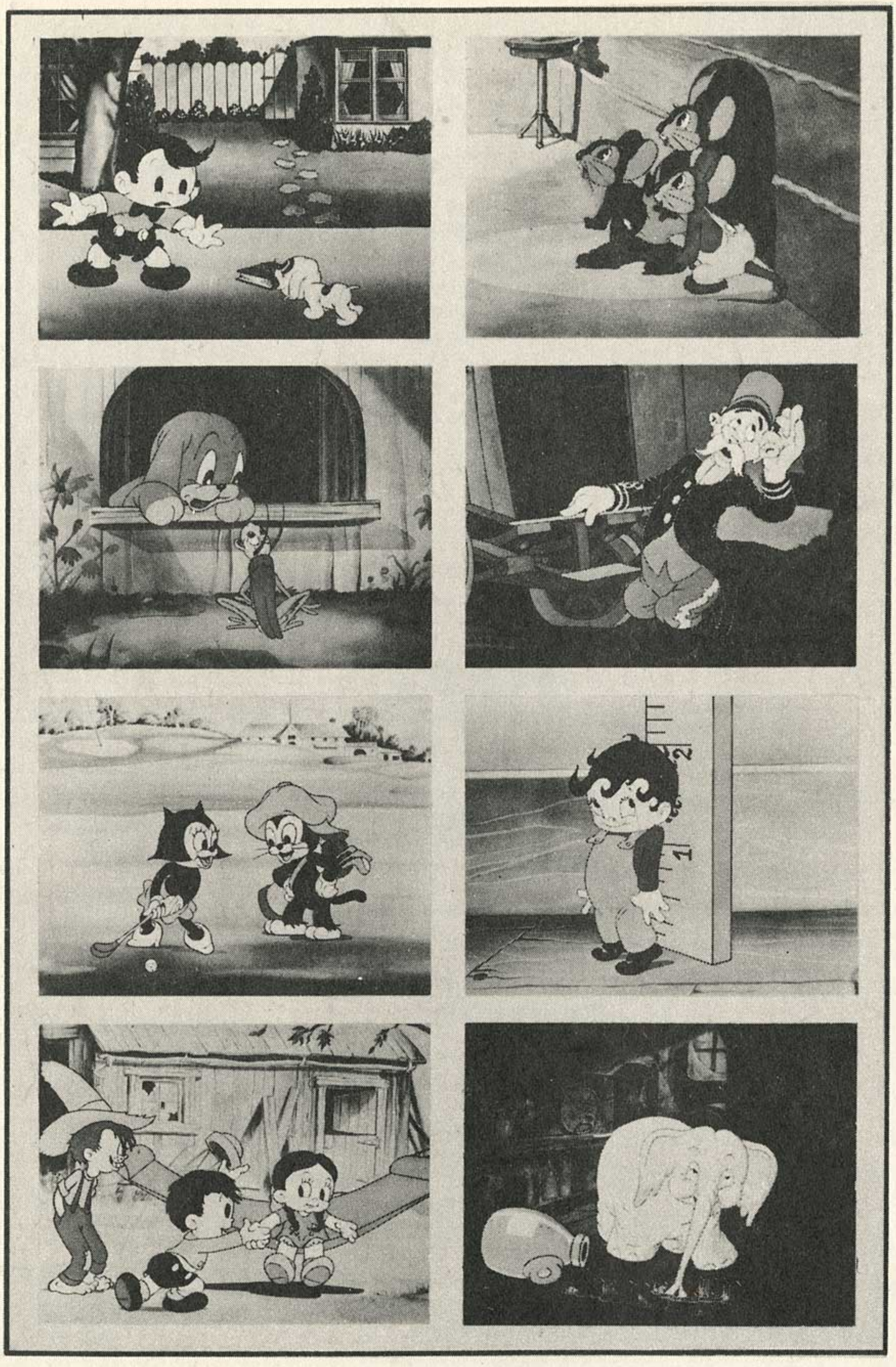


Leon Schlesinger Productions, 1351 N. Van Ness Avenue, Hollywood, California

Another studio specializing in animated cartoons is that of Leon Schlesinger. For several years he has been turning out 42 cartoons a year, the heaviest schedule of any of the cartoon producers.

Schlesinger is not an artist. He is a capable business man well versed in the theatre, from the exhibitors' point of view. After working for years as usher, box-office man, treasurer, press agent and manager of theatres, he turned to the movies. In 1930, he started making "Looney Tunes," and a year later he began another series called "Merrie Melodies."

When he started he had but 36 people working for him. Today his staff numbers 200.



Screen Gems, Inc., 7000 Santa Monica Blvd., Hollywood, California

Screen Gems, which produces cartoons for Columbia Pictures, was started by the late Charles B. Mintz. This studio, located in the heart of Hollywood, has a personnel of about 200 and produces thirty-two animated cartoons a year.

Mintz was the first cartoon producer to get a release for his product with a major distributor. This included a series of "Krazy Kat" cartoons and a series of "Alice Cartoons," the latter created by Walt Disney. He was the first to appreciate Disney, and made him his production chief. It was while serving in this capacity that Disney created "Oswald the Rabbit," a character still in existence, though being made by another studio.

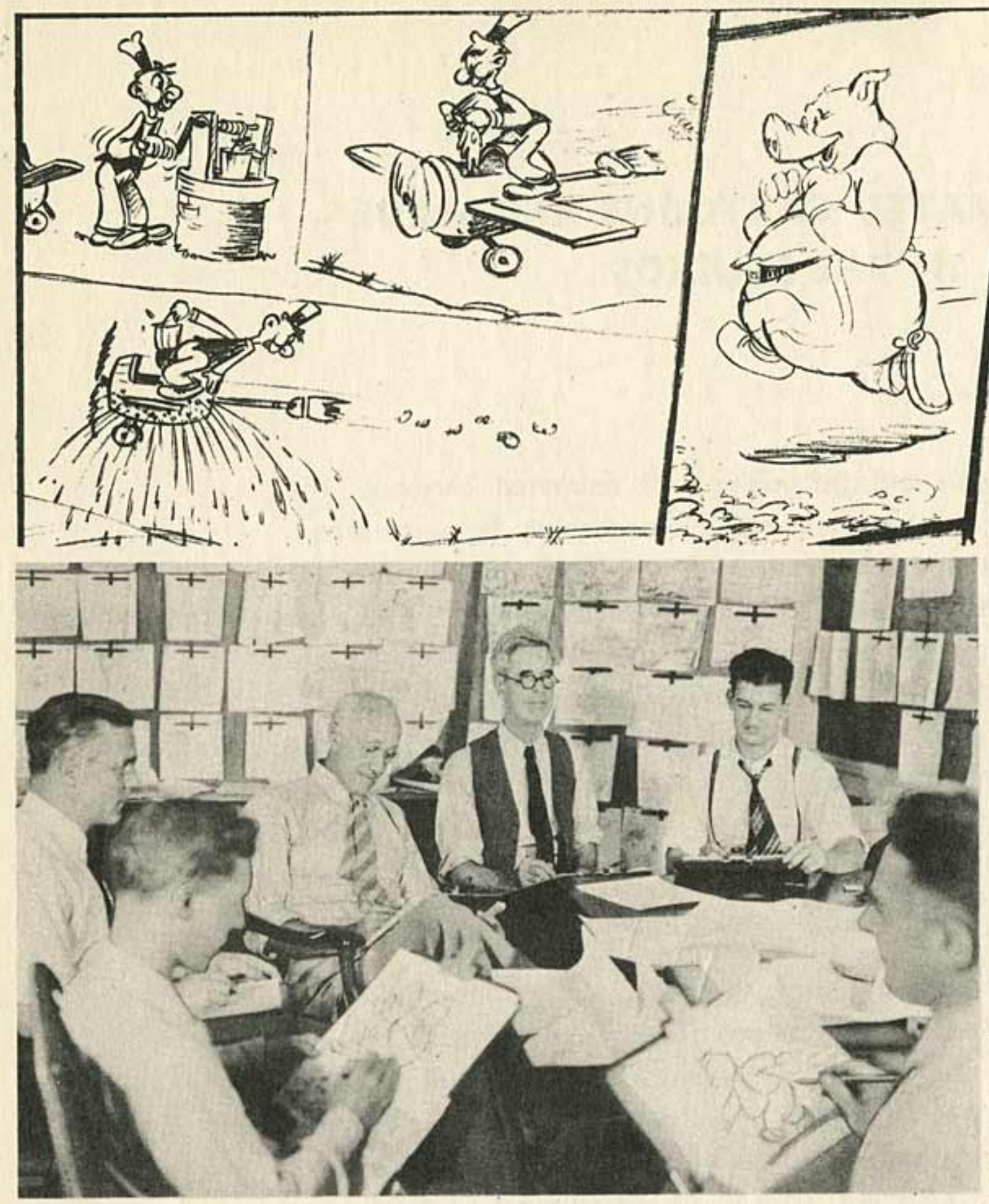
HOW ANIMATED CARTOONS ARE MADE IN THE STUDIOS

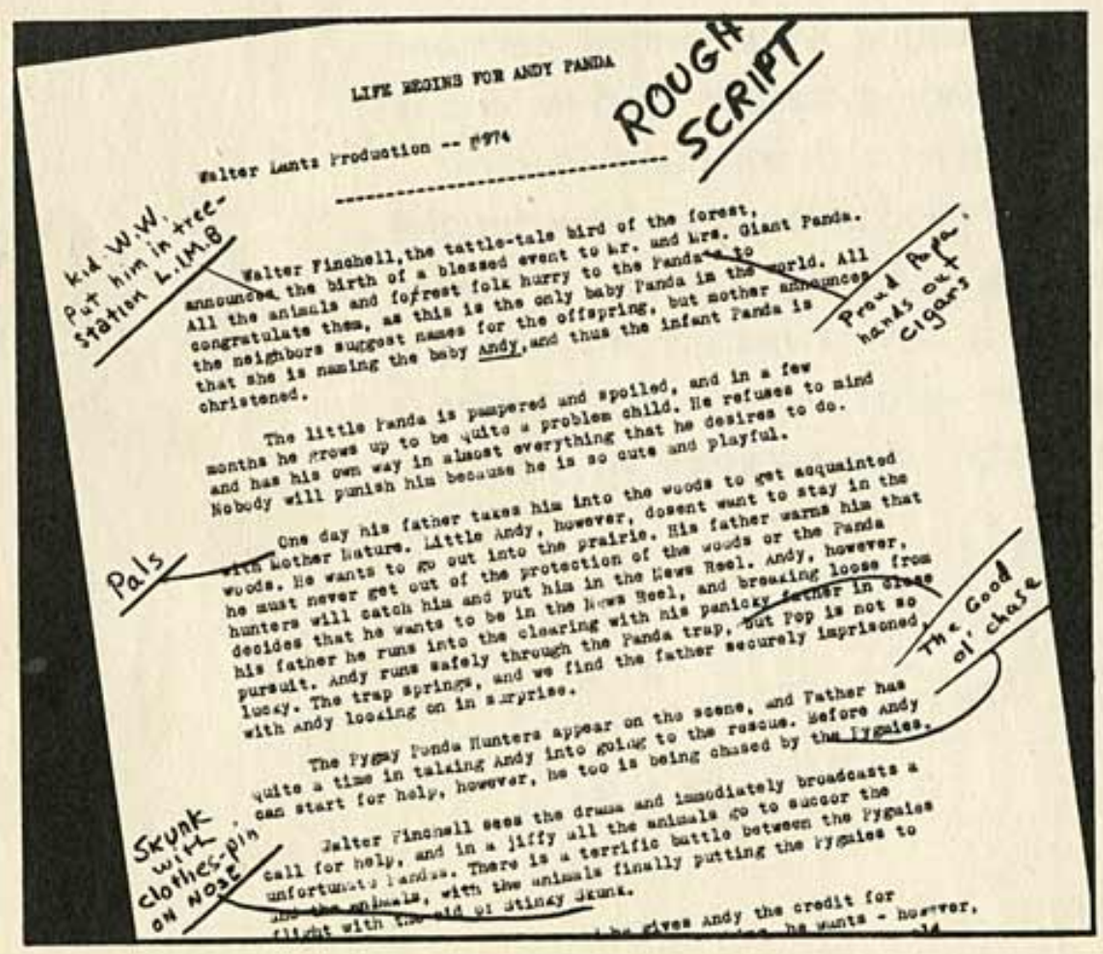
In order to understand the making of animated cartoons, the theory on which all motion pictures is based must be understood. Motion pictures do not actually move. A series of still pictures are projected on the screen in rapid succession, thus creating the illusion of movement. There are sixteen pictures to one foot of motion picture film, and the speed of projection in motion picture theatre machines is ninety feet per minute, or one and one half feet (twenty-four pictures) each second. Since this speed is much faster than the human eye can follow in detail, the illusion of movement is created. Ordinary motion pictures are projected at the same speed at which they are photographed, but in animated cartoons the camera photographs only one picture at a time.

The expression "every move a picture" applies to nothing so accurately as to the creation of cartoon films. Every move is actually a single picture. Everyone in a cartoon organization must think in terms of action but work in terms of individual pictures. Timing is the important thing in every phase of the work. Lines of dialogue, bars of music, and all other sound are reduced to the number of frames, or pictures, they require in the film. It is the sequence, speed and slight variation of positions of the characters in each succeeding frame as it is flashed on the screen, that makes the characters move. Co-ordination gives sense to the completed work.

The following description of the making of animated cartoons is based on the work being done in the leading cartoon studios, and is illustrated with photographs and other material from these studios.

The starting point for every cartoon production is an idea for the story. This may come from any source, a funny drawing, a chance remark, or an old story formula with a new twist. It may be the suggestion of a director, a gag man, an artist. Most studios offer a bonus to any member of the organization who suggests an idea that is used.





- When the story idea is finally selected it is turned over to the story department. Here gags, miscellaneous material, situations and routines are written down, discussed, sketched out, and chewed over for weeks. Sketch artists, some of whom are story men themselves, make drawings of parts of the story, illustrate the gags, create characters, sketch the highlights of the picture and indicate backgrounds.

- In some studios the idea is turned over to a group of writers who develop a synopsis, in story form. Then a copy is given to every person connected with the production of the cartoon. On the synopsis are indicated spots in which gags seem called for. Suggestions of all kinds are made and when they have been collected and selected the sketch artists and layout men prepare sketches of gags, characters and situations.

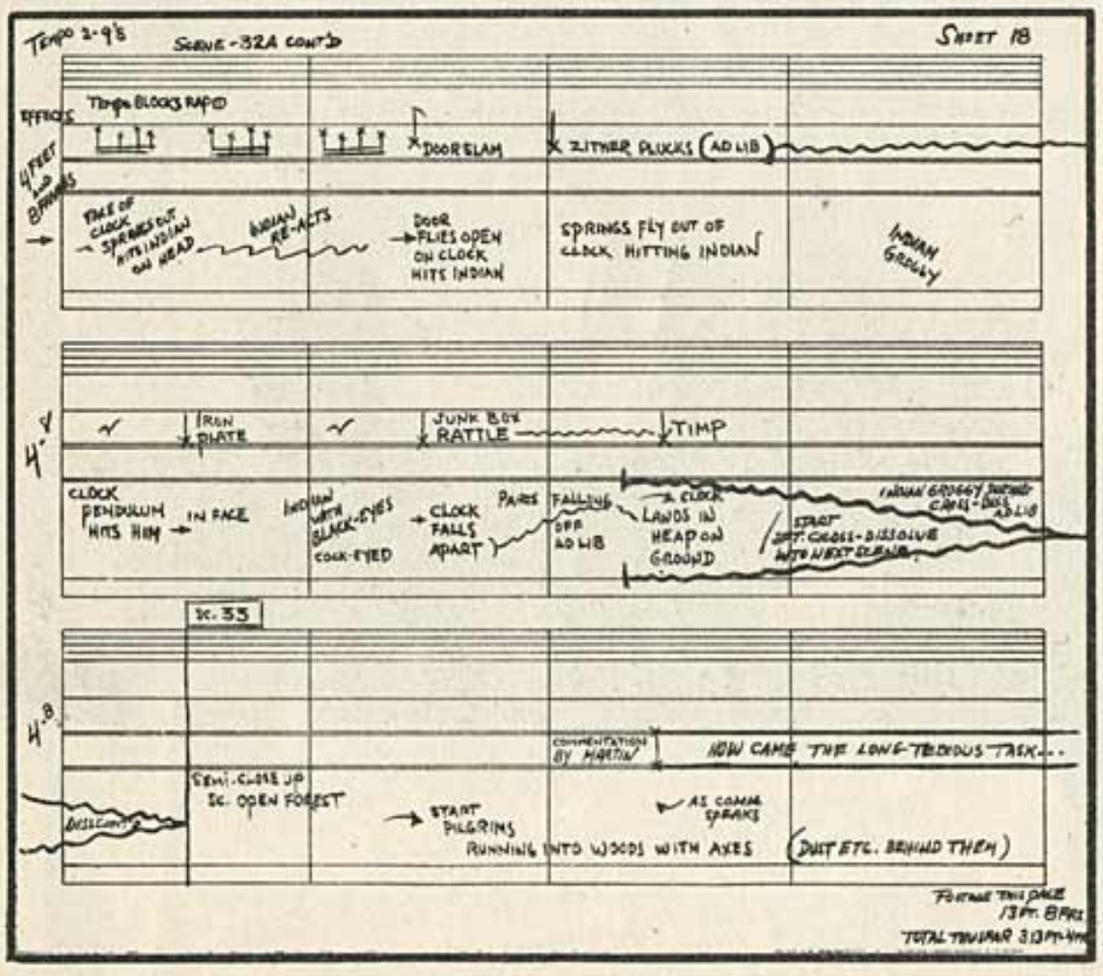
● Several hundred rough pencil sketches are made by the story sketch artists. These drawings, on white paper, are arranged in rough continuity. They give an outline of the entire story and show the principal sequences and gags. These rough sketches take the places of the written scenarios in the ordinary picture production. When the original idea has been capitalized to the limit a final conference is called. The director, the musical director and animators sit in with the story department as one of its members explains the story and gags. Suggestions, criticism, and at times changes in the story, are made.

● The final conference on a story is usually heated and intense. The whole story is discussed and its material sifted over carefully. Some parts are passed, others may be rejected or go back for improvement. Nothing is left to chance. A suggestion that may improve the gags or any phase of the telling of the story is quickly adopted. Some times a full week is consumed in discussing and analyzing the story. Often sound effects are suggested at these meetings. Occasionally, after the music is recorded, it is found that the story is either too long or to short. So another conference is held to determine what to add or eliminate. In the picture above a director and one of his idea men go through a bit of action to illustrate a gag.

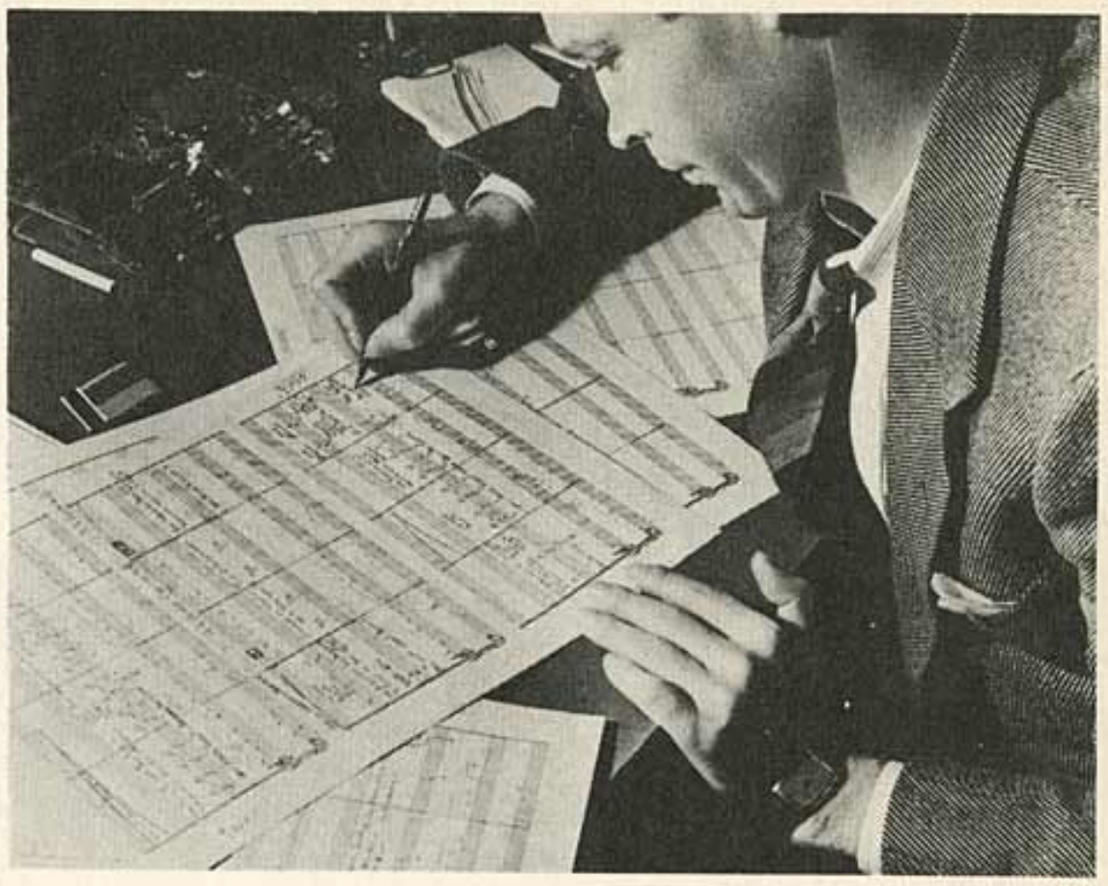
Scene No.	Rough Time Sheet no. 7. Description..	Footage
32A	S.C.U. (SEMI CLOSE UP) INDIAN LOOK OVER TOP OF CLOCK.. KEY TURNING, CATCHES IN HIS PANTS AND STARTS TO WIND THEM UP.. SO MUCH SO THAT HIS LEGS ARE EXPOSED ... HE REACTS AND TRIES TO PULL AWAY... KEY UNWINDING SOUND IS HEARD... SPRING BREAKS -- KEY WHIRLS AROUND RAPIDLY SPINNING INDIAN HE LANDS ON GROUND.. FACE OF CLOCK SPRINGS OUT HITTING INDIAN ON FACE -- DOOR FLIES OPEN.. SPRINGS LET LOOSE.. PENDULUM SOCKS INDIAN.. HE'S GROGGY.. CLOCK FALLS APART (3 PT CROSS-DISSOLVE	40½ FEET (INTO NEXT SC.)
33	L.S. (LONG SHOT) OPEN FOREST... PILGRIMS RUN INTO WOODS WITH AXES... (START COMMENTATOR SPEAKING) "NOW CAME THE LONG TEDIOUS TASK... (CONTINUE IT IN NEXT SC.)	5 FT
34	S.L.S. (SEMI LONG SHOT) CHOPPING RUMBLE IS HEARD.. TREES FLY UP... DUST RISES ... LOGS START DOWN... AND RAPIDLY BUILD VILLAGE FULL OF CABINS... (CABINS BUILT BEFORE COMMENTATOR FINISHES LINES.) COMMENTATION CONT'D FROM SC. 33 ---"OF BUILDING HOMES -- LOG BY LOG --- OH WELL THEY BUILT THEIR HOUSES!"	10FT
	(FAN WIPE INTO NEXT SCENE	55½ FT TOTAL FOR THIS PAGE

- Immediately after the final story conference a rough estimate of the time, of each bit of action in the story, is made. Scene after scene is gone over and is timed with a stop watch.

- This rough timing sheet will be used to guide the director in making out his "music detail sheet."



- Following the rough timing sheet the director writes the cartoonist's script on specially printed paper — "music detail sheets" (in some studios these are called "detail sheets," in others "music sheets"). These are overgrown music sheets, with bars and musical format. Horizontally they are divided into four parts—the top part for the music, (which the director leaves blank), the next for sound effects, then dialogue and the largest space for detailed action.



● The man who "details" the action on these sheets must know about acting, animation, timing, music and the actual mechanics of animated cartoons; which involve settings, photography, tone values, color and all other procedures. As he progresses with this cartoon "script," written in musical bars of so many beats each, consisting of so many frames, he confers with the story men and often makes changes and additions.

● The director will now make a careful estimate of the time to be required for each sequence as indicated by the story roughs. Working with a metronome and stopwatch he clocks every bit of action in the story. Above the director holds a stopwatch as his assistant goes through a bit of pantomime paralleling an action called for in the roughs. He figures the time required, to a split second, and records it on a "music detail sheet." This timing is checked and rechecked by the director. Nothing is left to chance. Everything is worked out in advance.

● The director and his assistants plan every detail of the film, picture by picture, editing the story to fit the time required for a bit of action. They decide on the size of the field of action and determine how much of the characters are to be seen in each drawing, as well as how many frames of film can be used for each scene. They tell where there shall be music, and with the musical director set the tempo. Sound effects are indicated and dialogue is given.

● Working on the basis of the "music detail sheet" the musical director scores the picture. He writes original music and adapts popular tunes. He works closely with the director so that his musical score will follow, for time and effect, the action indicated by the director. The music must at all times fit the mood of the picture and interpret the various scenes. Action that the animators draw must synchronize exactly with musical effects so the music is recorded before the work of final animation is even started. The musical side of a cartoon is of such importance that musicians are trained for this highly specialized work:

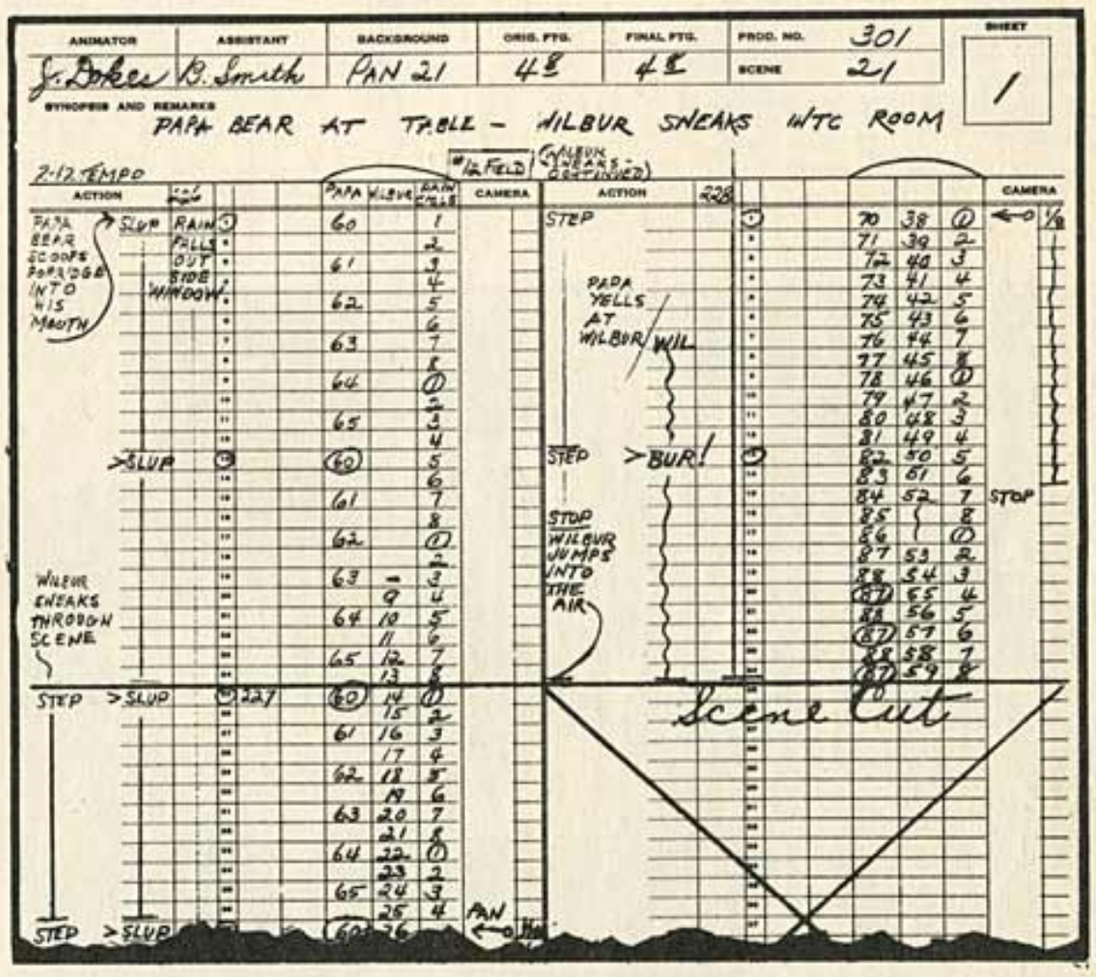
● Sound effects are very important and add punch to gags in a modern cartoon film. The work of the sound men is neither governed nor affected by the cartoonists. From the instruction sheets they know where a bell is to ring, where a character will groan, where a whistle will blow or a cannon boom. And the equipment used to obtain these effects is indeed odd. A trombone may produce the sound of an airplane and a derby hat poked rapidly with a finger, a motorboat. Files of sound effects are kept in the sound effects library.

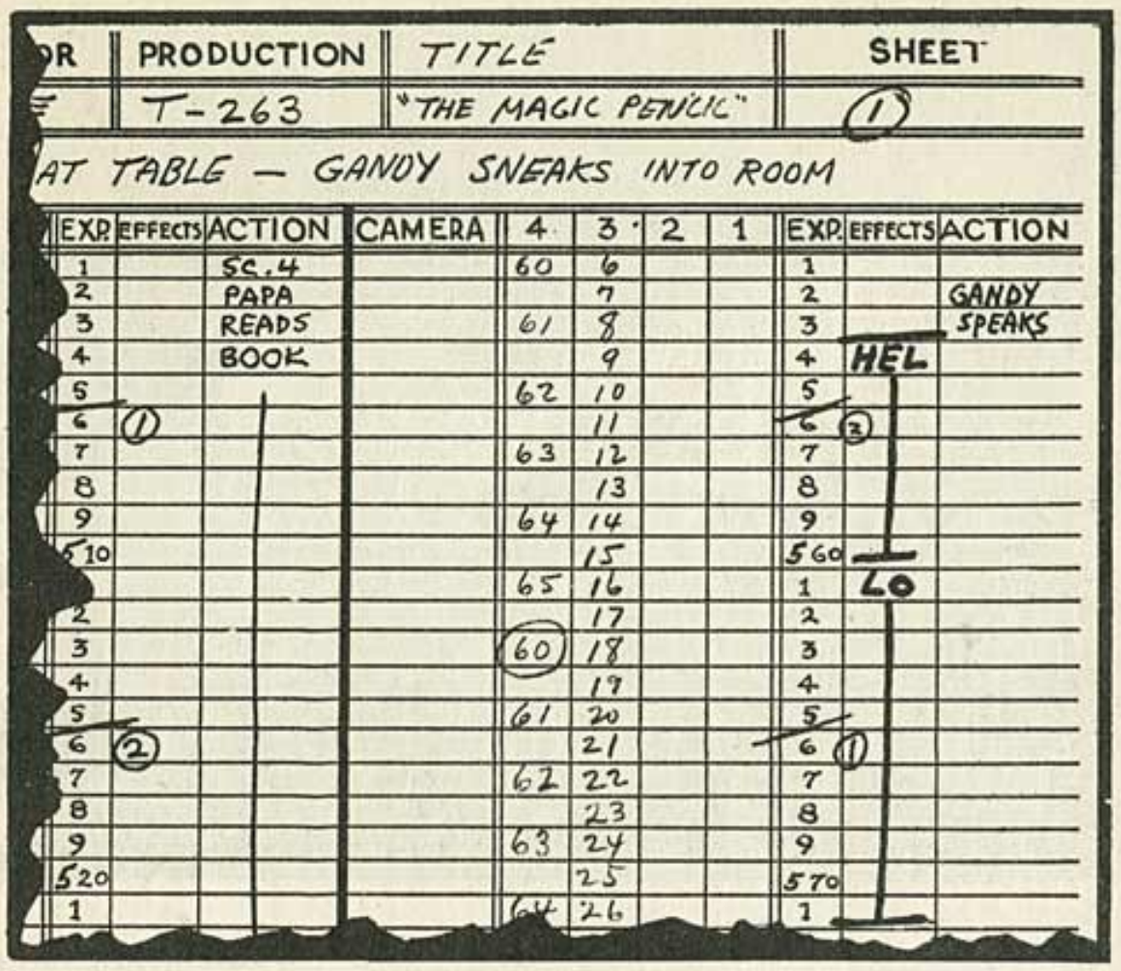
● Before sound and pictures match, three sound tracks are prepared — one for dialogue (which in most studios is supplied by professional actors), the second for sound effects and the third for the music. These tracks are checked and assembled for perfect synchronization, and, after all animation is completed on the picture, are finally merged into one track, which runs along the edge of the strip of finished film.

● The director then makes a series of "exposure sheets." These sheets are really a blue-print of the entire production. They describe and time every bit of action and dialogue that will take place, indicate the sound effects, and, give the musical tempo.

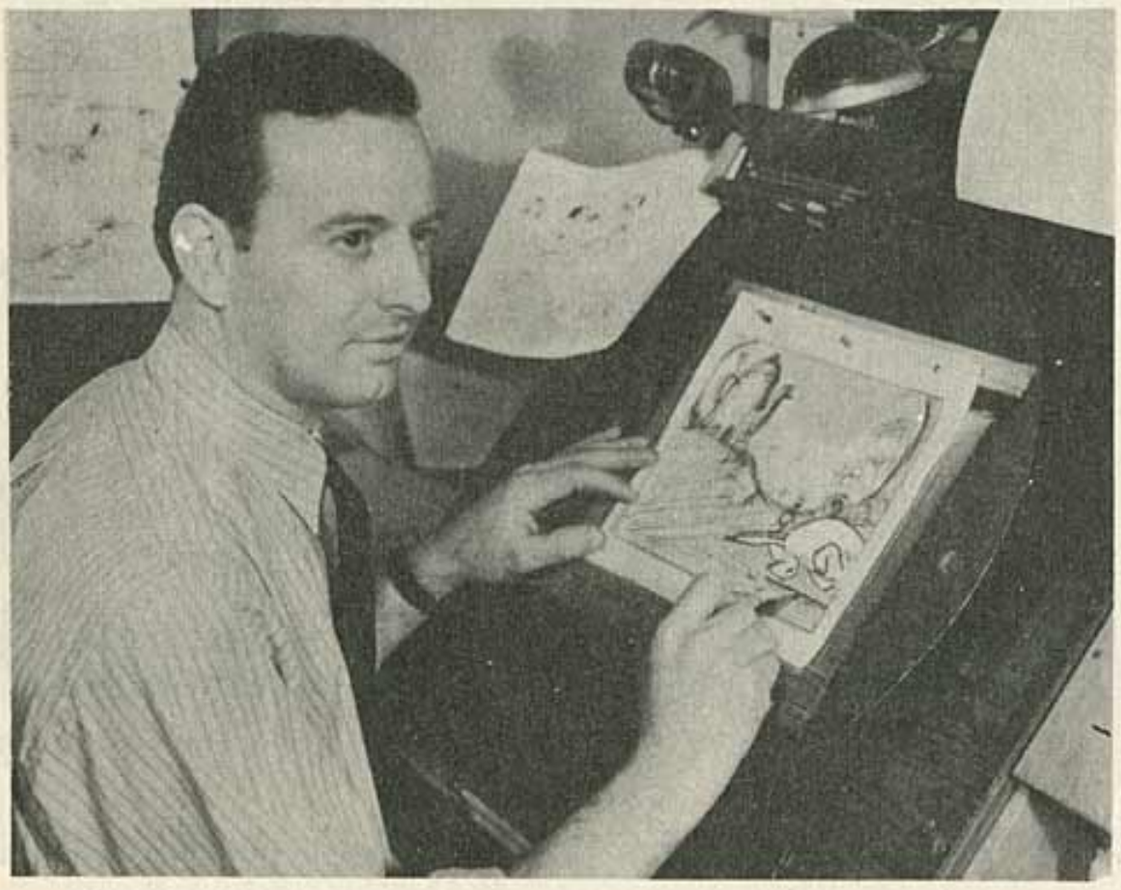
● Each animator is given an "exposure sheet" of the scene he is to draw. This tells him exactly how many drawings he is to make for the action assigned to him.

● Each space between the ruled horizontal lines represents a "frame" (an individual picture on a strip of film). Every tenth, twelfth or sixteenth frame (depending on the tempo), will be marked indicating it is a musical beat. Each column vertically indicates a different action, or "layer" of action. Thus if a man walks into a scene from one side, a dog from the other, and rain is falling—the animator does not draw man, dog and rain all on one sheet of paper. He makes a separate series of drawings for each action. Each drawing in a series is numbered, with the numbers corresponding in each column. However, each horizontal line clear across will have three different drawings exposed on it, a man, a dog and a rain drawing, each with a different number. This "exposure sheet" will be followed by the cameraman when he assembles the drawings and photographs them into a composite picture.

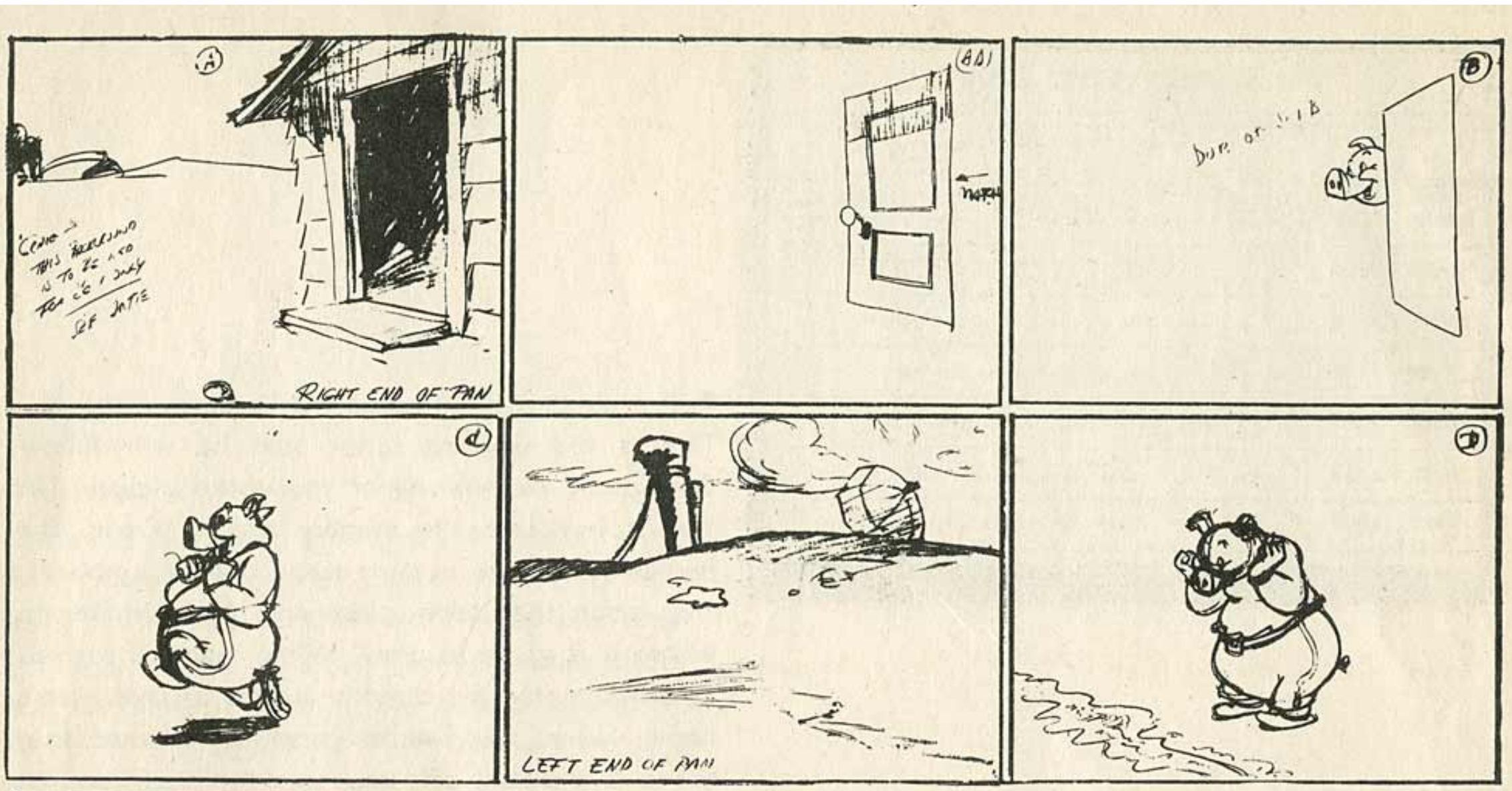




● The director must indicate the exact position of every word and sound. The dialogue is recorded on a sound track and measured in terms of individual drawings, so that artists can synchronize facial expression with words. Suppose a character is to say "Hello." The word is spoken for him and recorded on the dialogue track. The director read the recorded word in terms of frames and finds that the word takes 18 frames, which means 18 individual drawings. He marks this 18-frame space on the "exposure sheet," and the artist will draw his figure for those frames with the lips of the character speaking the words.



● Working constantly with the director is a "layout" man who is really a co-director. He plans the backgrounds (settings), plots the line of action (animation), and the areas in which a character moves (this is called the "field"). He helps plan the camera angles, the speed of moving backgrounds, camera "trucks," and the "continuity" or change from one scene to the next. This continuity must be smooth, or it will result in a series of confusing flashes to the audience. The layout man makes his sketches in the rough, showing the figures and the background. These sketches will be used to guide the animators and the background artists, and to coordinate the work of these two departments.



• Rough sketches made by Layout Director Art Bartsch for a recent "Terry-Toon."

THE TEMPERAMENTAL LION

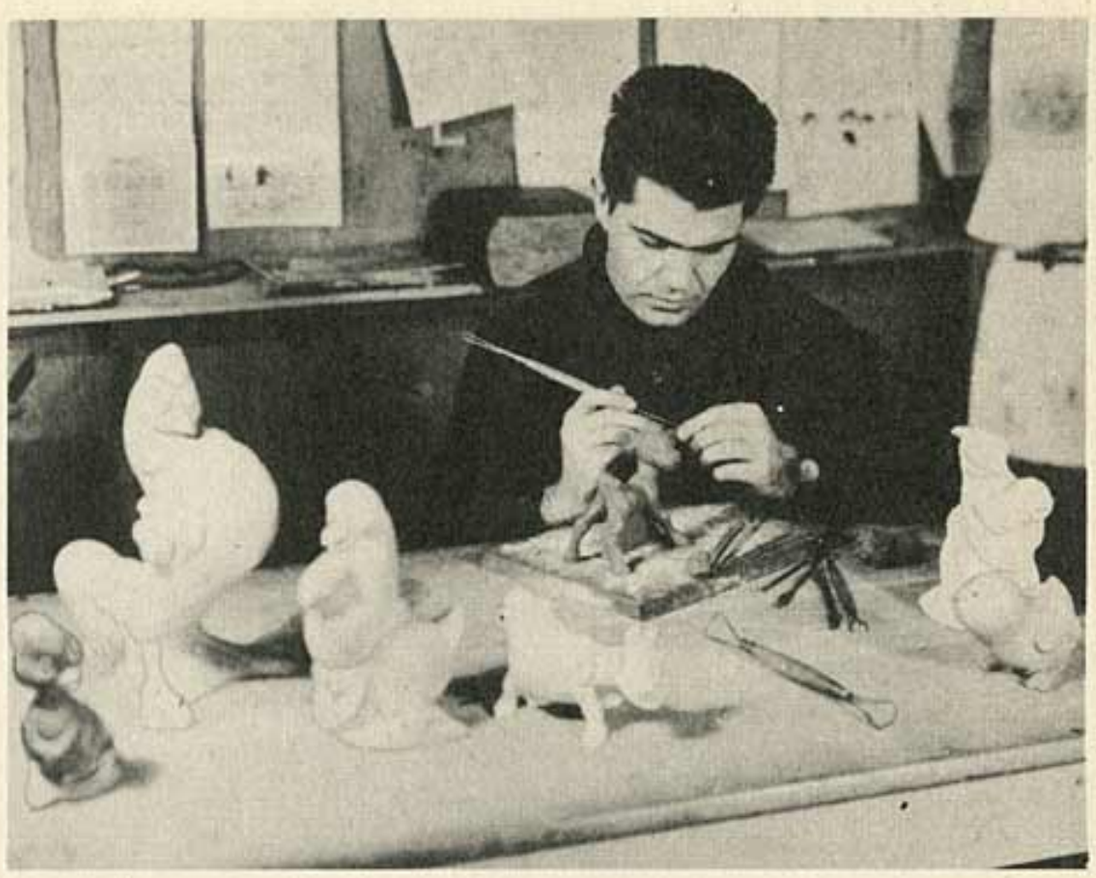
TERRY-TOON 283 — DIRECTOR CONNIE RASINSKI

ANIMATOR	NO. OF FRAMES IN SCENE / FRAME NO.	BACK-GROUND / B.G	NO. OF SCENE / SC. NO.	DESCRIPTION OF ACTION	CAMERA
WHIPP	550	NEW BACK-GROUND	1	1 FT. FADE IN → SEMI CLOSE UP.. MAJOR COMING HOME WITH LION IN CAGE... CROWD CHEERING	1 FT. FADE IN AT START
WHIPP	764	NEW B.G.	2	S.C.U. ZOO ENTRANCE - TRUCK WITH LION BACKS UP TO DOOR... KEEPER COMES OUT GREETS MAJOR..	
WHIPP	968	NEW B.G.	3	S.C.U. CAGE OPEN... LION SHOVED OUT OF TRUCK INTO ZOO.	
SILVER	1070	NEW B.G.	4	C.U. LION SPEAKS TO MAJOR THRU' BARS...	
SILVER	1134	AS SC. 3	5	S.C.U. LION FINALLY GOES INTO ZOO...	
VINCI	1239	NEW B.G.	6	S.L.S (SEMI LONG SHOT) KEEPER PRODS LION DOWN HALL OF ZOO	
VINCI	1301	NEW B.G.	7	S.C.U STOPS HIM AT OPEN CAGE DOOR	

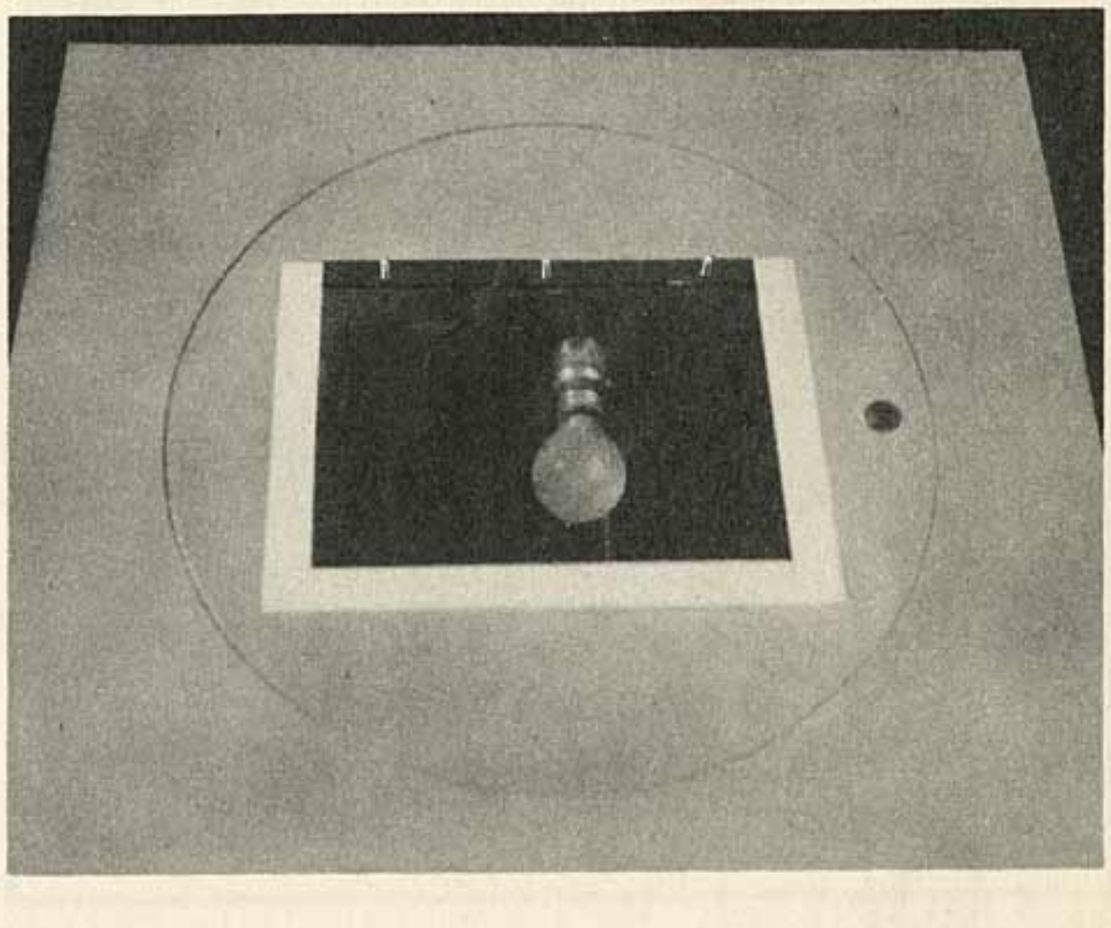
● The director now makes the "master scenario." This is the working script that he will follow throughout the making of the entire picture. On this is indicated the number of the scene, the number of frames in each scene, the backgrounds, the action that takes place and the animator to whom it is given to draw. When a scene is given to an animator the director writes in that man's name. When the finished work is returned that scene is checked off, and so on throughout the picture. From this sheet the director can tell, at all times, exactly how much animation is finished, just what is in work and what is yet to be done.

● The "master scenario" is turned over to the camera department when they are ready to shoot. It will guide the cameraman in photographing the finished picture.

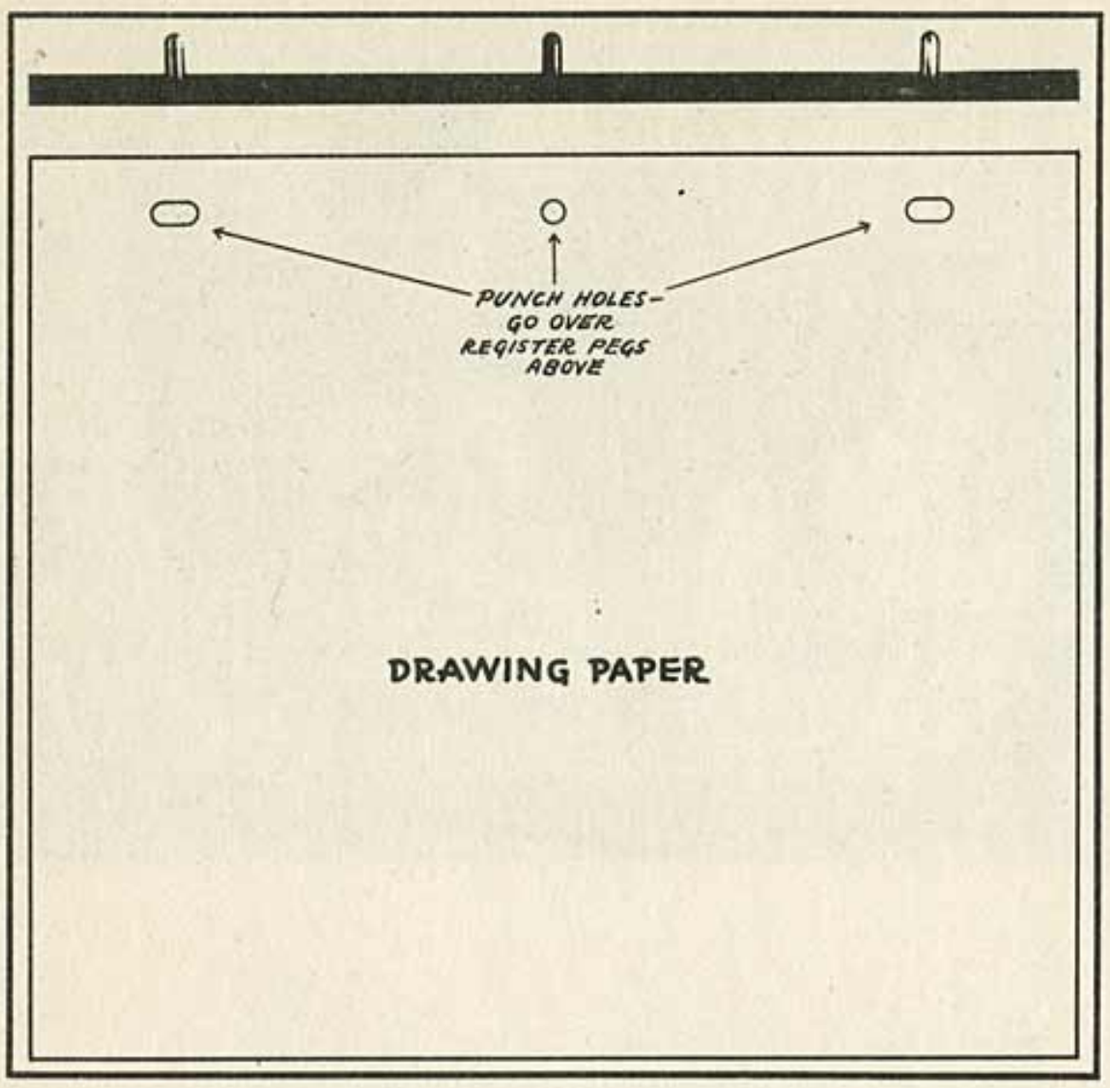
● The next step is to draw all the characters that will appear in the cartoon. A complete line-up of these characters, drawn to scale and showing comparative sizes, is delivered to every man who has a hand in the actual drawing of them for the camera. These drawings, called Model Sheets, will also show the characters in various positions and will always be kept close at hand by the artists.



● Some studios have a sculpture department where three dimensional plaster models of the characters are made. The artists study and draw these figures from all sides. These sketches are of great assistance to them in the work of animation, they help the animators "get the feel" of the characters.

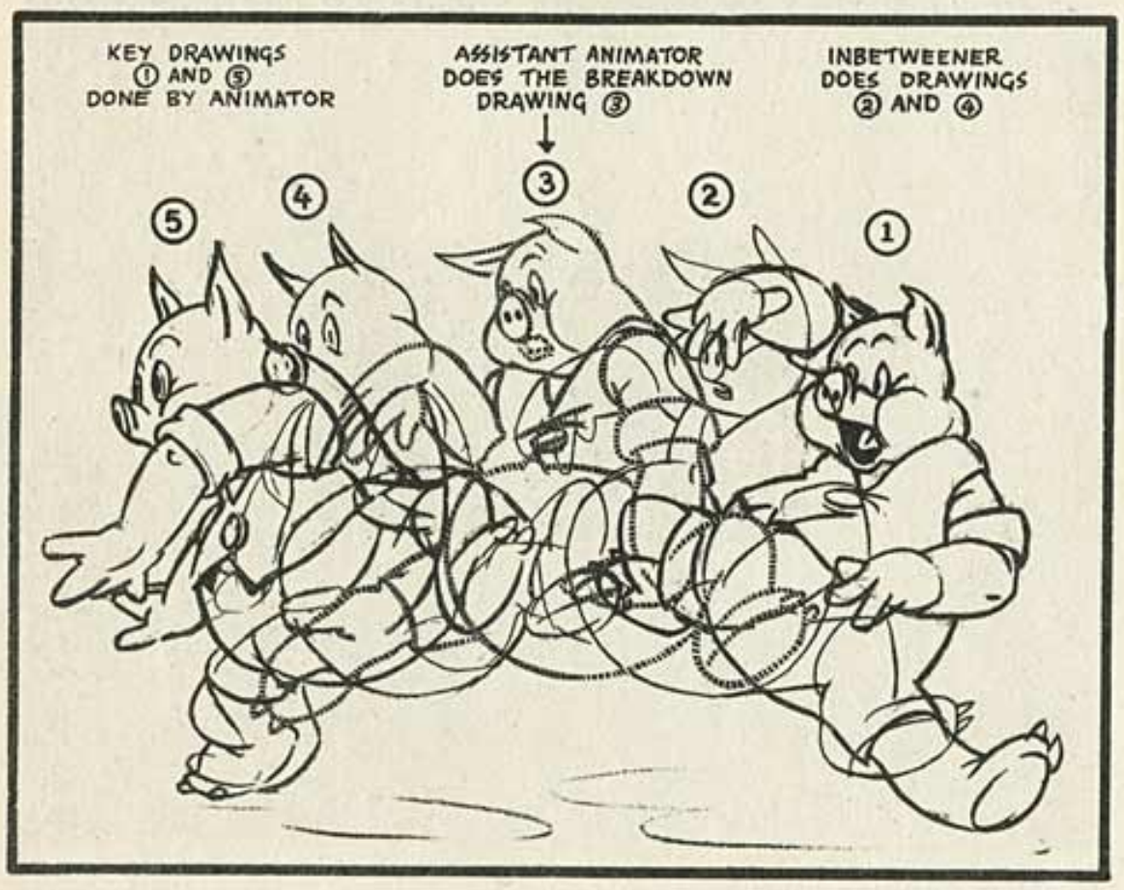


● The story is now ready to go to the animators for pictorial execution. The drawing table at which the artist works is called an animation board. Inserted in the top is a large circular disk, which can be made to revolve and permits the artist to draw at any angle. In the center of this disk there is a glass covered opening, measuring about 8 by 11 inches. An ordinary 75 Watt electric bulb lights this up from underneath, thus enabling the artist to follow the action of his drawing through several layers of paper and to keep the uniformity of his size. The animator draws the action in a series of progressive pencil sketches, each one a little different than the preceding one.

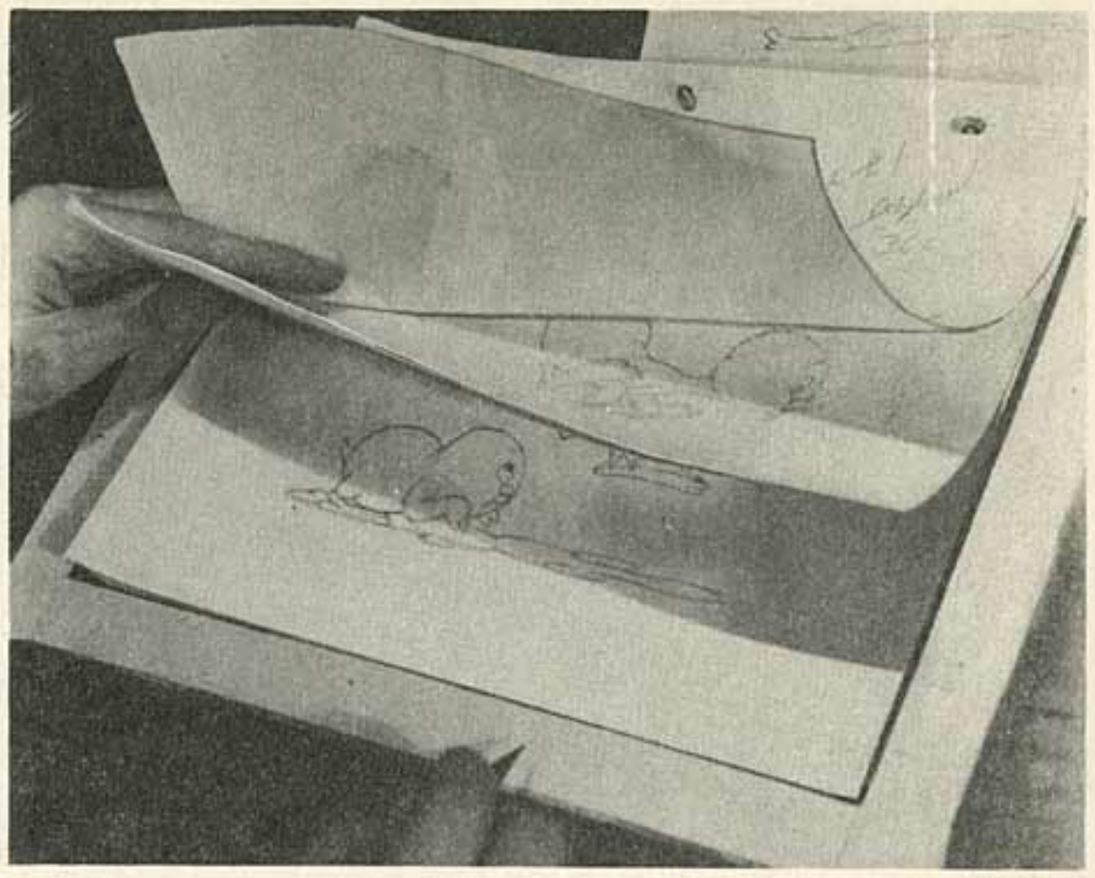


● With so many artists contributing drawings to the completed picture, every drawing must register accurately. Therefore, every sheet of paper used is of uniform size and is punched with three holes that fit the three metal register pegs embedded in the drawing board, on the long edge of the glass covered opening. Layout men, animators, in-betweeners, tracers and cameramen must all have identical sets of these pegs to keep drawings in the right position in relation to each other and to the background.

● All drawings are made on white 'translucent drawing paper (bond paper will do) with a soft black pencil. They are drawn in outline, usually one character to a sheet, on paper which measures 9½ by 11 inches — in some studios a larger sheet is used.



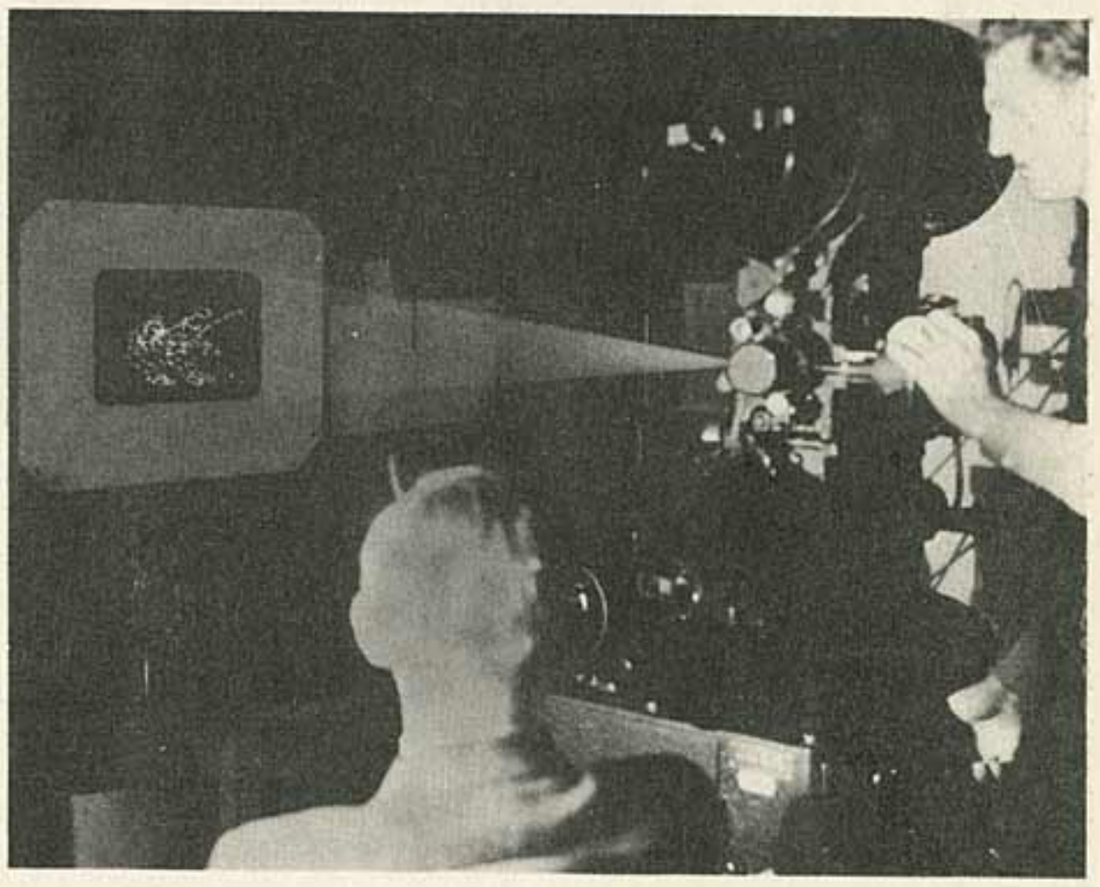
● The director divides the work among four or five head animators who will draw, in rough form, the high points of the action of each sequence. These are known as key drawings and are turned over to assistant animators who continue the work and add details. The assistants in turn, pass the work on to "in-betweeners" who make the drawings needed to finish the action in the sequence. To illustrate; let us say it takes five drawings for a bit of action, the animator makes rough drawings of numbers 1 and 5, giving the extremes of the action. The assistant animator makes finished drawings of the key sketches and continues the action. He makes the "breakdown" drawing, which is number 3, and the "in-betweener" will fill in the remaining drawings, numbers 2 and 4, completing the action. All the drawings are then passed on to an assistant who puts in the details and cleans them up. The illustration shows the five drawings placed one over the other.



● The artist draws progressive pencil sketches to show the action of the scenes. These drawings are in outline, each advancing the action just a bit. He is continually checking the action so that his figures will move along smoothly. This is done by flipping the drawings back and forth in the manner of the flipper book, mentioned in an early chapter.

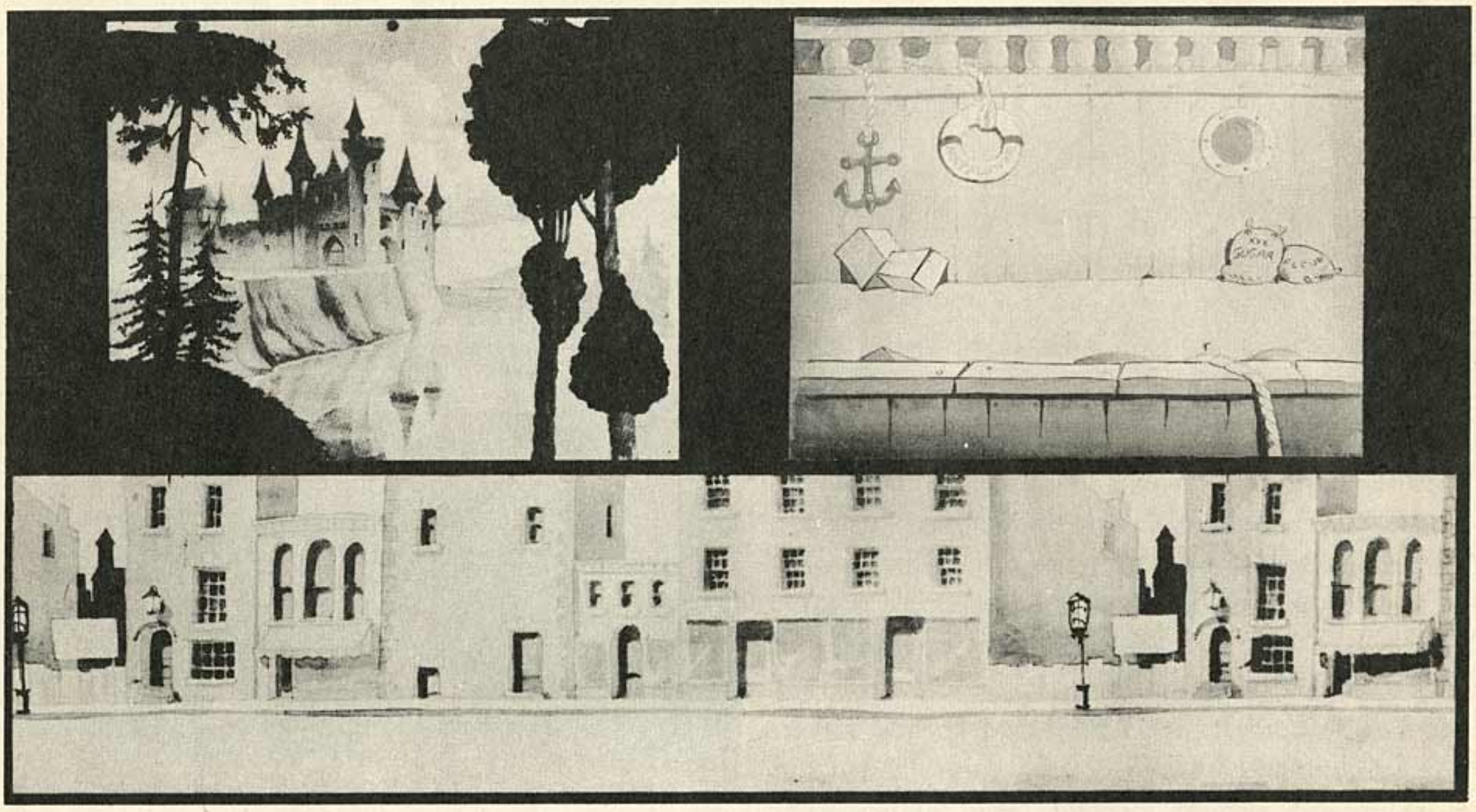
● When he has completed the original animation of a sequence, or even a single movement, he can make further tests by sending his drawings to the test department to be photographed.

● The drawings are photographed with an ordinary black and white camera. This film is developed and a few minutes later the artist can slip the test-negative into a Moviola and study his drawings in action.



● When all the drawings in a scene have been made, they are given to the cameraman to shoot an action "test." He photographs them on a strip of film in the order given on the "exposure sheet." This test is only for the purpose of determining if the action is satisfactory and the drawings are technically correct. It is projected on the screen with sound and examined very carefully by the director and musical director. Any sequences of animation which need correction are thus detected and sent back for remaking, similar to a "re-take" in the making of a regular moving picture. If everything is satisfactory it is turned over to the technical department for checking on sound synchronization, camera effects, uniformity of clothing and every other possible detail in drawing.

● While thousands of action drawings are being made the background department is preparing the "sets" against which all action will take place. The rough pencil sketches made by the layout man are re-drawn on heavy paper and rendered in gray washes, or water colors, always keeping them like the originals, as each animator has a rough sketch of the background to guide his action.



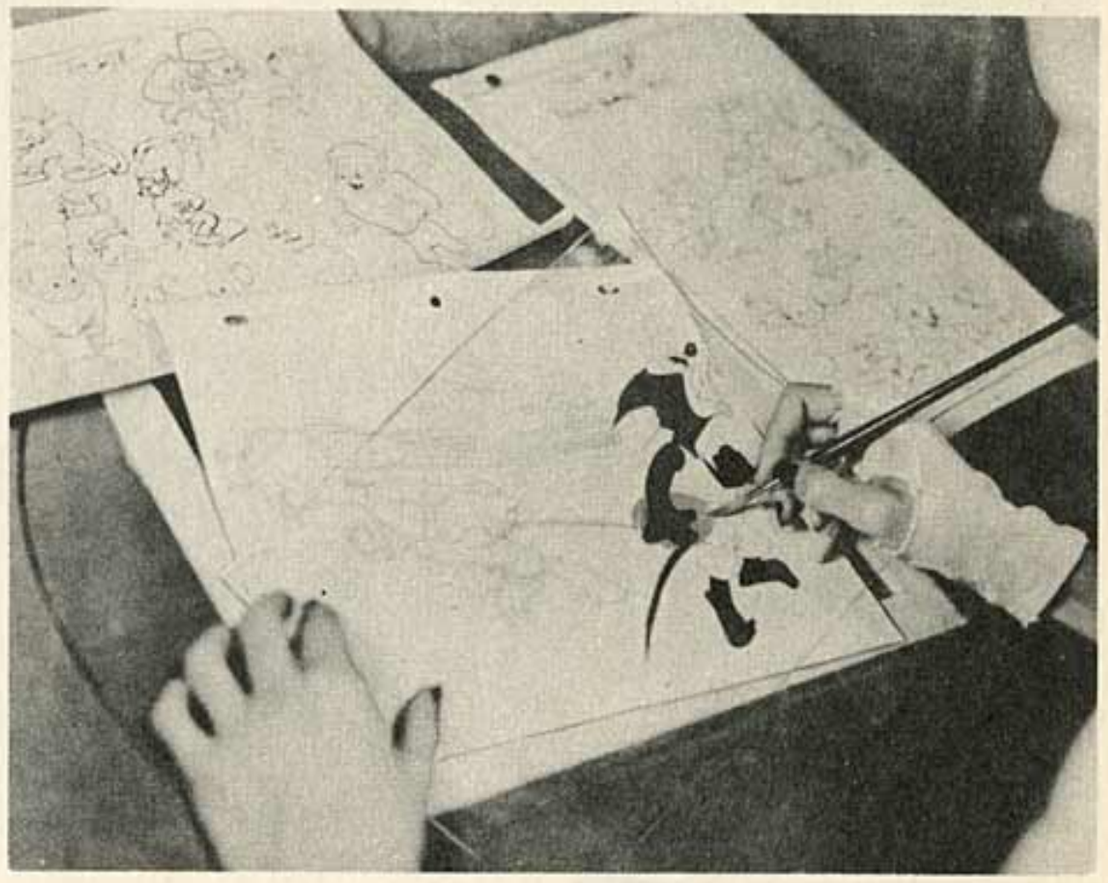
● There are two types of backgrounds, still and moving. When it moves it is called a panorama or "pan," and usually is moved a fraction of an inch between each exposure. The "pan" furnishes the means for running action. The above (long drawing) is the background for a dash down the street. In photographing this scene the background is moved in one direction and the character drawings animate in one spot, creating the illusion of their moving in the other direction.

● The still background remains stationary throughout, and therefore is smaller. It is used for straight action.

● The next step in the production of animated cartoons is "tracing," in which the outlines of the drawings are traced, in black or colored ink, on thin celluloid. These transparent sheets are known as "cells," and are punched with three register holes exactly the same as the drawing paper.

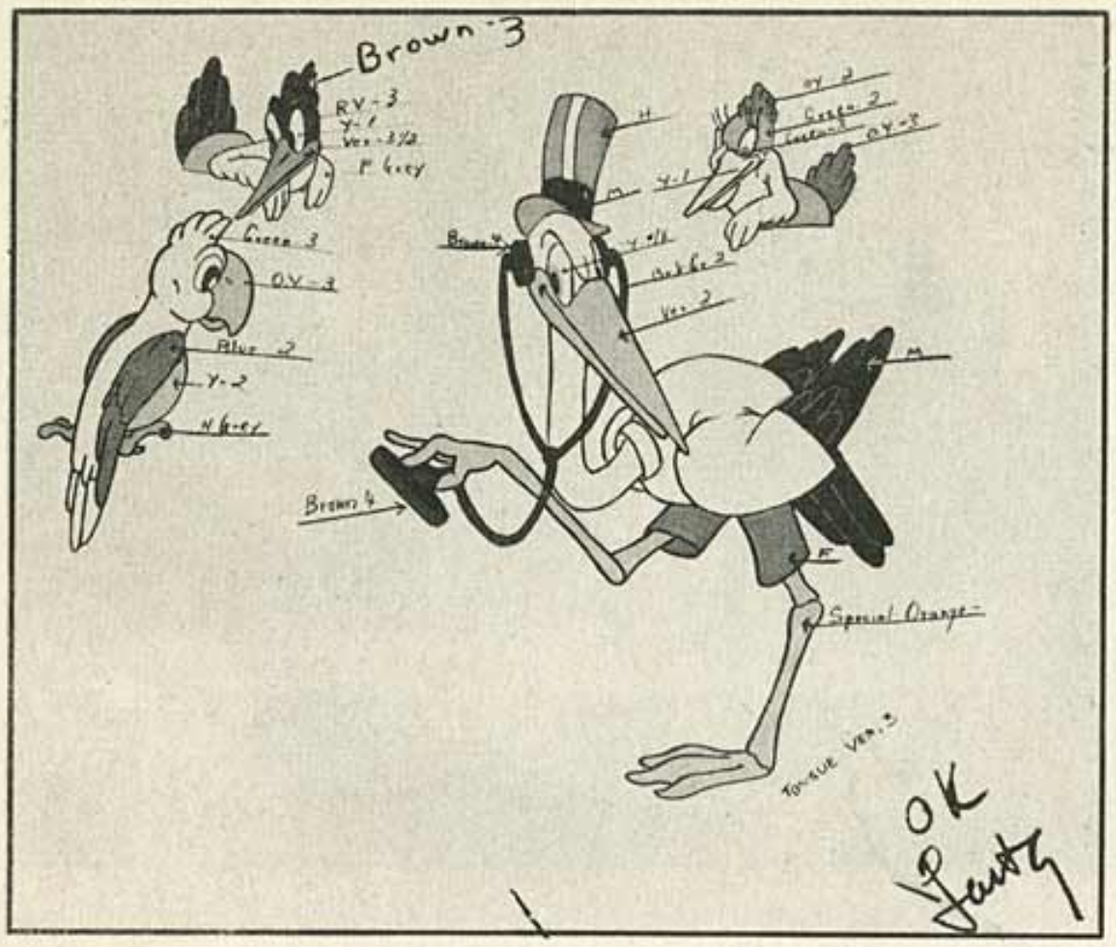
● The tracers work on drawing boards on which there are three register pegs. The paper drawing is put in position on the board so the holes fit over the pegs, then the "cell," which is the same size as the paper, is placed over this. It is now in fixed position so the artist traces the drawing on to the "cell." Usually only one figure is placed on a sheet. This gives the character complete freedom of movement and permits different actions on each "cell." A figure can pass in front or behind another.

● The work of "tracing" is done by junior members of the art staff.



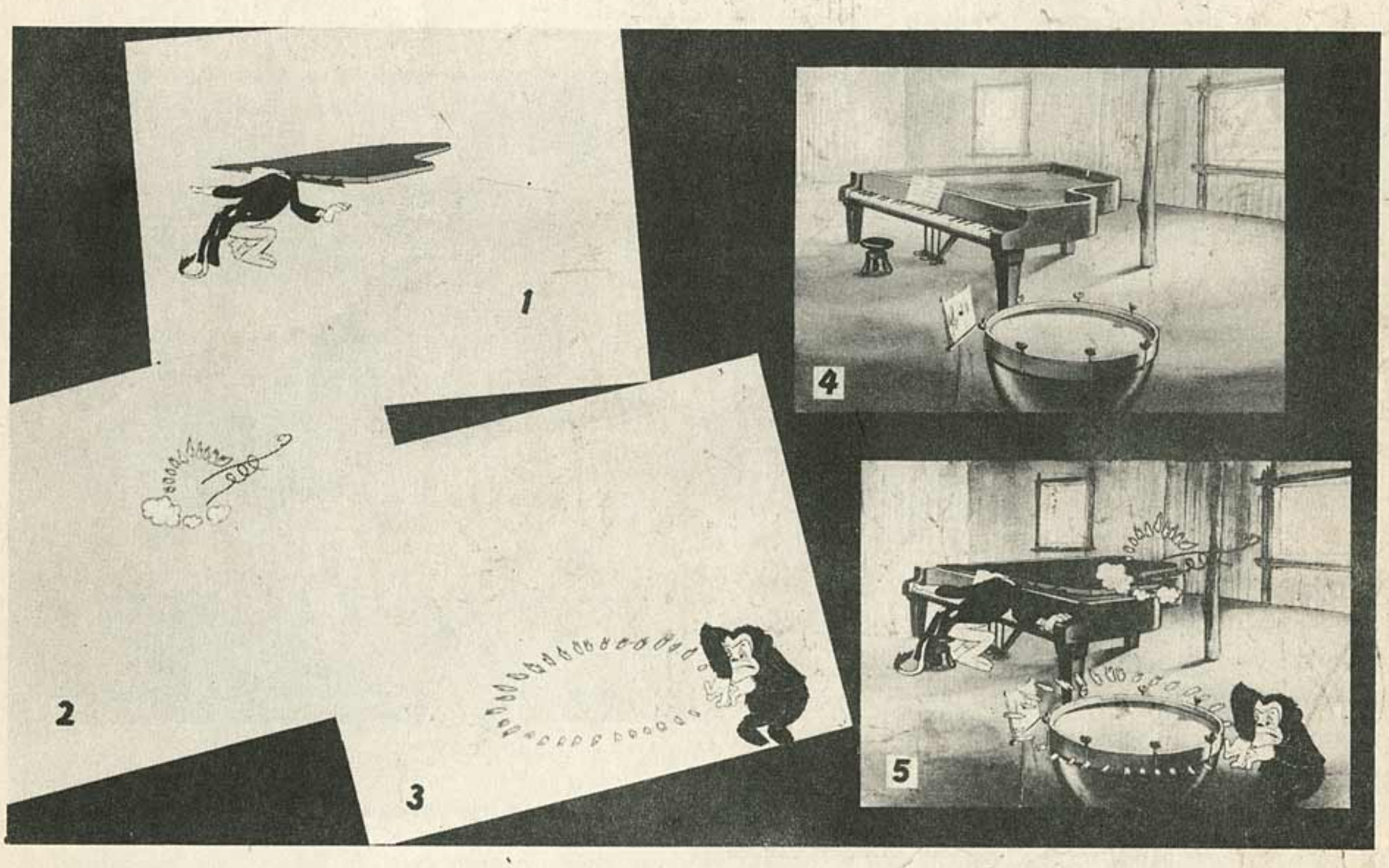
● When the "tracing" is completed the "cells" are taken over by another group of junior artists who do the "opaquing." In order to give solidity to the figures the outlines are filled in with the proper shades of black, white and gray, or sometimes in color. So that it will not interfere with the ink contour of the drawings the painting is done on the back of the "cells." Special opaque colors are used, and the artists are at all times guided by charts which indicate the colors to be used.

● When the key characters are painted on the "master" color "cells" they are checked over the background in relation to each other, for proper color and for contrast against the background.



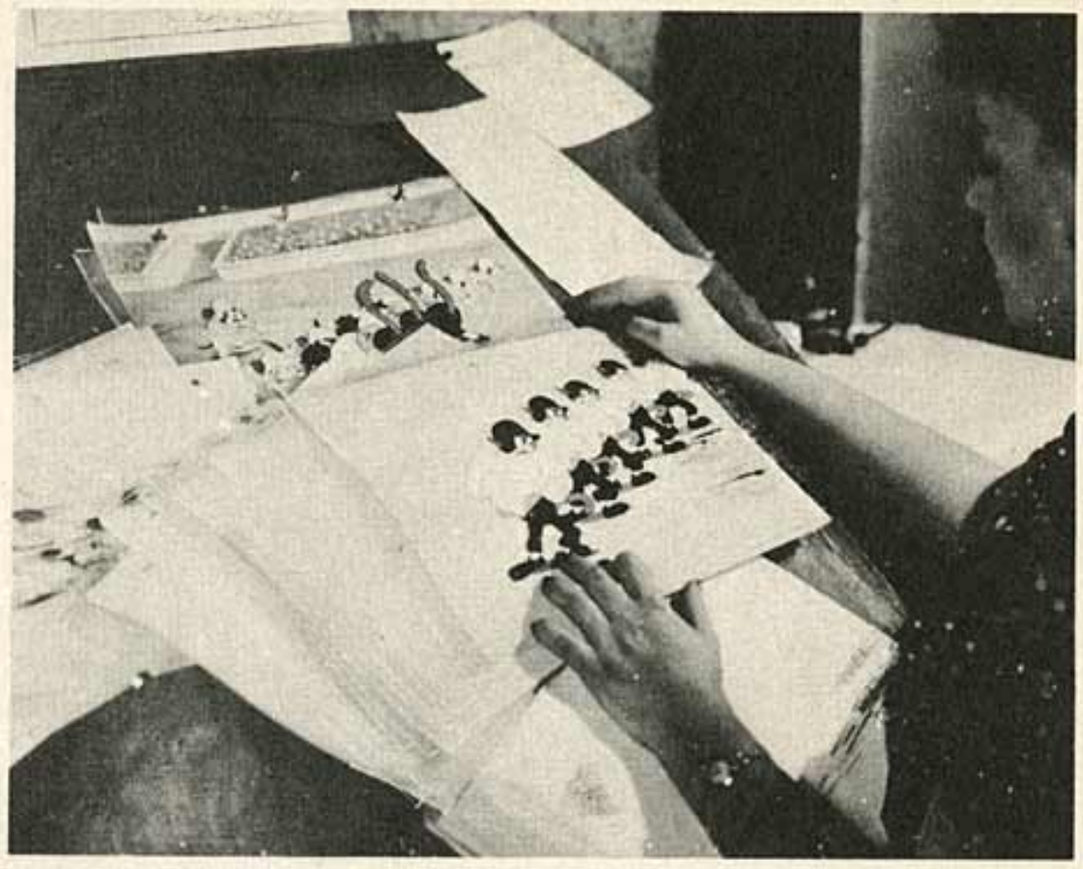
● Since many varying shades and colors are needed in painting the "cells" uniformity is assured by using special paint mixed in the studio laboratory by color experts. These colors are mixed in large quantities and are numbered, the numbers corresponding to those on the color chart.

● The director indicates, by number, the colors to be used in painting the characters on the "cells." The opaquers get from the color department jars of paint bearing the numbers called for and fill in the indicated areas.



● The purpose of "tracing" and "opaquing" is to enable the "cells" to be placed one over the other and over the background so they appear as one complete drawing. The "cell" is the finished art which is put before the camera, the background showing through everywhere except where the opaqued figure blocks it out. A single picture, as it appears on the screen, may consist of as many as four such "cells" superimposed upon a background. Here three separate "cells" (Nos. 1, 2 and 3) are placed together over the background (No. 4) to make up the completed scene (No. 5).

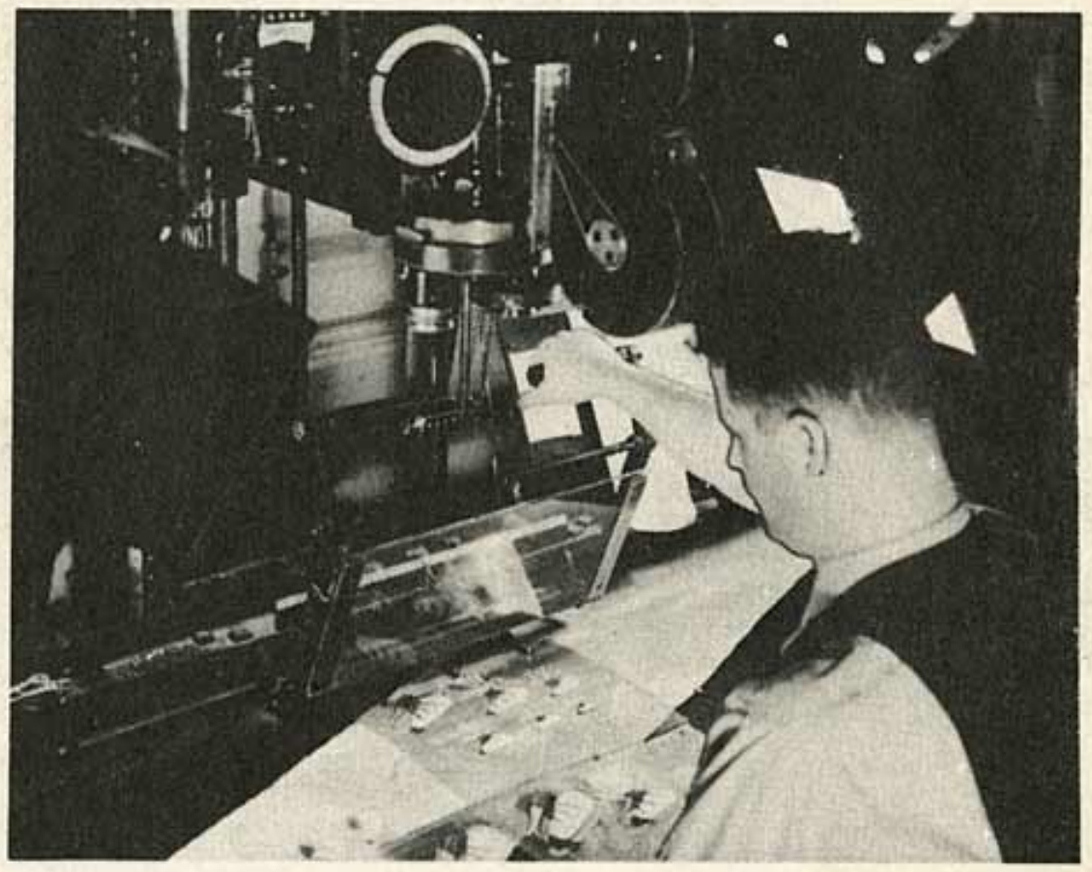
● The finished "cells" now go to the checking department where they are very carefully examined and checked, one by one, against the "exposure sheets." They are checked for mistakes in color, drawing, tracing and opaquing. A keen eye is kept open for unpainted spots or omissions, for these may cause flickers on the screen. They are checked for matching "cells" so that all action is in the proper order. The numbers put in by the animators are also checked, for these are the numbers the cameramen will follow.



● The next step is to photograph the final production. Following the checked and corrected exposure sheets the "cells" and backgrounds are assembled in numerical order. A regular motion picture camera is used. This is arranged to shoot downward, over a special table, and is geared to take only one frame at a time.

● First the background drawing is put in position, on the table, and over this are placed several "cells" (as many as four at a time can be used). A sheet of glass, operated by pneumatic force, presses the drawings flat and removes wrinkles. The operator touches the control button of the camera and one frame of the completed picture is photographed. The glass is then lifted, the "cells" removed and replaced with the next set showing the progressive movement, and photographed.

● The photographic operation is repeated with each drawing that is to blend into the completed film. For seven minutes of screen entertainment the cameraman must go through these motions 10,080 times.



HOW I CREATED ANDY PANDA

By Walter Lantz

Universal Cartoon Producer

Su Lin and Mei Mei were the real parents of my baby panda.

Reading a copy of "Life" magazine one day, my eye was attracted to its three page layout of the baby giant pandas, Su Lin and Mei Mei.

Their cute antics as caught by the fast shooting cameras from outside the panda cage at the Chicago zoo fascinated me. These two balls of white and black fluff, carrying with them the alien atmosphere of their Oriental homes, seemed to possess the softness of the kitten, the innocent expression of the puppy, and the mischievous playfulness of the bear cub. I was deeply amused as picture after picture unfolded the laugh provoking postures characteristic of Su Lin and Mei Mei.

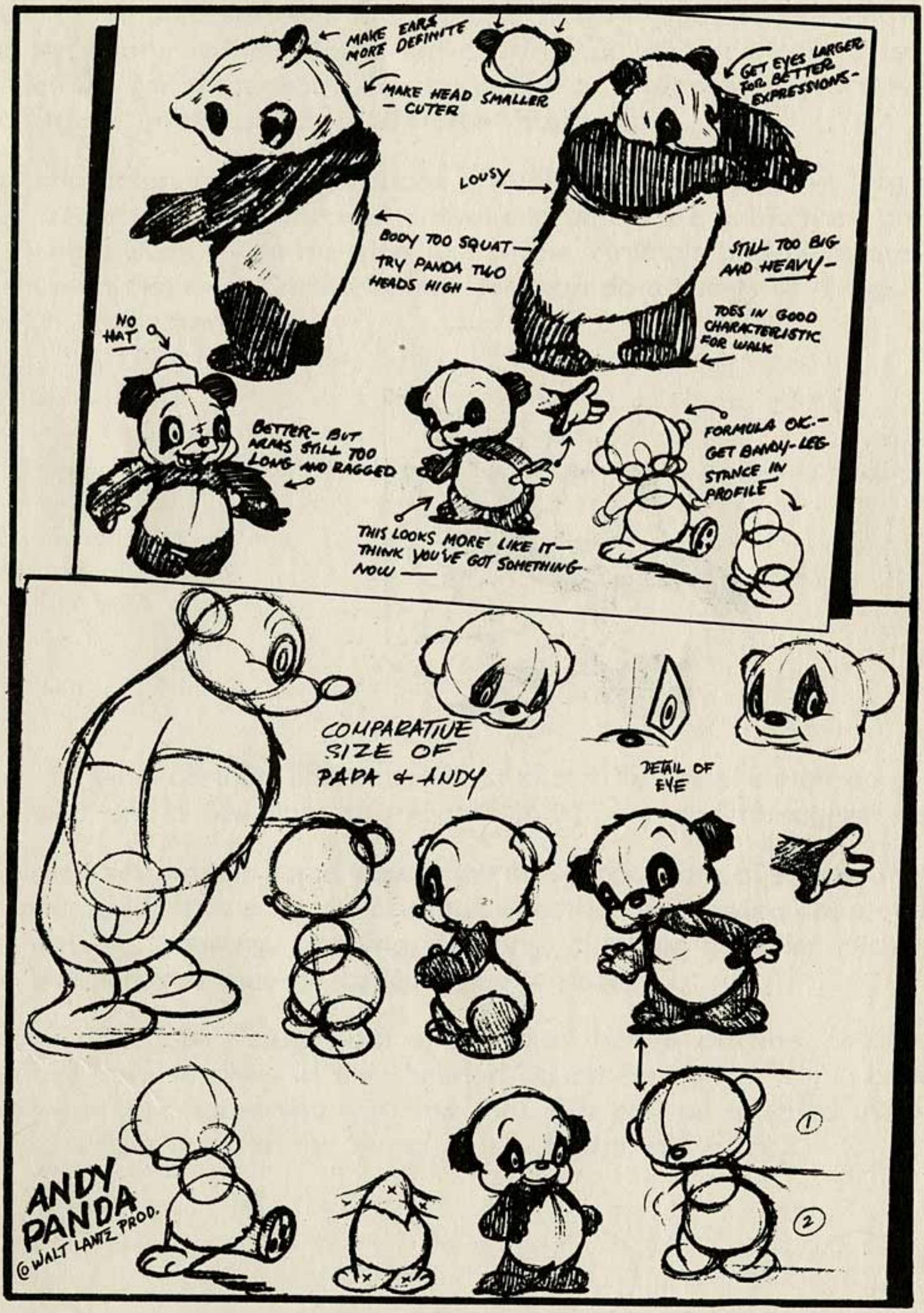
"There is my next character," I said to myself. About a year later Andy Panda was born.

I felt my baby panda couldn't miss. No animal, in or out of the zoo, is so adaptable to animation, for even in real life the panda seems like an animated animal rather than a flesh and blood creation. All I had to do was to draw Andy Panda behaving naturally — and the laughs would come.

Of course Andy's birth was accompanied with the usual labor pains. Months were spent in making thousands of sketches and models of little Andy — trying to give him all the quaint, lovable and humorous characteristics that make pandas the supreme joy of the animal kingdom.

To learn better the habits and personality of these rare bears, I made a special trip to Chicago to study Mei Mei at close quarters. I hung around her cage for three days with a 16mm camera, shooting every mood and motion I could catch, snapping every phase of the little panda. When I returned to Hollywood I had with me over four thousand feet of film which later proved of inestimable value to me and my staff in perfecting the model for Andy Panda and providing the story department with down-to-life material.

"Life Begins for Andy Panda" was the name I gave to my first panda cartoon. Our studio loved our creation and we were all happy that the public too, took kindly to the little fellow. Adoring Andy, we

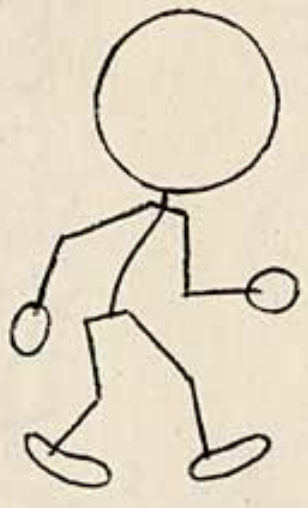


naturally wanted to see him improve with age, and since his formal debut we have constantly tried to make him better and more lovable with each succeeding cartoon. The accompanying illustrations show the steps taken in creating Andy and the changes he has undergone.

HOW TO DRAW ANIMATED CARTOONS

In drawing animated cartoons it should be remembered that all drawings must be simple. It is necessary, without forfeiting charm, humor or caricature to eliminate all superfluous details, for throughout the production of a film the characters will be drawn thousands of times in thousands of different positions.

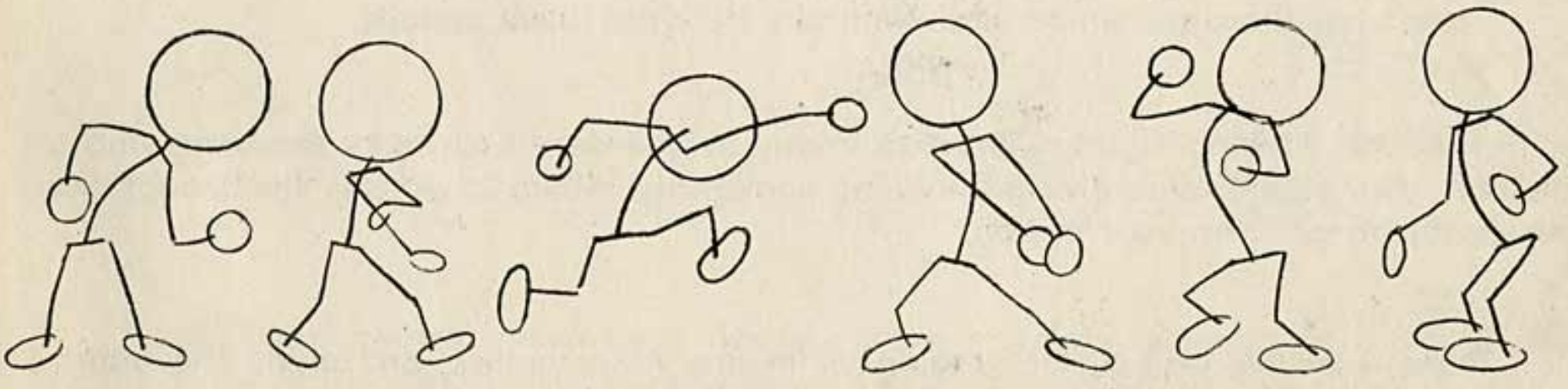
Cartoon characters are exaggerations of real life and often have large heads, small bodies and short legs. Most of the well known characters are humanized animals, Mickey Mouse and Donald Duck — to mention just a few. Animals and birds are given human actions and human clothing. Cartoon characters can do all sorts of things that would be impossible with real actors.



To start drawing cartoon characters first sketch in the skeleton action. A circle or oval for the head and a few lines to indicate the figure and to suggest the action.

This skeleton system is a rapid way to get the proportions of the figure and to bring out the action desired. It is a simple and quick method of drawing characters in all sorts of positions, walking, running, jumping, fighting, climbing a ladder, playing the piano, or any other position you may be called upon to draw.

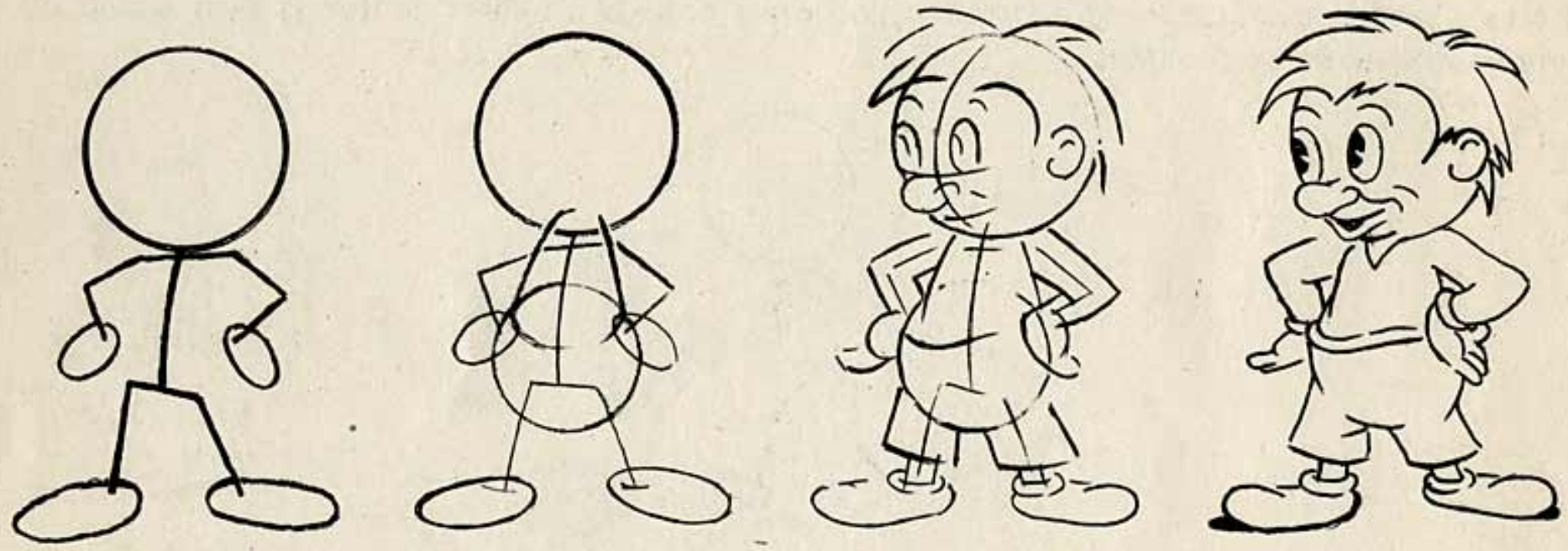
The action should be thought out and studied before putting pencil to paper. It will help the beginner to draw in the skeleton action carefully. As you advance and become familiar with the figure you will find that this can be roughed in to suggest the action. Later a single line for the swing of the figure will suffice.



Study these skeleton sketches and note how a few lines suggest the action.

The figure must at all times be in a natural position with perfect balance maintained. In walking the figure is always balanced. It must be in balance to have it look natural. Particular care must be taken to have the arms and legs in correct position in relation to each other in order to maintain this balance.

Once you have established the skeleton action the next step is to build up the figure. By using circles or ovals, as indicated on these drawings, your figure will begin to take shape rapidly.

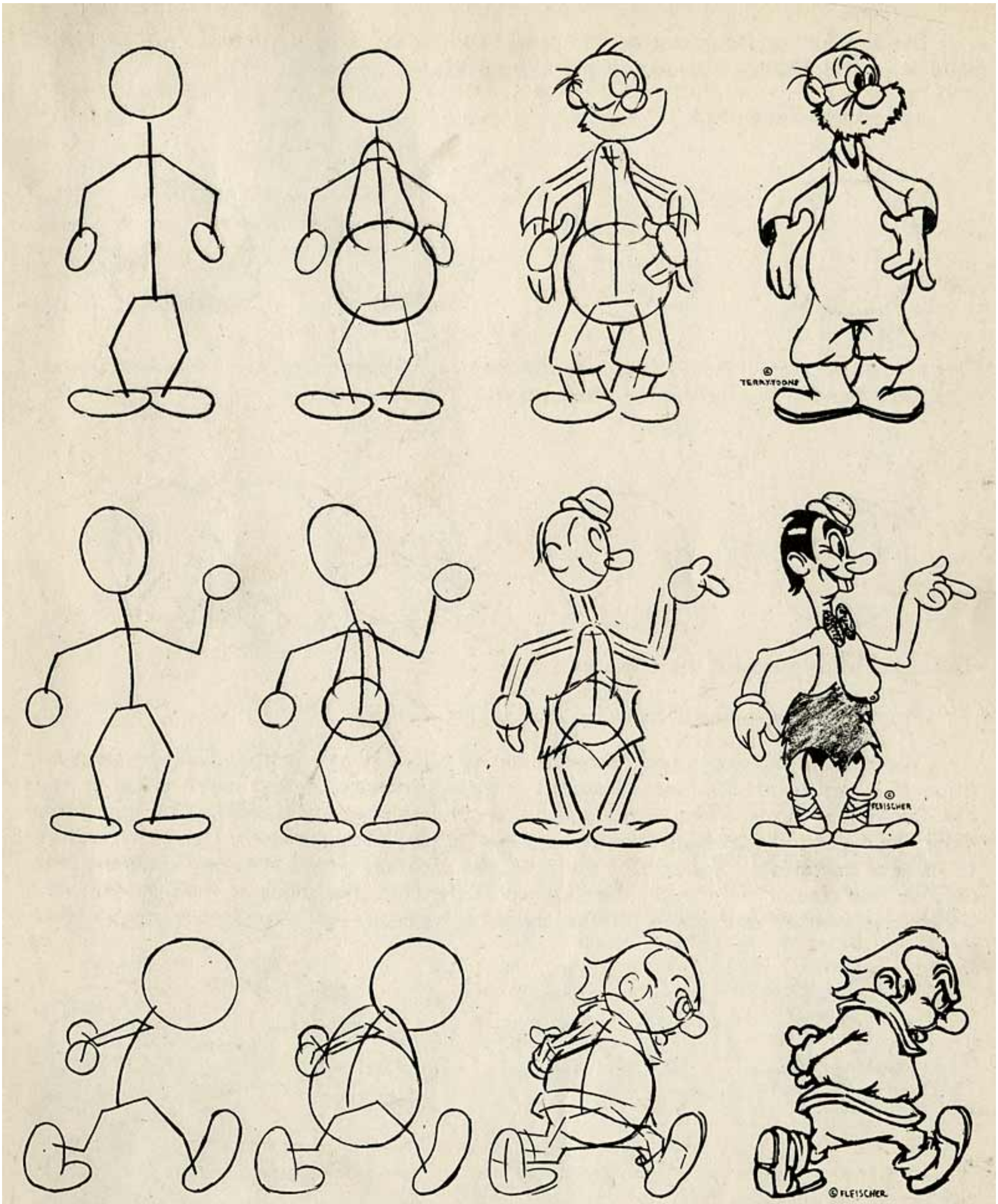


First rough in the masses—a circle for the lower body, the upper part of the body is often pear shaped—(on some figures, especially where the character has a large chest, an inverted pear, or electric light bulb, will do for both parts of the body). Sketch in the arms and legs, with circles suggesting the hands and ovals the feet. Now your drawing begins to look like a figure. At this point your sketch is ready for details. Draw carefully and do not rush. Speed will come later. Keep your lines sharp and clear, and think out every line you put on your drawing. Don't hesitate to make changes in your sketch as you go along. The first line you put on paper may not be the right one.

Keep your drawings simple and eliminate all superfluous details.

Practice drawing figures. Draw as many as you can in as many positions and remember your figure must always be doing something. Make it express the thought you are trying to get into your sketch.

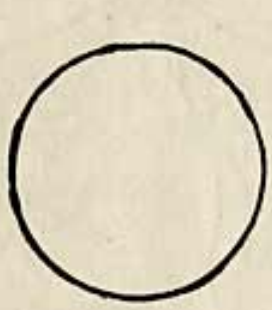
Observe people walking or running, or in any other action, and study the relative positions of the arms and legs as well as the balance of the figure.



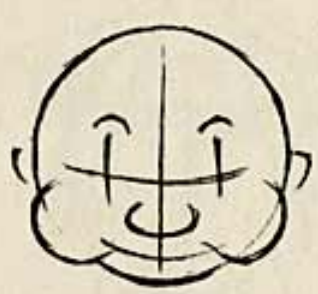
Study the drawings shown here. Those on the extreme right were made in the studios of several leading cartoon producers. The others are to show how our plan of procedure was followed.

The simplest and quickest way to draw heads is by using a circle, or oval, for the basis of your drawing—and adding the features as you go along.

Just follow these steps.



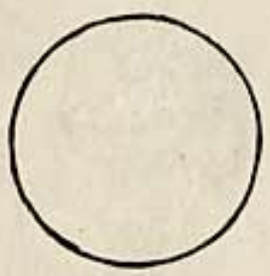
First, draw a circle free hand.

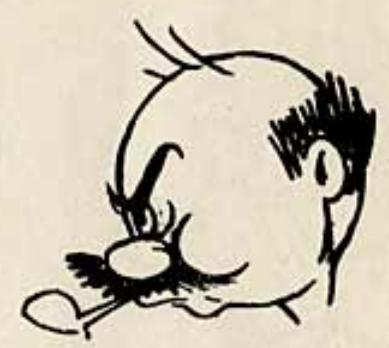


Add a few lines for the location of the features.

Sketch in the details.

Finish drawing and clean up.

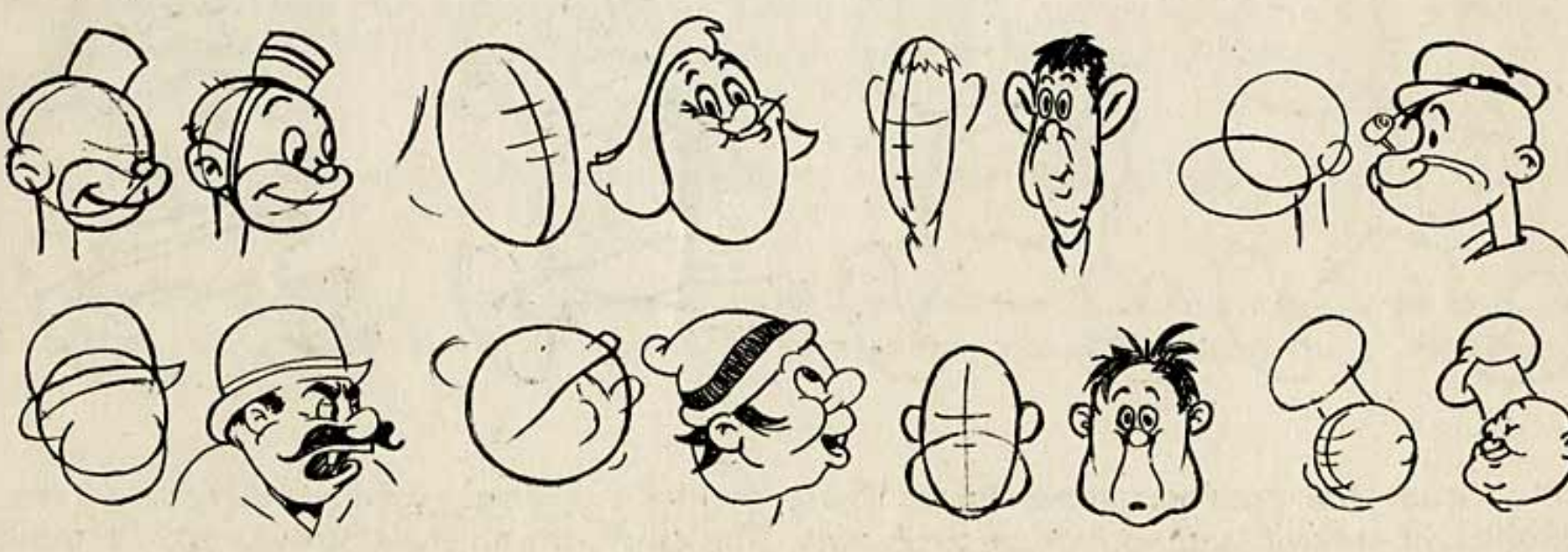




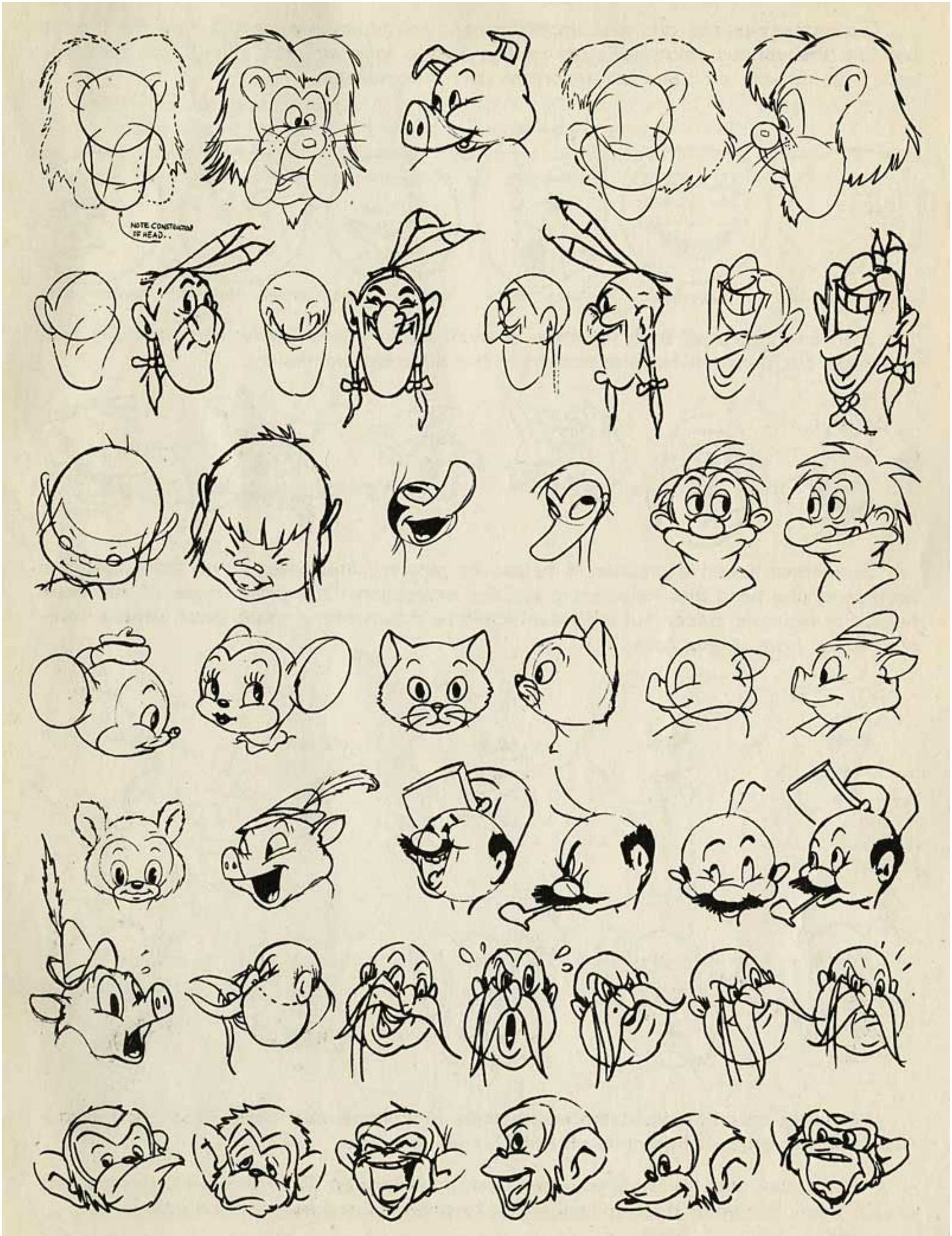
The same holds good for the side view.

Practice drawing heads following this simple method.

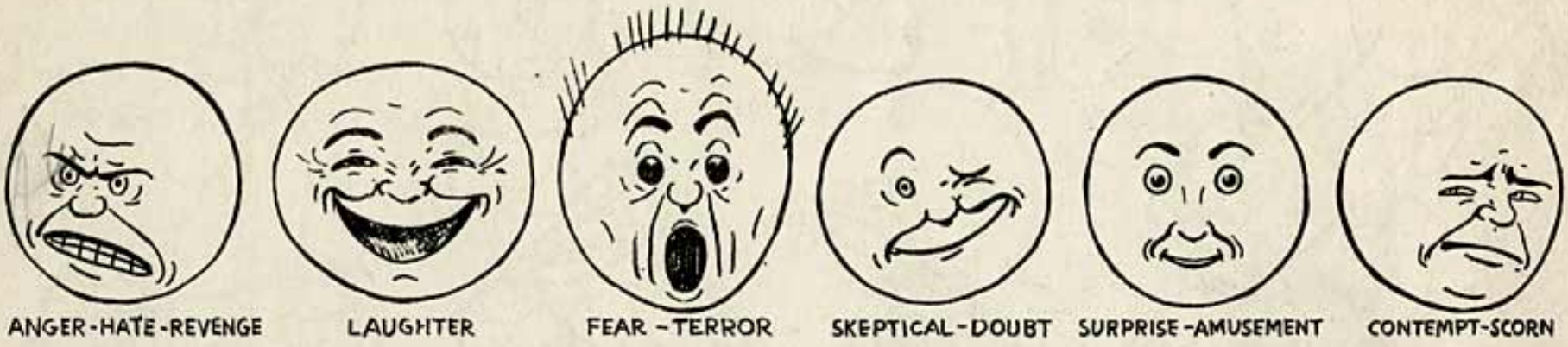
The trick of making a good sketch and one full of humor is in drawing an exaggeration of a real head. All funny drawings are exaggerations of that which exists in real life. Remember that a funny drawing is not a careless one. Avoid making all your faces alike. Bear in mind that each type of face has its own characteristics. Use every feature to its best advantage. The size of the nose, the location of the eyes and eyebrows, the position and size of the mouth, the location of the chin, the shape of the ears, the way the hair is combed and above all the shape of the head,—all enter into making a good drawing.



Study the heads on these two pages. They are all based on circles or ovals.

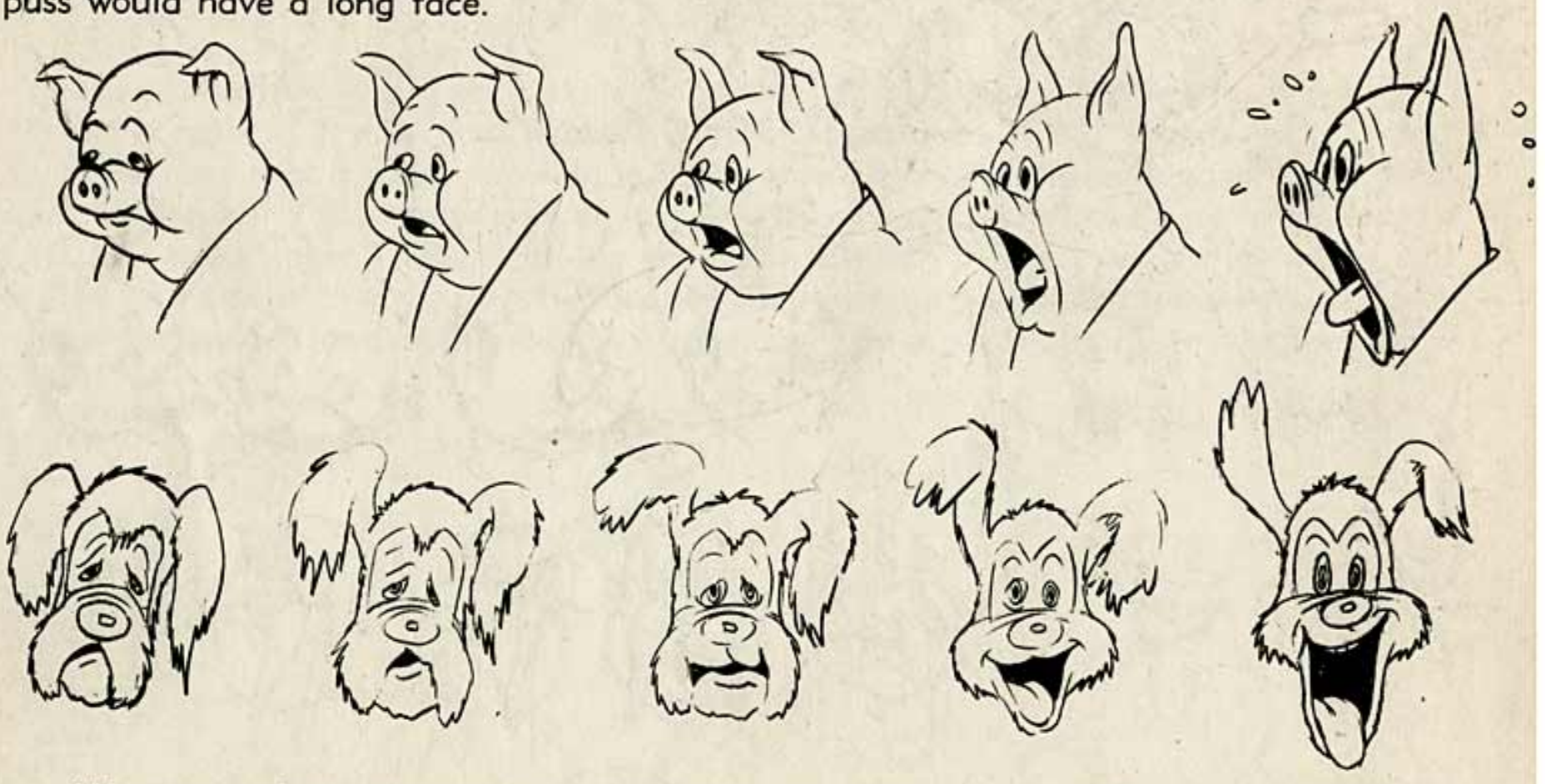

NOTE CONSTRUCTION OF HEAD..

Facial expressions are very important, and you must know how to draw the face to indicate the various emotions, such as joy, fright, laughter, etc. All of the features, eyes, nose, mouth, etc., play an important part in expression.



Here are indicated, by a few lines, some of the emotions. Study them carefully, and notice the positions the features assume in the different expressions.

Sometimes facial expression is helped by gestures and poses of the body, and the position of the head also helps bring out the expression. Often the shape of the head helps. For example, a cheerful individual could be drawn with a round head, while a sour-puss would have a long face.

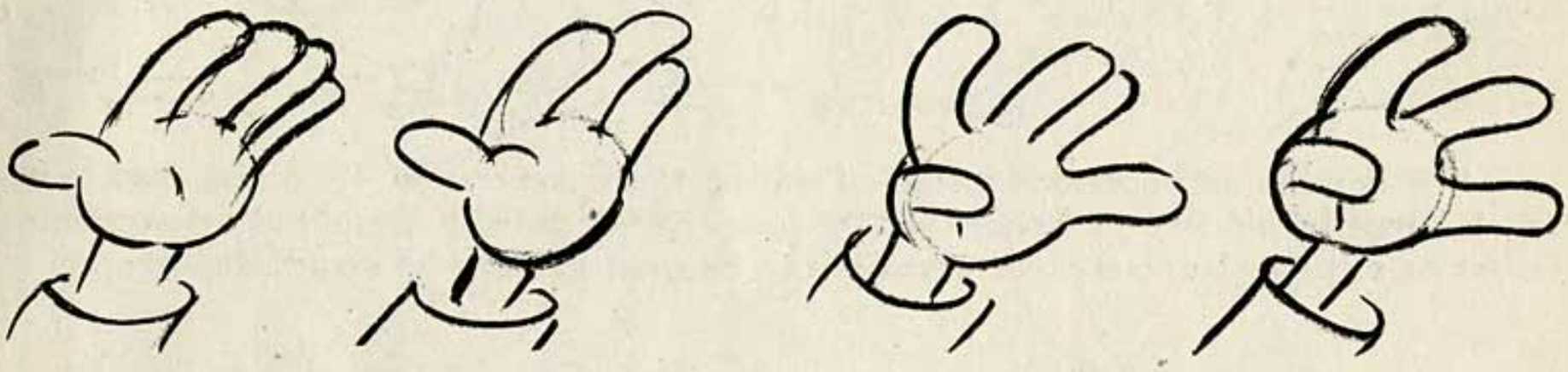


We must adapt these human expressions to animals and birds. In animated cartoons the humanized characters all have human emotions.

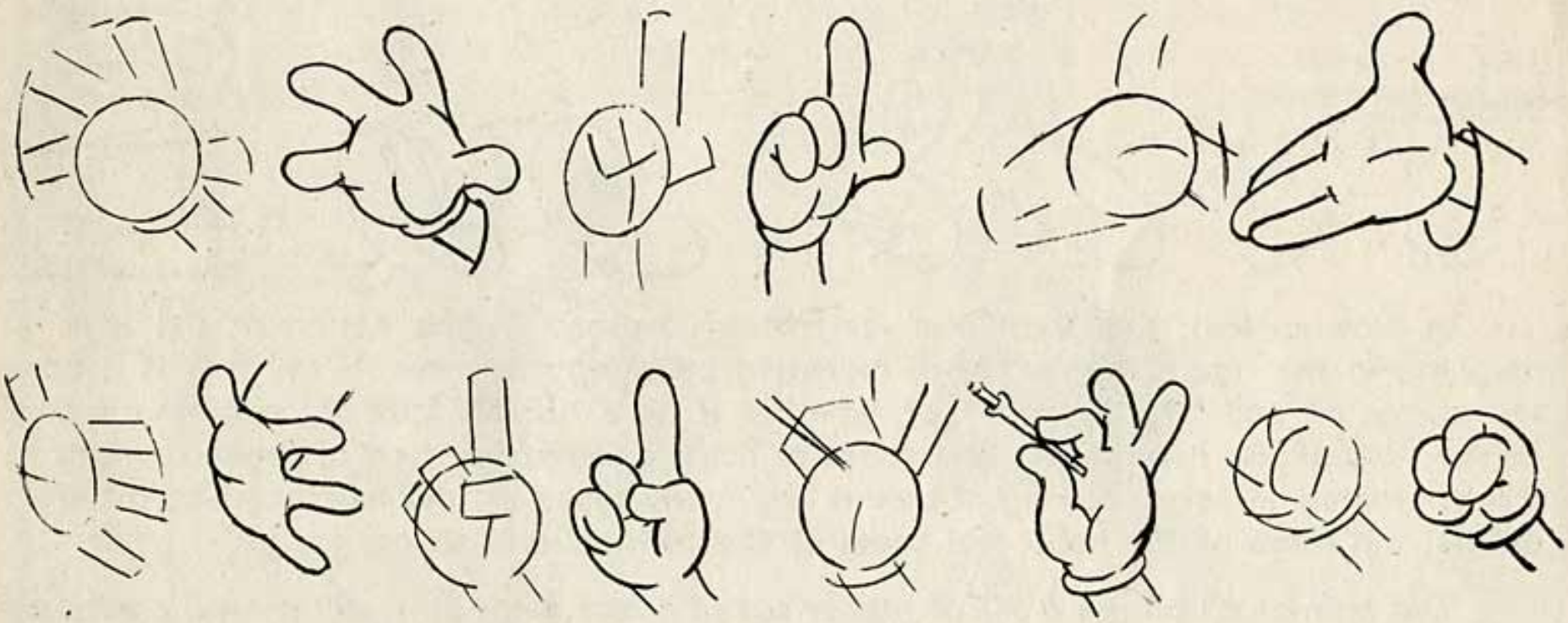
It is a good idea to study your own face in the mirror. Try various expressions and sketch them. Put down the principal lines of expression and keep them simple.

In drawing hands you must remember that the hand is at the end of the arm and the action of the hand must be consistant with the movement of the arm.

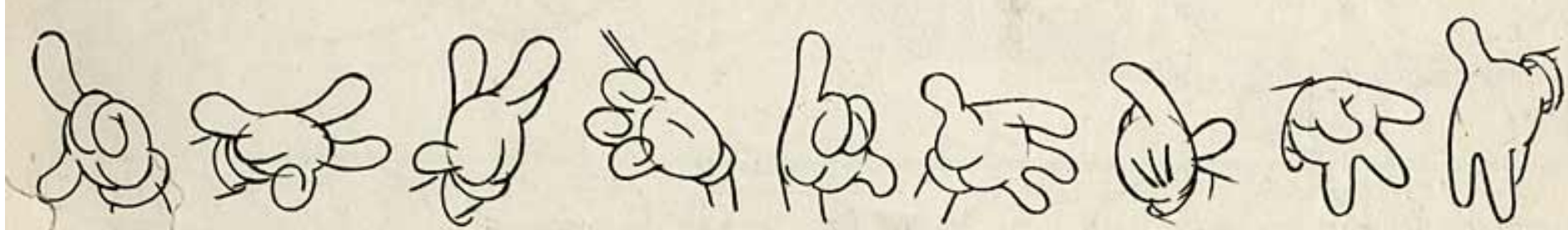
Most cartoon hands have but three fingers and a thumb and very often are gloved. Three fingers are easier to draw than four and less confusing to the eyes. Also it is easier to draw hands with expression when they have but three fingers. Gloves are used because they give smoother animation by eliminating details, such as finger-nails, knuckles, wrinkles, etc.



Compare these four fingered hands with those of three fingers and note the difference.



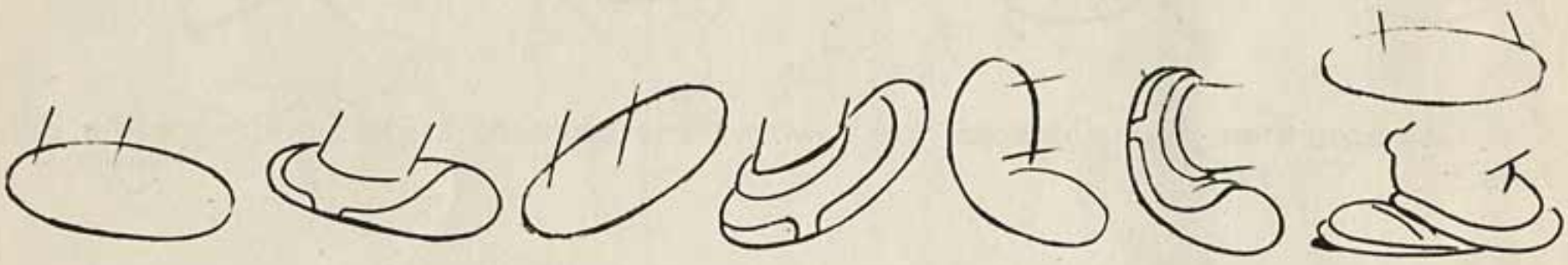
The basic construction of the hand is a circle. Added to this is the thumb and three fingers.



Study the hands shown here and note the simplicity of these drawings. Draw a series of hands in different actions following this simple method of construction.

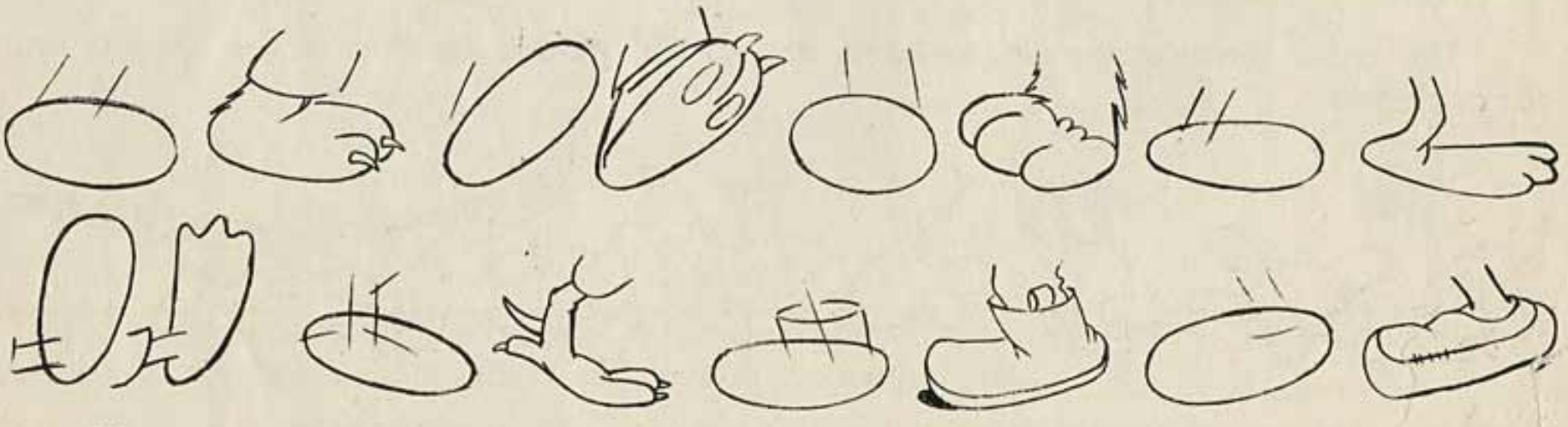
When animals are humanized the front paws look more like hands. When a bird is humanized very often the end of the wings become hands.

The hand is an important means of adding to the expression. It can be used to express silence by placing the finger over the lips. The hands held up will help in expressing horror or surprise. Various other gestures can be used to assist in expressing emotion.

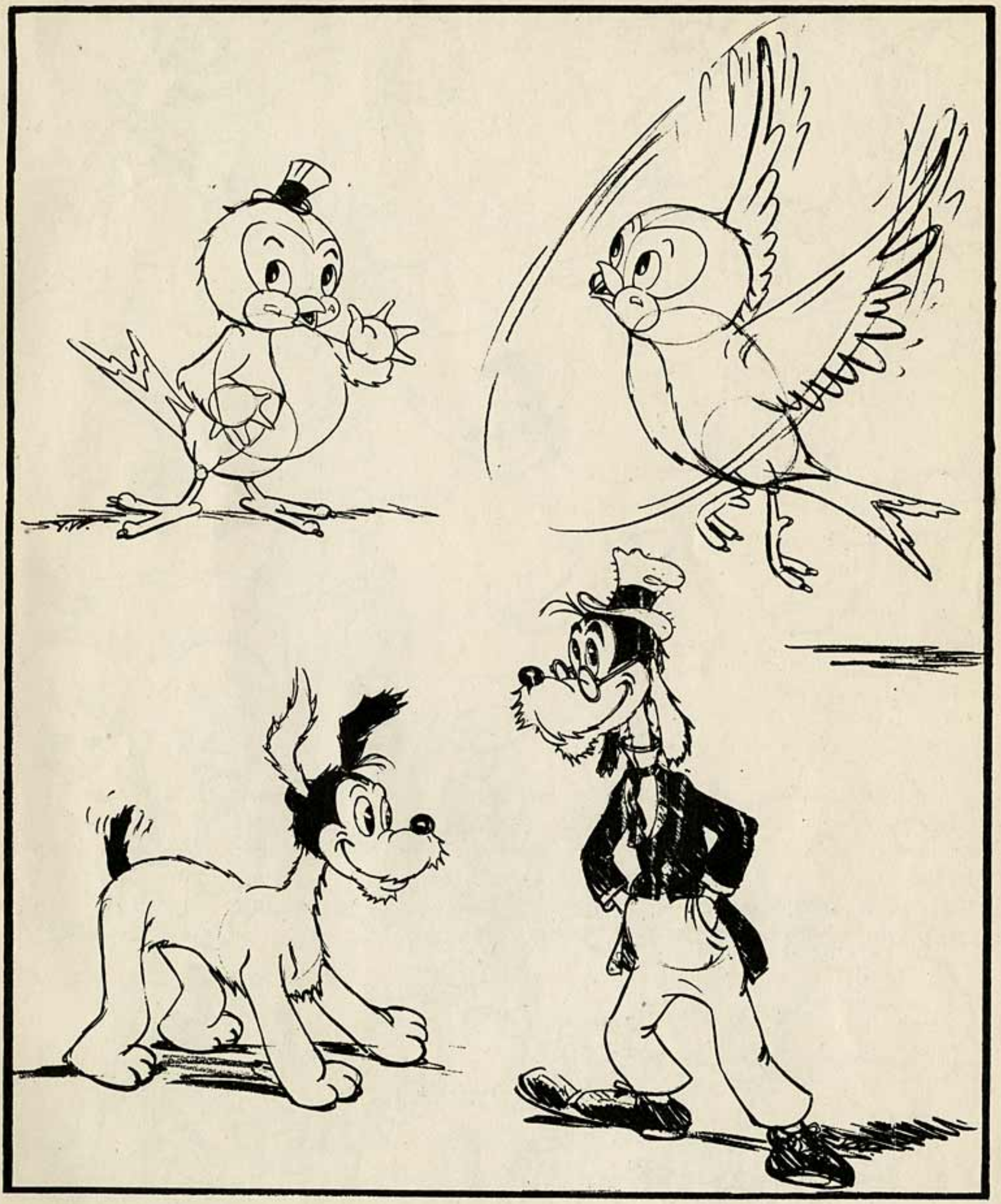


In drawing feet, their action is very often governed by the action of the legs. In roughing in the figure the feet were indicated by elongated ovals. With this as a basis we now go on and build up the foot, whether it be a human foot or an animal's paw. In the case of the human we draw shoes or boots or whatever type of footwear worn by the character we are drawing. Observe the many types of footwear worn by different people, the shoes of the hobo, the boots of the farmer, and so on.

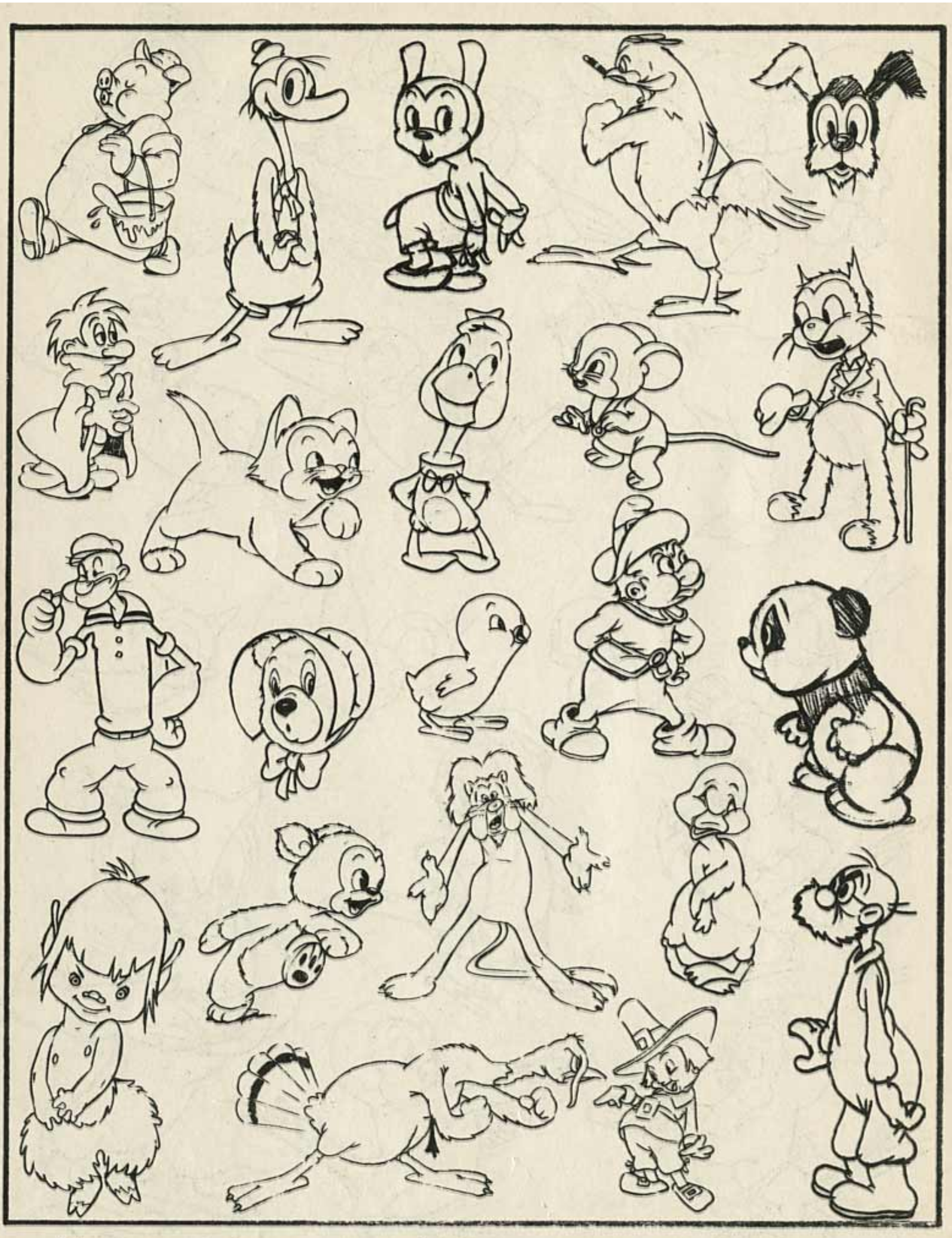
The animator can get a lot of humor out of a foot, both in its action and character.



Here are shown a number of feet of cartoon characters. Study them and draw a variety of feet in a variety of position.



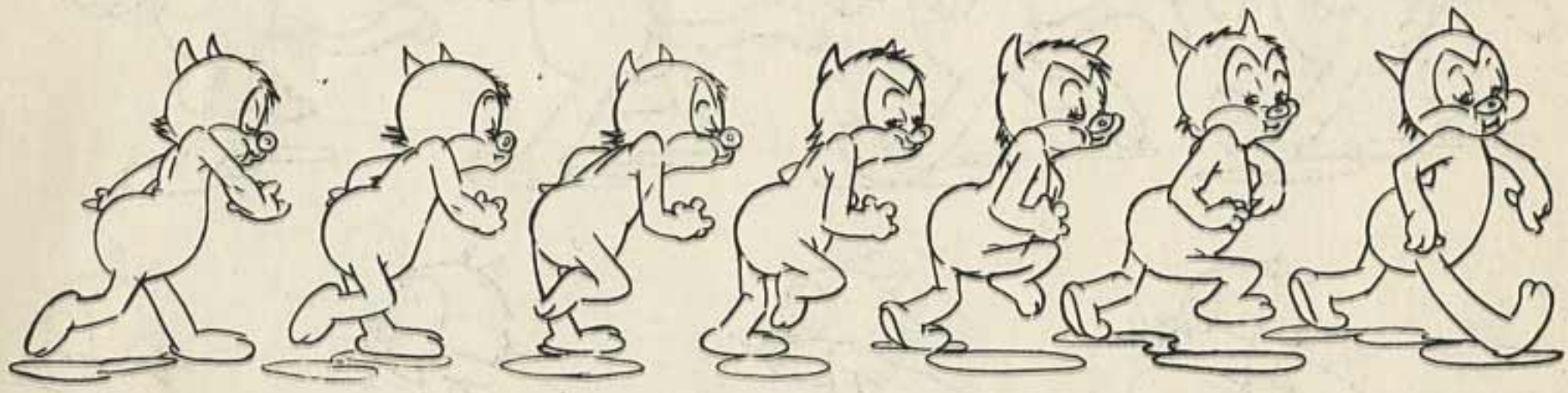
The importance of animals and birds in animated cartoons cannot be stressed too strongly. They appear in both animal and humanized form. Here are several drawings by Director Volney White of Terry-Toons, showing how he handles two of their characters.



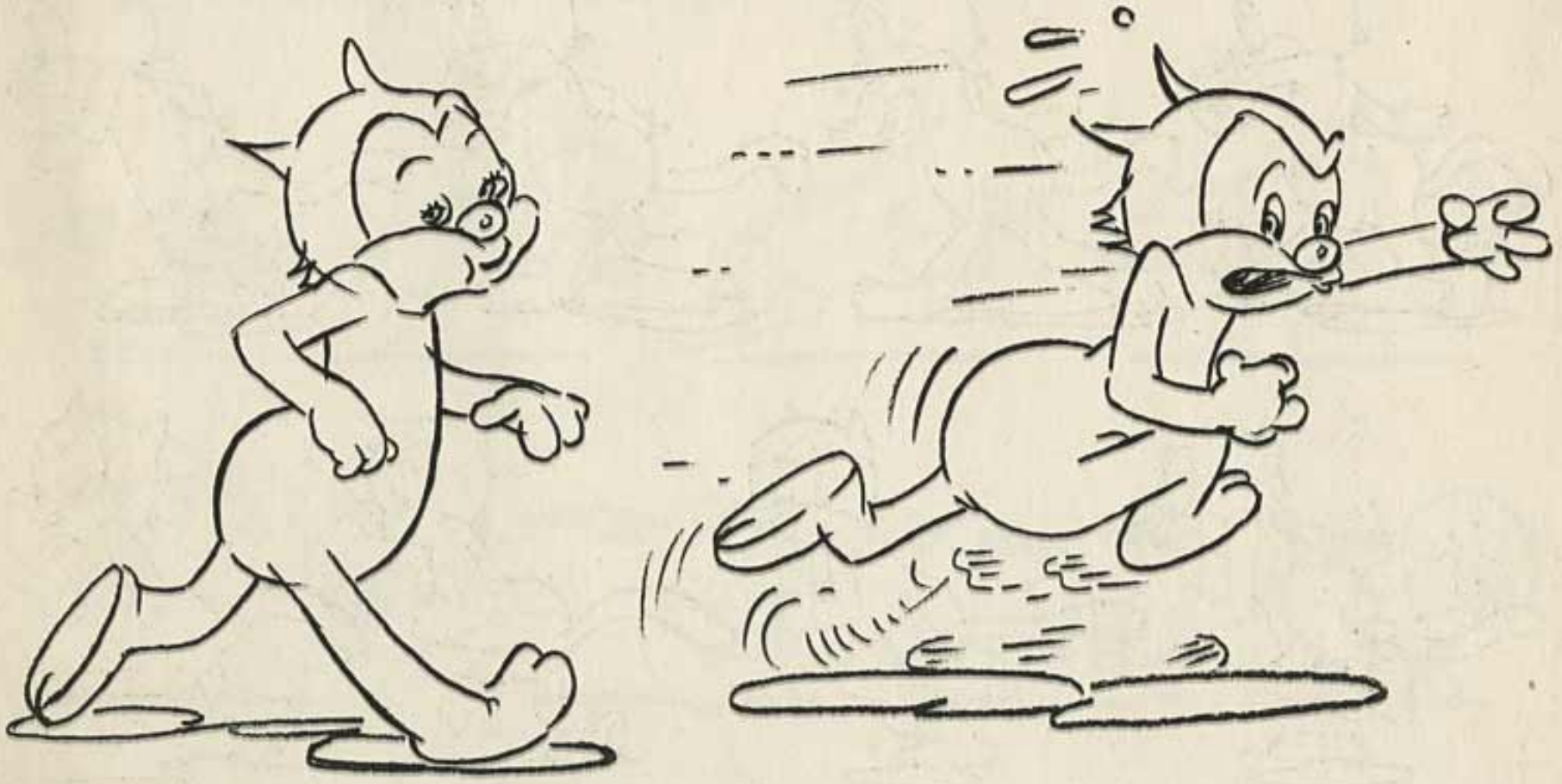
Many types of characters are used. Here is a selection from the cartoons of various studios. Study them carefully, they are all drawn following our plan of procedure.

After character construction we now go on to animation, for animation is the basis of cartoon making.

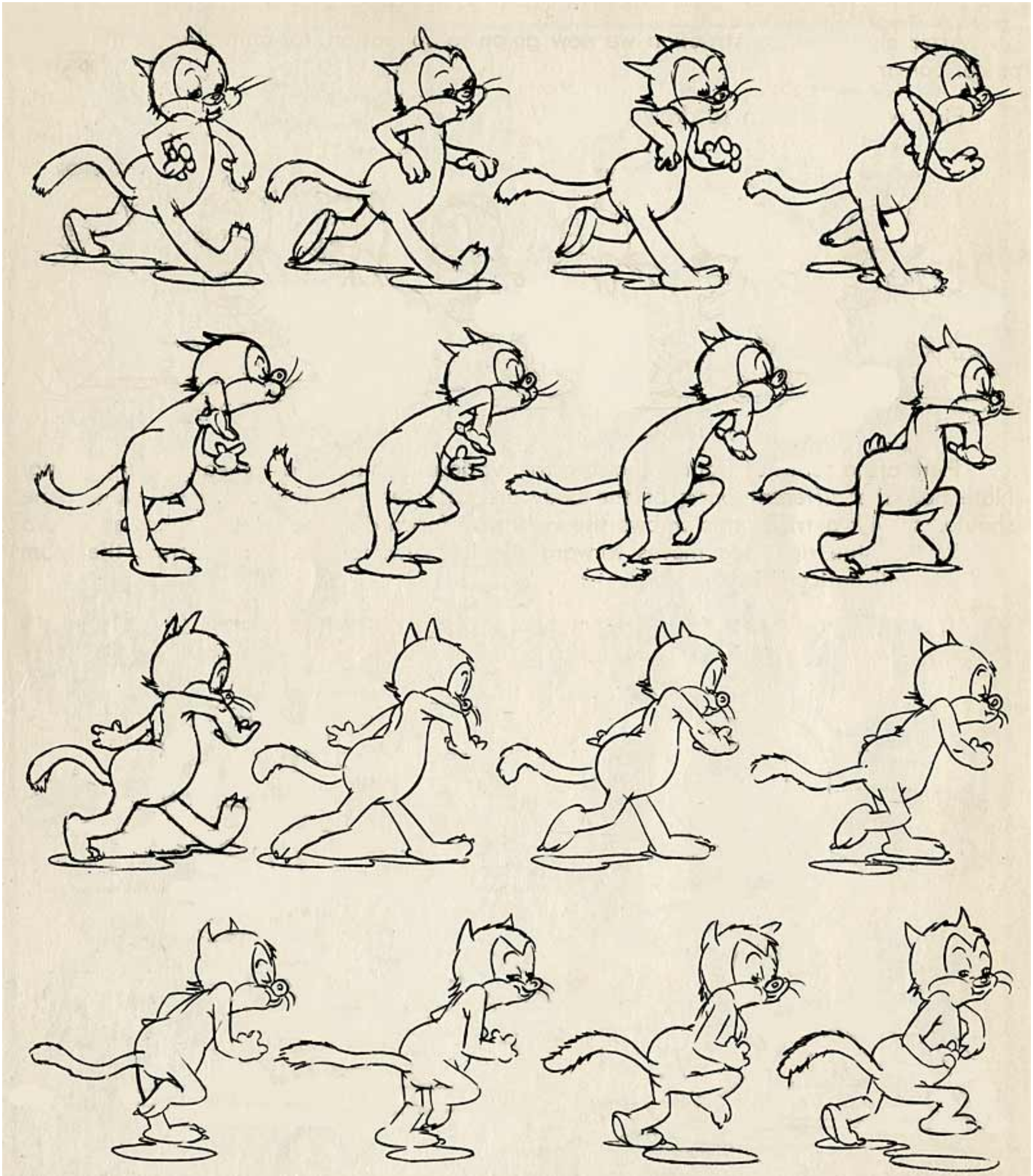
First we must learn to draw a walk.



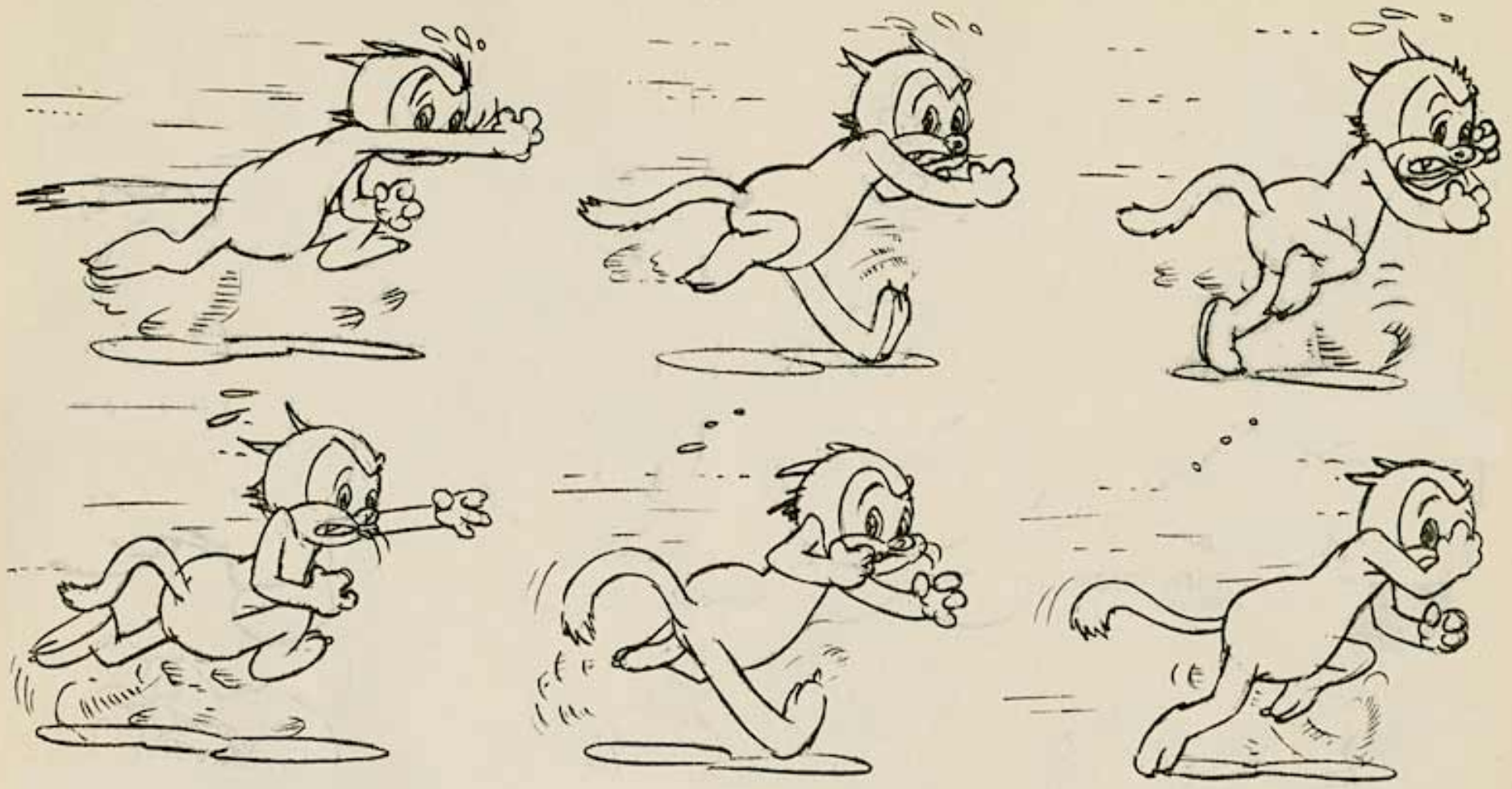
Here are a series of figures showing the various positions assumed when walking. Note how the different parts of the body are affected. As the character walks, the shoulders twist a trifle, this throws the right arm forward as the left leg takes a forward position. As the right leg moves forward the left arm follows. Walk across the room and you will notice this.



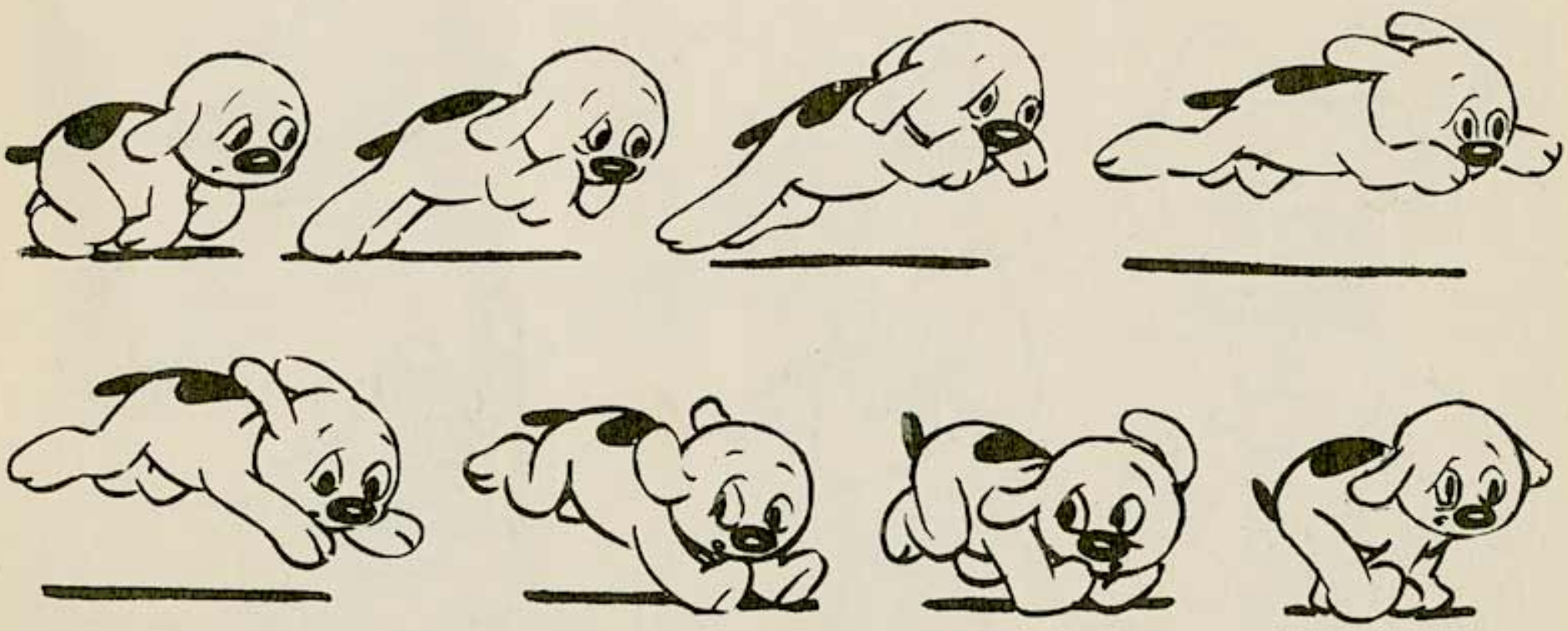
In comparing a walk with a run these differences must be noted. In walking the body is always in balance, one foot is always on the ground and sometimes both, and the arms swing easily at the side of the body. While in running the action is more violent and the figure is usually off balance. The movement is wider and the steps are longer. There is more action in the arms—they help propel the body forward. The body and the head lean forward and at certain points both feet are off the ground at the same time.



Where action is continuous against a "pan" background, as in characters walking or running, or birds in flight, where the figure goes through the same action over and over again, it is not necessary to draw the repeat action. One cycle of the action is drawn. The cycle of a walk may take 16 drawings, this is used several times over to make up the length of the walk required. The last drawing in the cycle is followed by the first one to repeat the cycle of action.



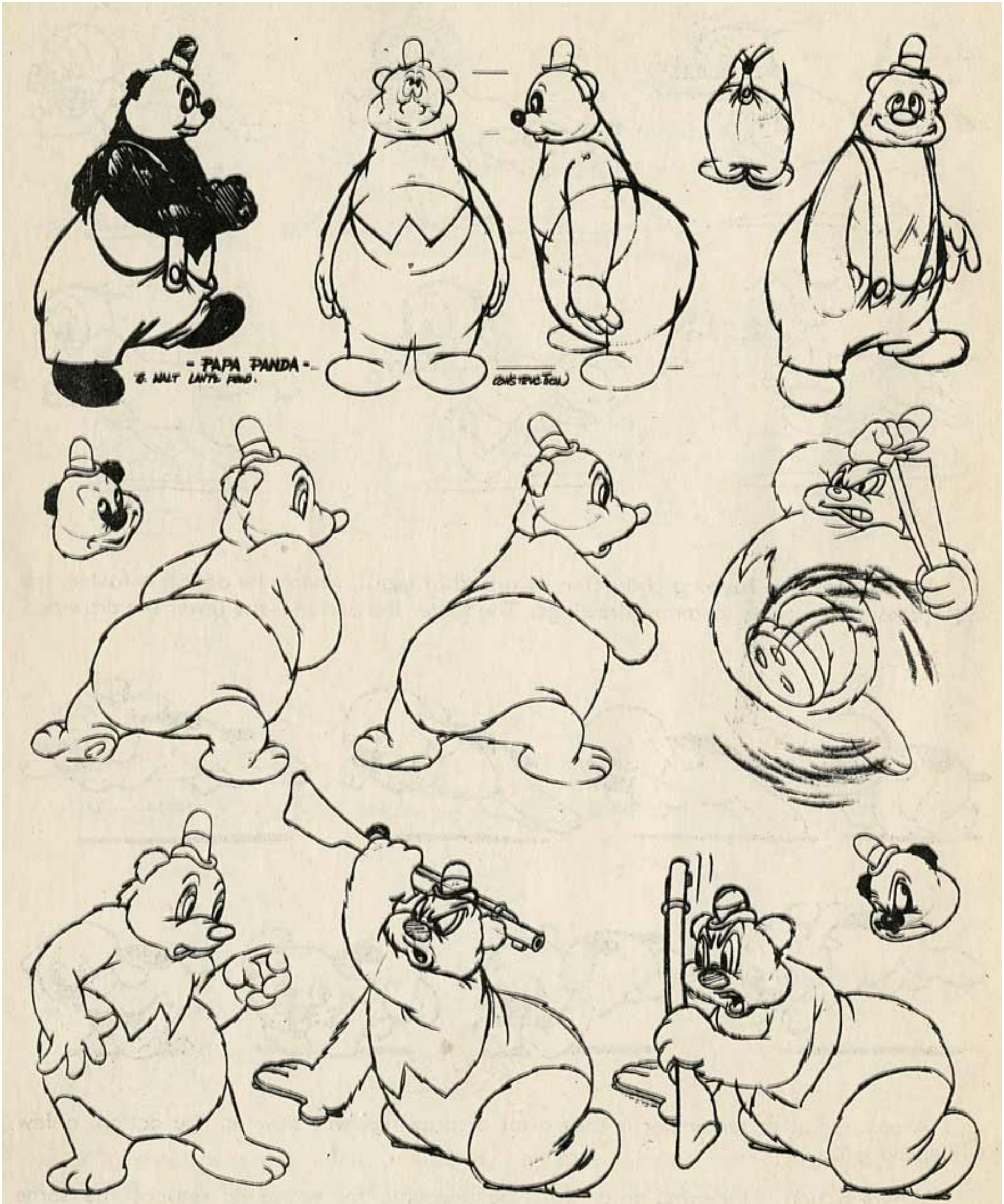
In the case of a running character, or a bird in flight, where the action is faster, the cycle does not require so many drawings. The faster the action—the fewer the drawings.



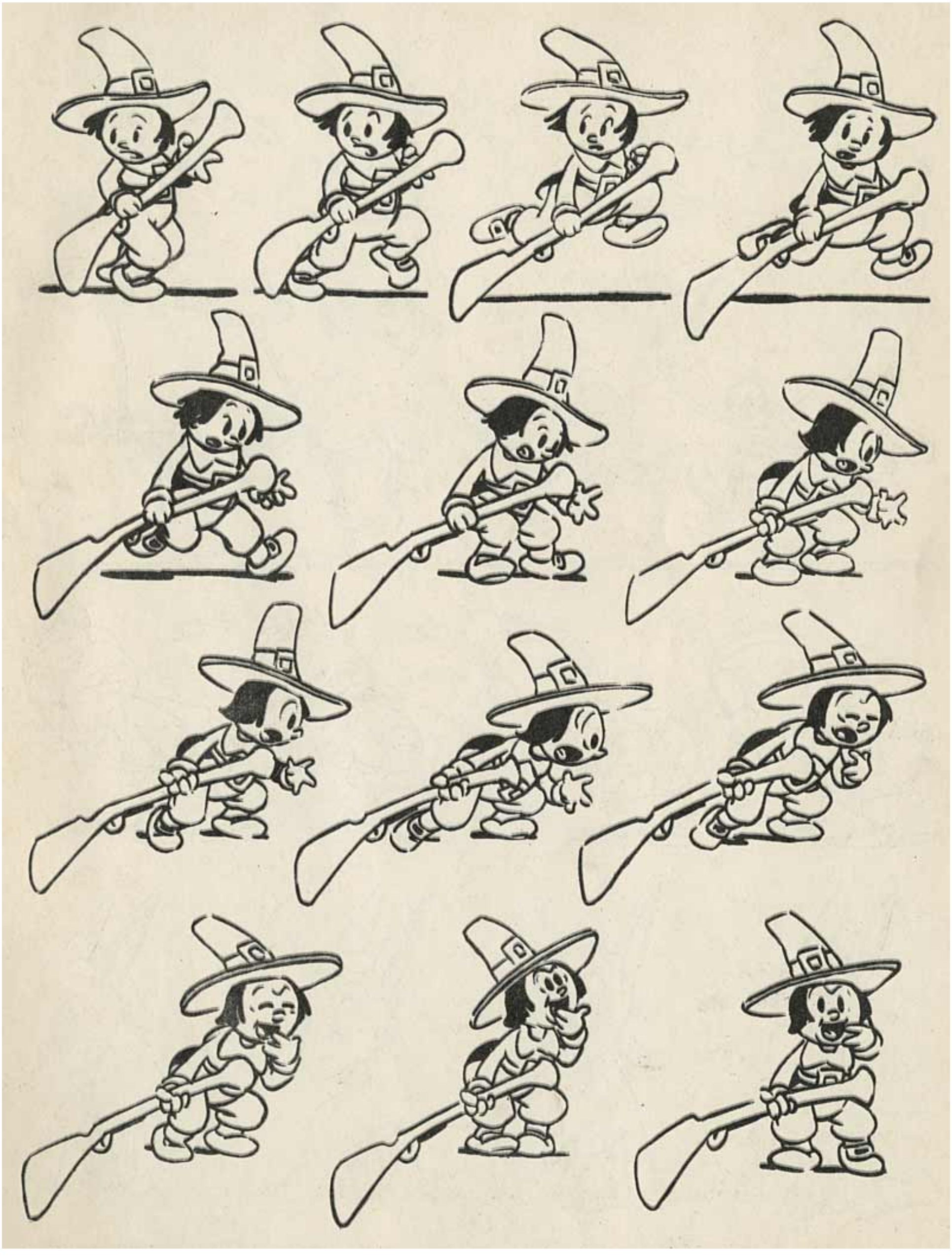
A good point to remember is that a lot of drawings will slow up the action, a few will speed it up.

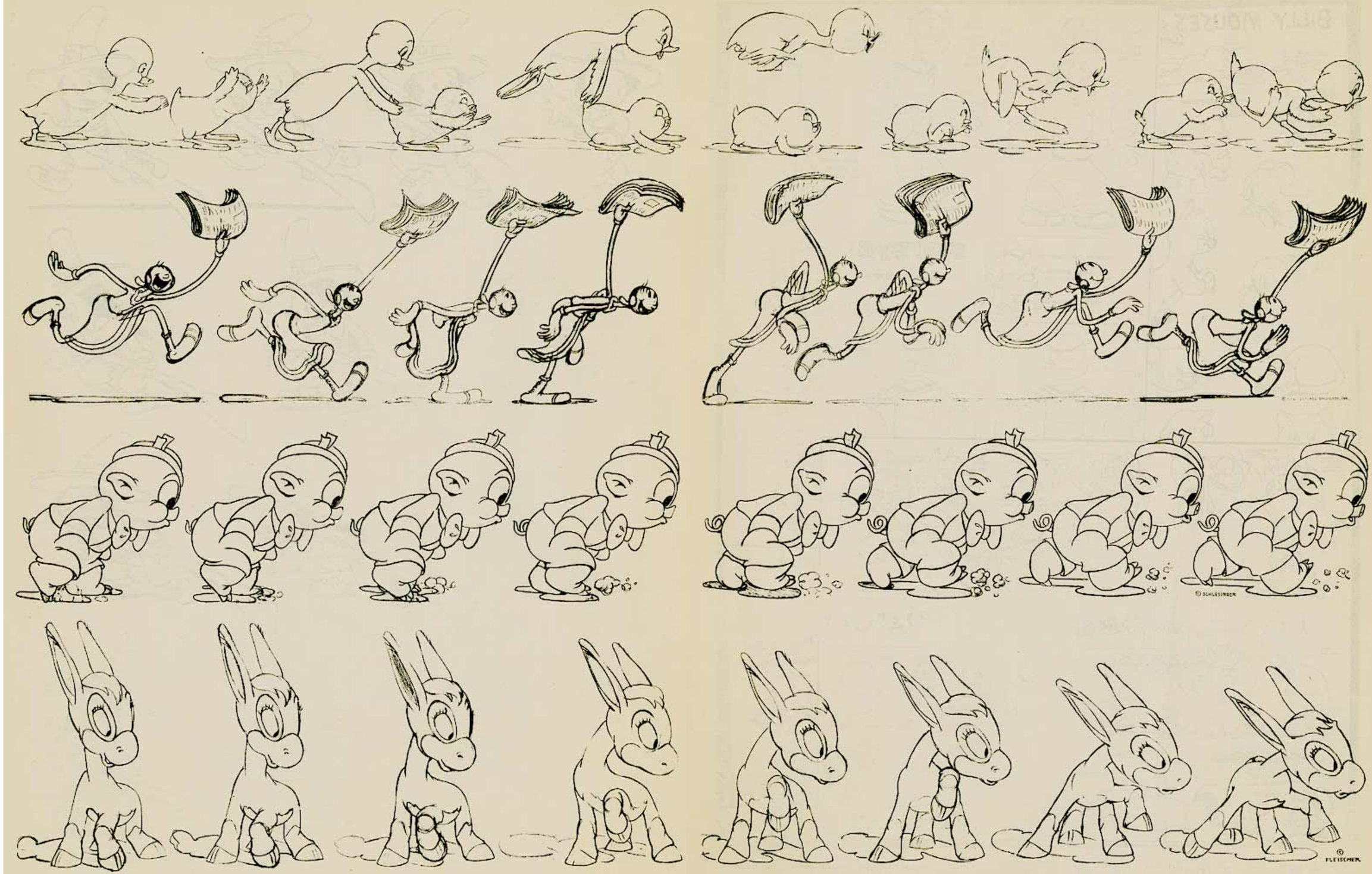
Where action is repeated on a "still" background, for economic reasons the same drawings are sometimes re-used. This is not a very good practice because the repeat action bcomes monotonous on the screen.

These drawings were made by Director Conrad Rasinski of Terry-Toons.

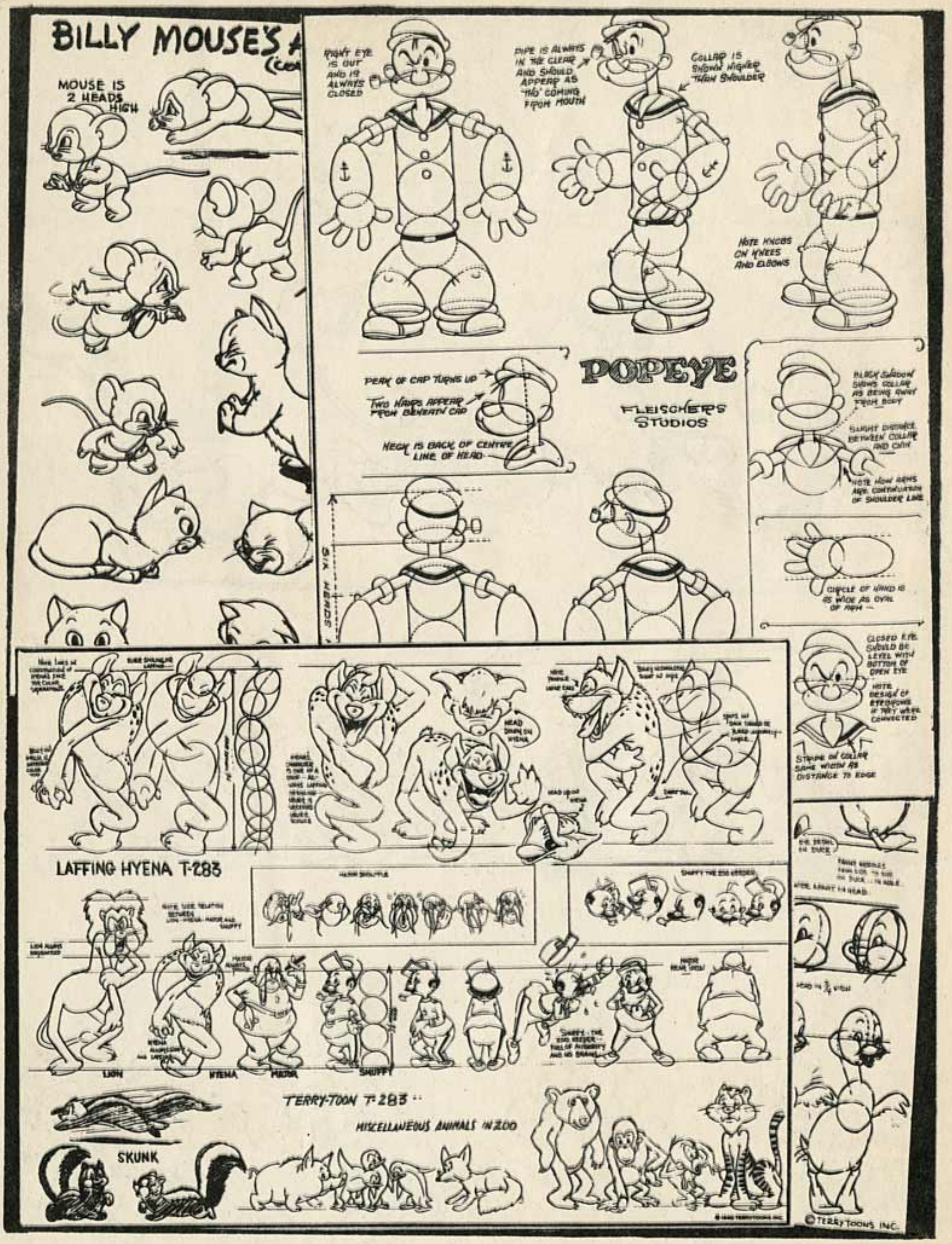


Study the construction of the figures on these two pages. Note the development of the action.

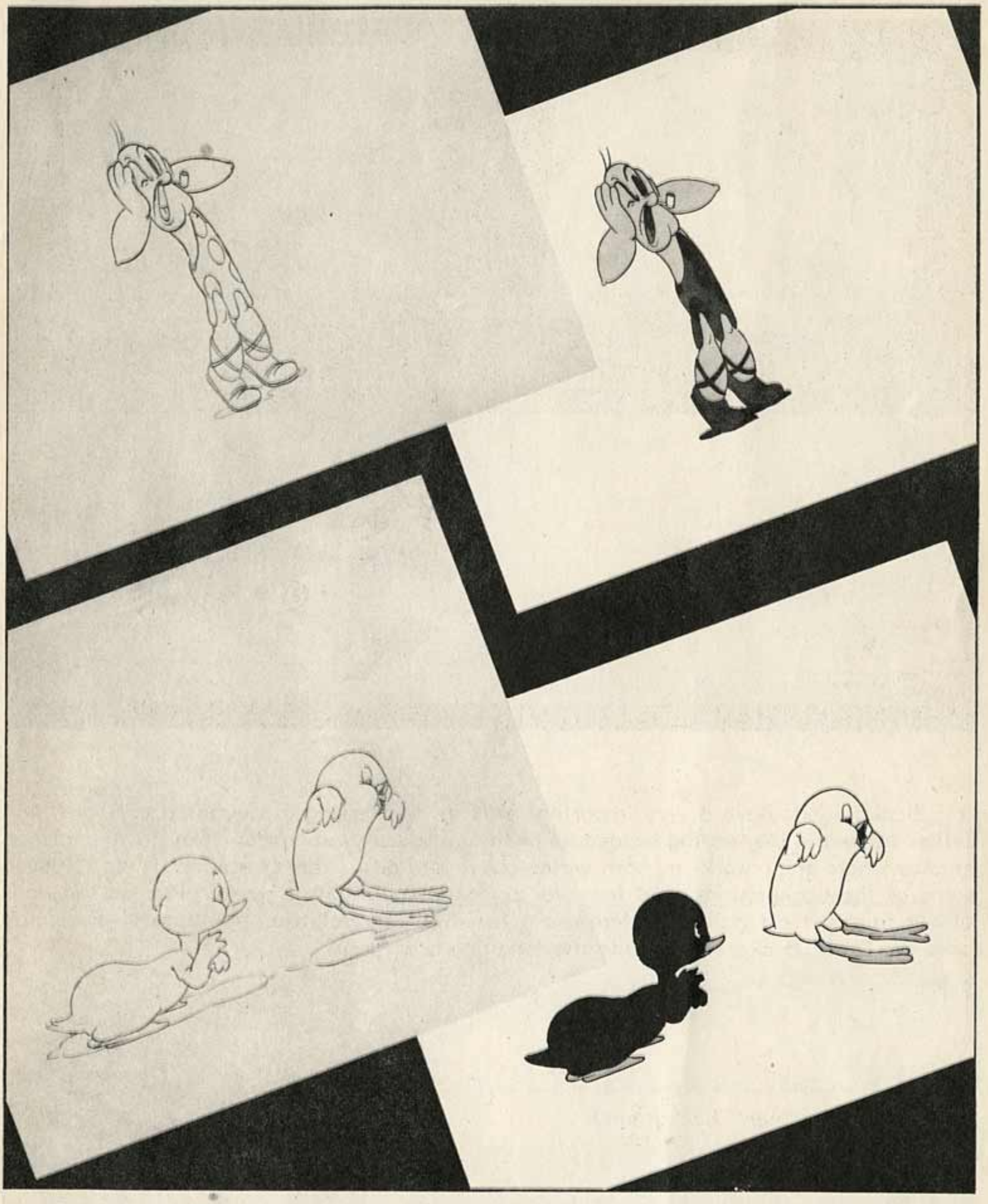




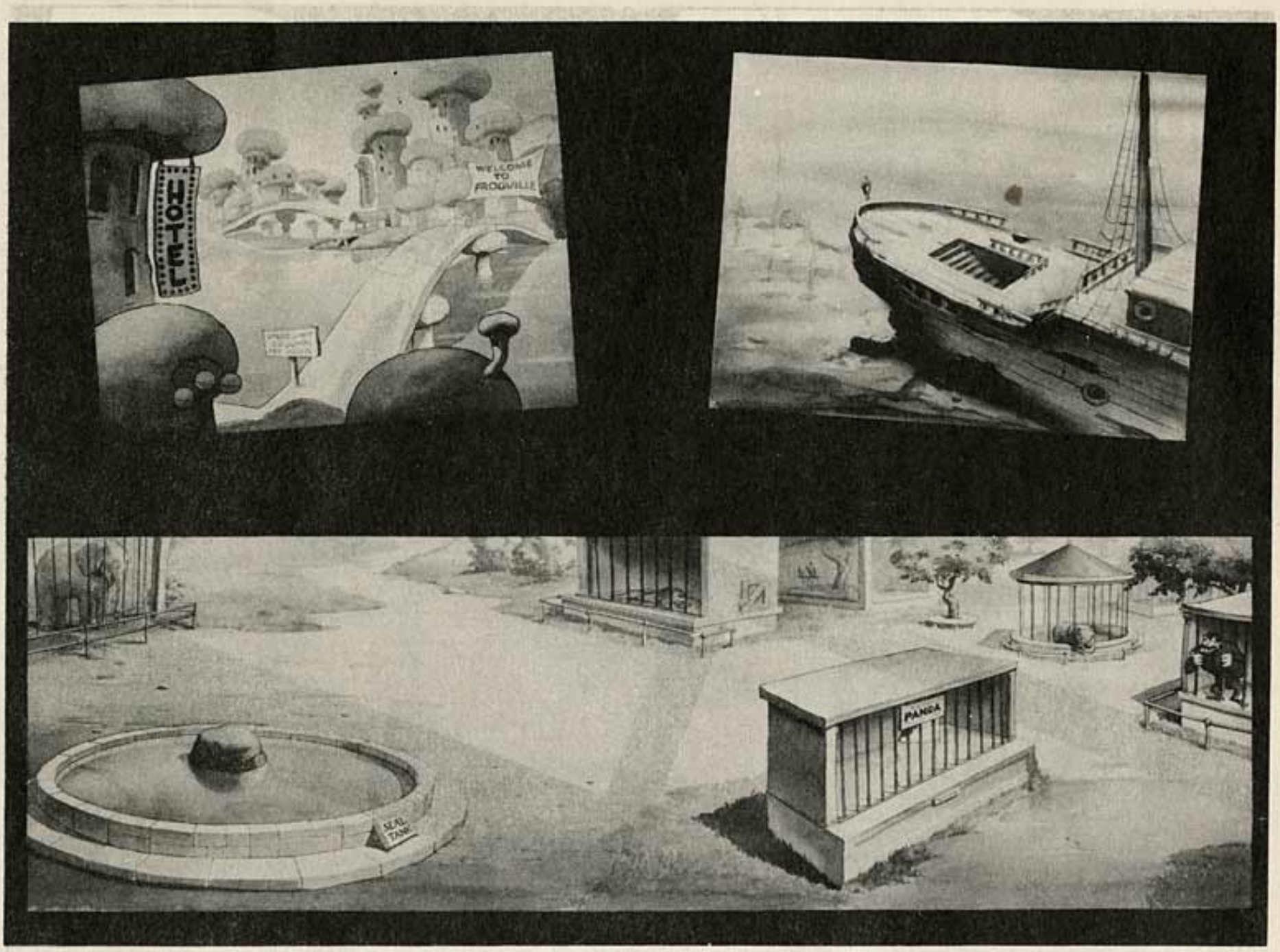
Here are several sequences of progressive action. Study the movements of the various parts of the figure as the character animates.



A selection of Model Sheets showing the characters and their comparative sizes. Also all other information the animators must have while drawing these characters.



Study the difference between these pencil drawings and finished "cells." Note the simplicity of the pencil drawings, the animator has eliminated all superfluous details and unnecessary lines, yet the character is all there. On the "cells" you can see how outlining and opaquing have given solidity to the figures—this will make them stand out when placed over the background for photographing.



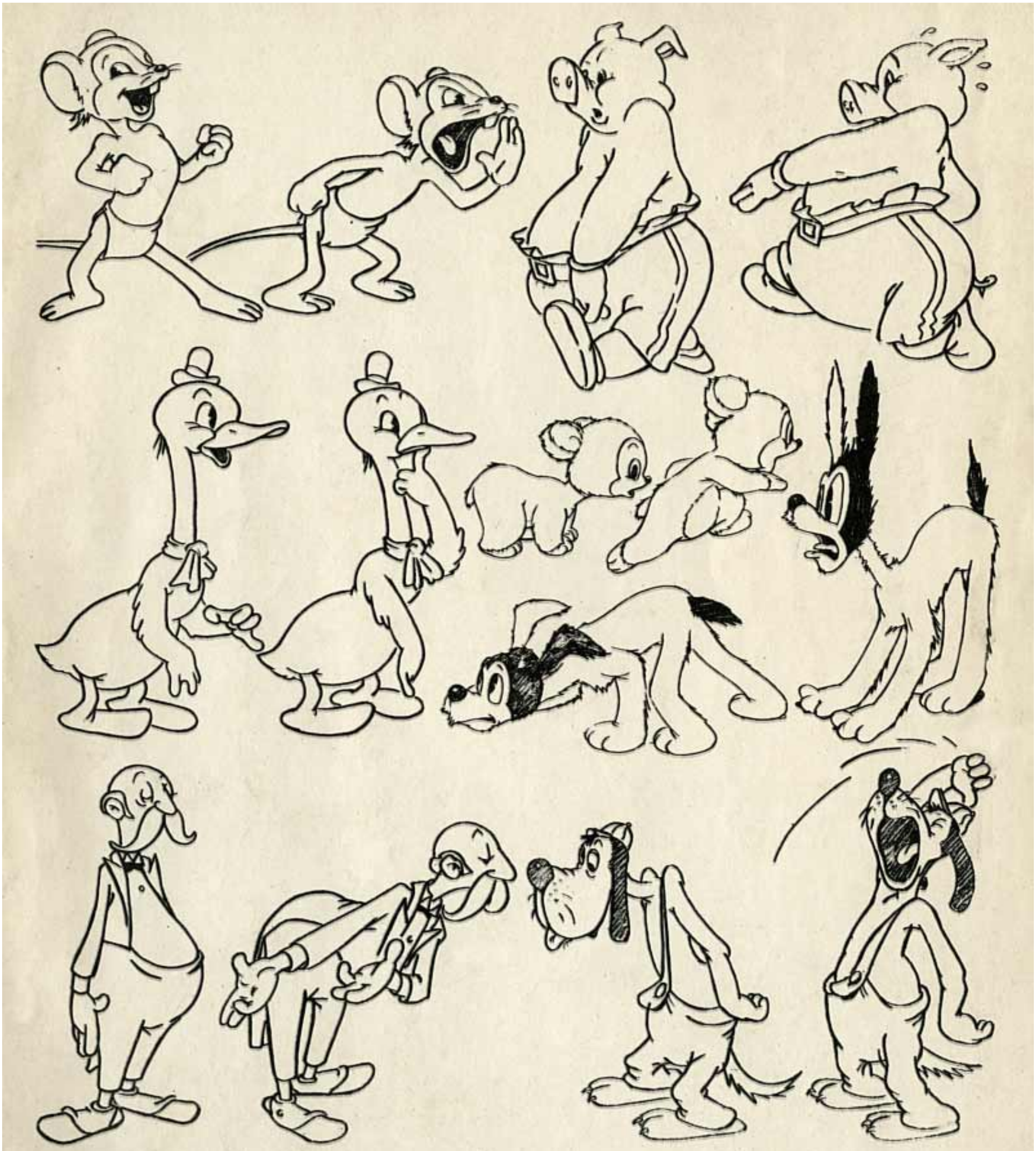
Backgrounds have a very important part in the making of animated cartoons, and artists trained in the leading academies of the world are finding their way to the cartoon studios where their work, in both water colors and oils, is being used every day. Indeed some of the backgrounds used for color cartoons would not be out of place on the walls of our foremost art galleries. Here are a few from several recent pictures — the small ones are "still" backgrounds while the long one is a "pan."

Another "pan" background.

Until the introduction of the "pan" (panorama) background a figure moving rapidly across the screen appeared to move so quickly that it was impossible to follow it with the eye. Yet today we see cartoon characters racing endlessly across the screen, and we are able to see all the details of the movement. The figure is moving, but it never passes out of sight. Its limbs go through the movements that would make it move, but the figure does not change its position on the screen. Each phase of the animation is done in the usual way, but the action overlaps on itself. You get the illusion of movement by the fact that the "pan" is moving back of the figure. When the drawings are ready to be photographed they are in turn placed before the camera over a long "pan" background. This background is much longer than the actual camera view. After a frame has been photographed, the background is moved a stage in the direction opposite to that in which the figure appears to move. Marks at the top of the "pan" indicate how much it is to be moved with each exposure.

A series of drawings may show a character walking towards a tree. What really happens is that the tree, on the background, approaches the character. When animating the moving leg is shown in its progressive stages, while the other leg moves back with the movement of the "pan." If the "pan" moves back ¼ inch, the leg moves back the same distance on each exposure. For example, in the cycle of 16 drawings it will take one foot of film for the left and right step, while the "pan" moves 16 times ¼ inch or 4 inches, bringing the tree closer and closer to the character.

A sequence of progressive action drawings and a still from the recent M. G. M. cartoon film "The Mad Maestro."



These are key drawings—the extremes or high points of an action. It would be very good practice for you to continue the action of each of these characters. Make the "breakdown" drawing, which is midway between the two extremes, and then fill in the "inbetween" drawings needed to finish the sequence of action and to tie together the extremes. Make each drawing on a separate sheet of paper.