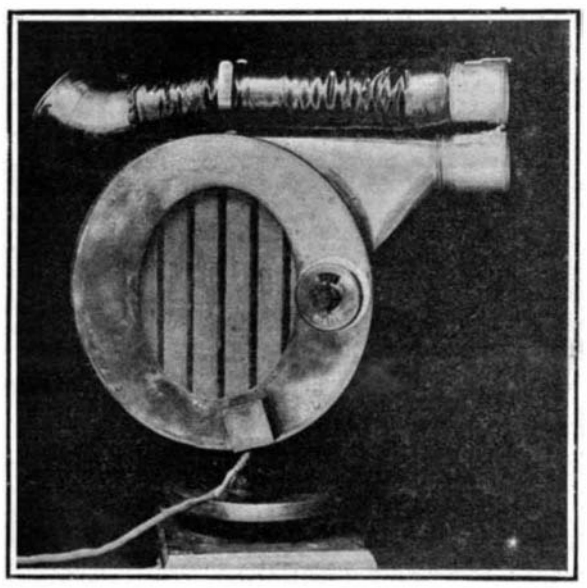
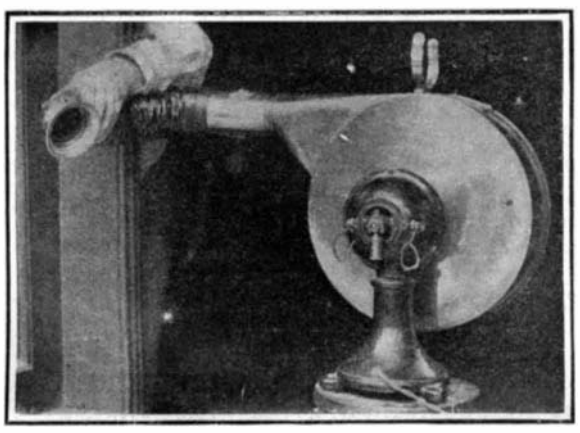
excellent cleaning powder for removing spots from fabrics. After being thoroughly soaked, the meerschaum can be cut like cheese, and it is then roughly shaped with a knife to the form of a pipe. When dry the bowl and stem shanks are drilled, and then, if the pipe is of a plain pattern, it is turned on a lathe to the desired form. If a square-stem shank is desired, it is shaped with a file. The shank is now shouldered and threaded to receive the amber stem-piece. These stems are cut from plates of solid amber, most of which is imported from Germany.



Rear View of the Hair-Drying Machine.



The Electric Hair-Drying Machine.

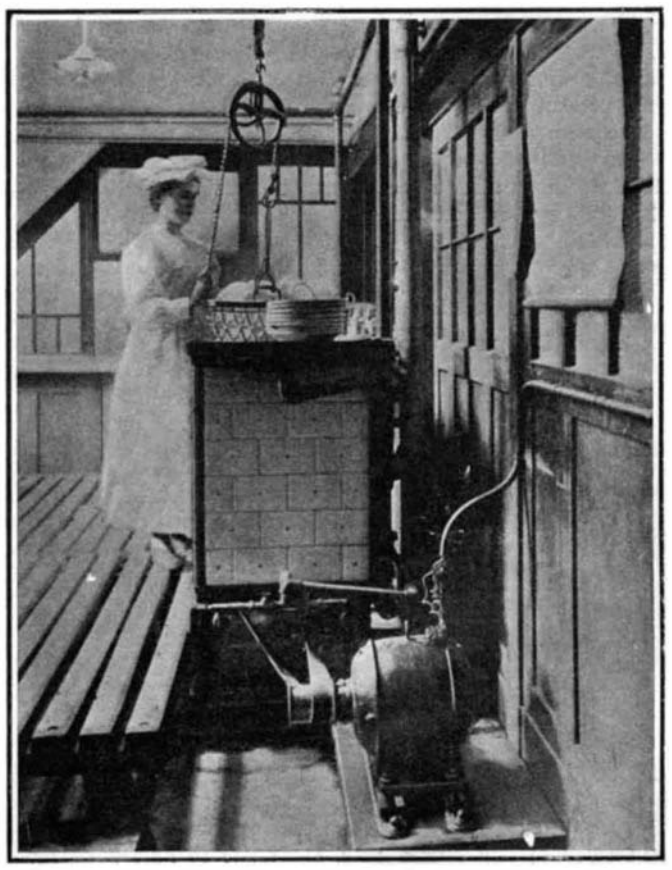
Amber occurs in many parts of Europe and America, but in largest quantity along the coast of Germany. This fossil gum is found in lumps or grains, and is melted at 550 deg. F. and refined. There are two qualities of amber, the transparent and the opaque or cloudy, the latter being much tougher and, therefore, more serviceable. The pipe stems after being tooled out are bent to the required shape. They are first immersed in oil and heated until they lose much of their brittleness. Then they are held over an alcohol flame and bent as desired. The threaded ends of the stem are protected while bending by an arbor screwed therein. The pipes are now carefully smoothed with pieces of American rush, or shave grass. The stem of the grass, owing to the natural deposit of silica, has a fine roughness which perfectly adapts it for this service. After the pipes have been properly finished with the rush, they are immersed in melted wax for a short time, depending on the density of the meerschaum, and then they are given a high polish with chalk precipitate.

Meerschaum is an excellent material for artistic carving, and some carved tobacco pipes are perfect gems of art. One of our illustrations shows a meerschaum carver working out an elaborate design. In the selection of a meerschaum pipe, one should be careful not to pick a dead white specimen. That which is of a slight creamy color will soonest take on that beautiful rich yellow-brown shade which so delights the smoker. Nor should the meerschaum be too light, as that is an indication that it is too porous to color properly, while on the other hand, a very heavy meerschaum may be almost too dense to absorb the coloring nicotine. A great many so-called meerschaum pipes are made from artificial meerschaum, a material composed of the chips and dust of meerschaum bonded with some solution and molded into blocks. The artificial product is somewhat heavier than the genuine. There are still other ways of imitating meerschaum, and a novice will find much difficulty in successfully selecting a genuine meerschaum pipe of good quality.

SOME NOVEL USES OF ELECTRICITY.

The increased use of electricity in every branch of industry is surprising even to the most ardent advocates of this mysterious form of energy. Not only has electricity invaded the territories occupied by all other forms of energy, but it has actually created new fields of its own. This is particularly marked by the present electrical invasion of our homes, where labor-saving devices were never thought of until electricity showed its wonderful adaptability to all classes of work. Electric light had scarcely ceased to be a novelty when the electric fan was introduced and then the sewing machine motor. In the past few years more attention has been paid to electric heating devices. In the nursery and sickroom electric milk warmers and devices for heating water are becoming a necessity, while the easily-regulated electric pad threatens to entirely displace the hot-water bag. Electrically-heated curling irons, electric cigar lighters, electric chafing dishes, etc., are but a few of the many electrically-heated devices now in common use. Electric flatirons are now quite extensively used in the kitchen and sewing room. Travelers find them most useful for pressing out clothing that has been mussed or creased in packing; ladies find them useful for ironing out flimsy shirtwaists and lace collars and cuffs which they would not dare intrust to the usually careless laundress. Outside of the household electric flatirons are commonly used in tailoring shops of all classes, and even architects and engineers have begun to employ them for smoothing out blue-prints and plans.

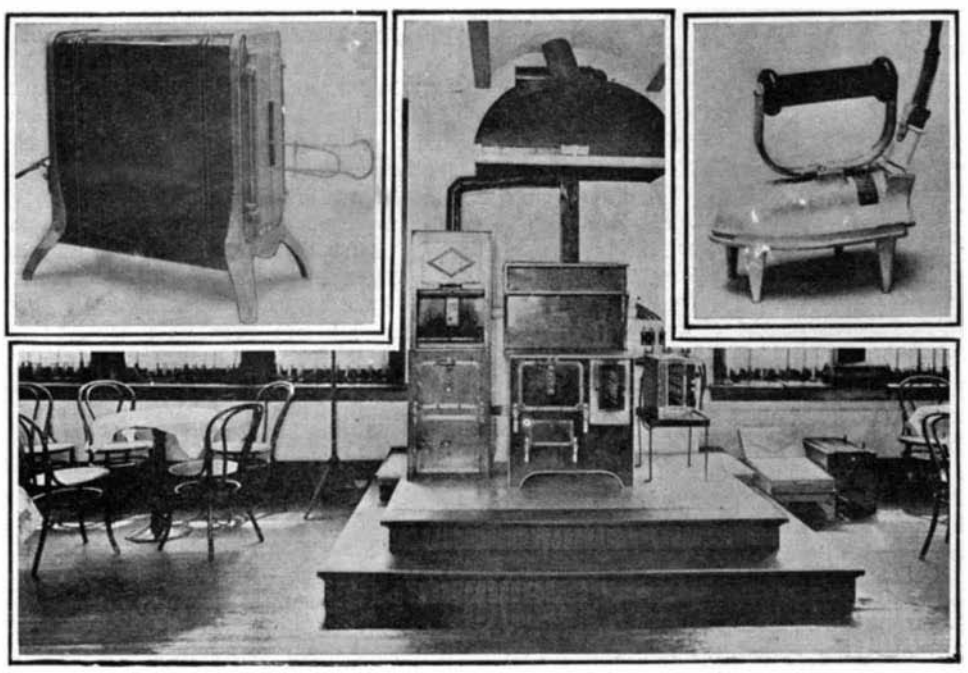
One of the latest electrical novelties is the hair-drying machine. This combines both electric heat and electric power. It consists of a casing which incloses coils of resistance wire and an electric fan. The fan sucks air into the casing over the resistance wires and the latter heat the air to any desired temperature under control of the operator. A flexible tube communicates with this casing and receives the current of heated air, permitting the operator to direct the current where desired. When properly handled twelve persons can be treated in one hour at a cost of but a fraction more than one cent each. The kitchen offers an excellent field for electrical apparatus. Already many electrical cooking outfits have been invented. The electric range is a convenient little piece of kitchen furniture whose chief charm lies in the fact that it is ready for instant use at the touch of the switch, and immediately after the cooking is done, the power can be cut off. This results in a great saving of expense, doing away entirely with that wasteful consumption of energy which is necessary in coal ranges in keeping the fire going so that the range will be ready for use. The electric range also possesses an advantage over the gas stove, its closest competitor, in that no match is required to light it, and it is entirely free from odors. One of our illustrations shows a small electric broiler which will cook a medium-sized steak at a cost of but two cents.



Washing Dishes in an Electrically-Operated Machine.

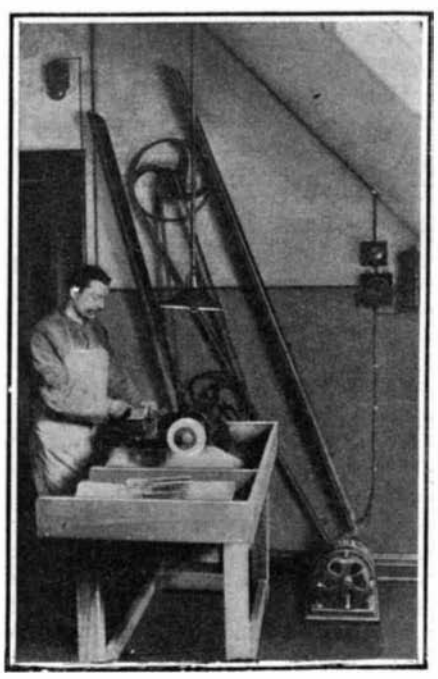
The electrical restaurant, shown in another of our illustrations, serves to exemplify the convenience and adaptability of electricity to kitchen work. It will be seen that the cooking apparatus is placed in the center of the restaurant with no attempt to screen it off from the rest of the room. Here the manager, in a business suit, does the cooking while chatting with his patrons with no fear whatever of smoke, soot, or ashes spreading out into the room, while the cooking smells are drawn up through a ventilator just above the range. A whole chicken can be roasted in a quarter of an hour and lamb chops can be broiled in three minutes. This rapid cooking results in retaining the juices of the meat.

The advantages offered by the kitchen for the development of electric power devices have not as yet been fully realized. The kitchen is the workshop of the house, and affords a splendid opportunity for labor-saving apparatus. A well-ordered kitchen should have its electric fan set in the wall to draw off the heated air and odor of cooking from the building. Small electric refrigerating plants are provided to do away with the inconvenience of hauling ice into the house. As yet electric labor saving apparatus has not been introduced to any large extent in private houses, but some of the accompanying illustrations, which show its uses in hotels, will be suggestive of its possibilities in the home. Here may be seen the electric dishwasher, the dishes being piled into an open wire basket and dipped into boiling water which is whirled rapidly against them by an electric motor. The same operation repeated in



An Electric Broiler. Electric Flatiron.

A Restaurant Equipped With an Electrical Kitchen.



The Knife-Polishing Machine.

SOME NOVEL USES OF ELECTRICITY.

three different vessels will thoroughly clean the plates, after which an electric fan is used for drying them. The entire operation requires but a few minutes. The knives can be scoured and polished by passing them between a pair of rapidly-rotating buff-wheels, and an emery wheel is provided for sharpening the steel blades. But the use of the electric motor in the kitchen is not confined to cleaning apparatus. A number of electrically-driven machines have been devised for preparing food. Two of these are shown herewith. One of them consists of a cabbage-chopping machine, and the other is a potato-paring machine. The latter discharges potatoes fully pared except for the eyes, which can readily be cut out by one of the attendants. It will be evident that these are but a few of the different uses to which electric power can be applied, and it is expected that the next few years will add wonderfully to the present variety of electric labor-saving devices for kitchen use.

We are indebted to the *Bulletin* of the New York Edison Company and to the Siemens-Schuckert Works of Berlin for the photographs used in illustration of this article.

New Departure in Animal Study.

BY F. MANDE SMITH.

With practically nothing known of the diseases of wild animals, the establishing of the Infirmary and Laboratory of Pathology for the inmates of the Zoological Garden of Philadelphia is an interesting departure. The office of the Zoological Society is in the quaint little old mansion, called "Solitude," which was built by John Penn, the nephew of the founder of Pennsylvania. Standing rather near the main entrance, this plain and dignified one-story building consists of a central hall, running through it, and four large light rooms. To the right of the entrance is the laboratory. Immediately back of it is the *post-mortem* room. To the left is the infirmary, and in the rear of it is the quarantine room. New arrivals for the collection go at once into the quarantine room, provided they are of moderate size, that they may be examined and watched for a certain period. Smaller animals on the sick list are placed in the infirmary, and, truth to tell, our friends (or relatives), the simia, are in the majority. As a rule, from one to half a dozen may be found in this pleasant room.

In the *post-mortem* room there is a refrigerating plant, a dissecting table, barrels of formaldehyde (one a 10 per cent, the other a 40 per cent solution) and Muller's solution, and a barrel of "remains." It is indeed uncanny to see a section of what is mortal of an animal friend, which one has admired and taken sugar to for years, but the spirit of which has passed on—one hopes to eternal sweets, or fruit, or tenderloin steaks, or whatever it best likes.

Long tables are built into three sides of the laboratory, while at the table in the center there is always some work being carried on. Upon it is placed the microtome, which is an interesting instrument for cutting tissues into sections of tissue-paper-like thinness. Though these sections are usually cut from 1/250 to 1/500 of an inch in thickness, or rather thinness, the microtome has a capacity of 1/2,500 of an inch. This thinness is necessary, that the specimen, which by this time is mounted on a glass slide for use under the microscope, may be seen through.

The specimens as they come from the autopsy are placed in fixing solutions, and then in alcohols. Lastly they go into paraffine, liquid or solid, and after four to eight hours in the incubator, at 52 deg. Cent., or 122 deg. Fahr., they come out imbedded in this remarkable substance, and ready for cutting in the microtome. One or two specimens are taken of each organ, averaging about 14 to an animal. In the *post-mortem* room Dr. Courtland V. White, who heads the staff of this new infirmary and laboratory, dictates changes, and anything abnormal is made a note of. The final touch to the specimens is to mount them on glass, and color them with haematoxyton.

One incubator is full of culture media, and in these cultures many sorts of bacteria are being grown in anything from milk to Japanese moss (agar). One culture is alive with typhoid, another with tuberculosis. There are many of these cultures, and despite their smallness they hold enough deadly bacteria to kill a million people.

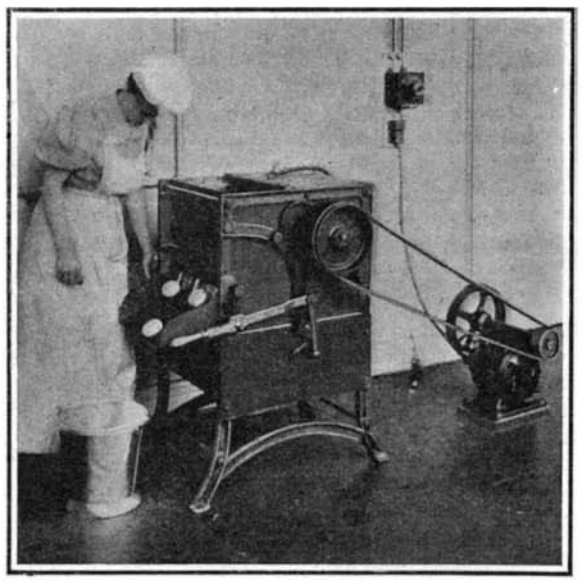
It is hoped and predicted that improved hygienic methods will be discovered, and new serums against dread disease for the benefit of mankind, as well as the lower animals. This new departure has cost $9,000 for the building and $2,000 for the apparatus.

A Substitute for Sponges.

In Algeria, the cultivation of "vegetable sponges" is now making progress. The cultivation of this plant (of which about ten species are known, and cultivated, in the warm regions of Asia and Africa) is fairly extensive in the environs of Algiers and Oran. Prior to maturity the fruit is edible; when the stage of ripeness has been passed, however, the pulp becomes separated from the fibrous matter which then forms the spongy mass termed the "vegetable sponge." Fine specimens, when carefully bleached in a weak lime bath, are sold at from 3½ to 4½ pence apiece. Paris is at present the chief market for most of the vegetable sponges grown in Algeria. They are highly suitable not only for toilet and bathroom, but also for domestic purposes.

Work Standing and Seated.

Is manual labor better done standing, or in the sitting posture? A question as interesting from the individual as from the social point of view. We know that those who practise the trades and the most deli-

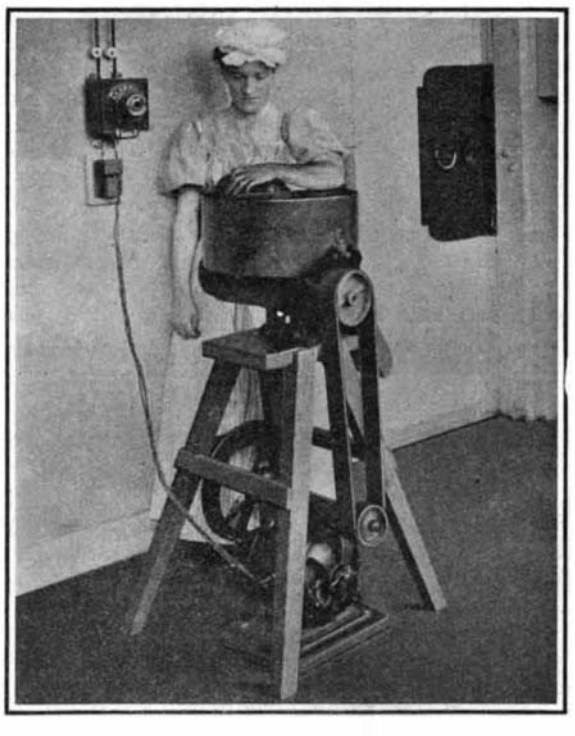


Electric Potato-Paring Machine.

cate arts seated often rise to consider their work with more precision, or to perfect its details. And the physiologists admit, on the other hand, that the standing position is the attitude that best assures stability against exterior forces, and so obtains the best fulcrum in the various activities.

Nevertheless, it was not futile to confirm these somewhat theoretical considerations by experiment. That is what M. Charles Ferré has done by means of the ergograph, an instrument that allows registering the number of liftings of a given weight by the middle finger, and the extent of each movement of this finger. Now, the result of these experiments is to show that work standing is about one-tenth superior to work seated. But, if we compare these works at their beginning and at their end, we notice that work seated is less considerable at the beginning and gradually subsides, while remaining pretty intense at the end; whereas work in the standing position is more intense at the beginning, persists for a long time very high, then rapidly falls.

The standing position, then, favors work and appli-



Electric Machine for Chopping Cabbage

SOME NOVEL USES OF ELECTRICITY.

cation during a long period; but it is certain that this exaltation is followed by a more rapid fatigue. By experiments of the same sort M. Ferré has ascertained, moreover, that a long period of inactivity preceding work diminishes the value of the latter, whereas a short period of inactivity of five or ten minutes is followed by an improvement in the work. After an hour of inactivity work is reduced to its minimum. It seems that the subject is torpid or asleep. Practical deduction: the pauses from work, as between two classes, should never exceed fifteen minutes.—From Illustration (Paris).

FRANKLIN'S SCIENTIFIC WORK.

Rather late in his very active life the tenth of Josiah Franklin's sons had occasion to set down the impressions of his remarkably varied and successful career and to reflect, in a graceful yet simply-worded autobiography, on the meager advantages that he had inherited from his father. Two of Josiah Franklin's attributes were singled out by his youngest son as the most noteworthy in his heritage. "A sound understanding and solid judgment in prudential matters, both in private and publick affairs," was the first; the second was "a mechanic genius" in being "very handy in the use of other tradesmen's tools."

Of Franklin's "sound understanding and solid judgment" historians have written at length; of his "mechanic genius" little is popularly known beyond the picturesque facts of his early days spent in candle-making shops and in printing offices.

Franklin's interest in electricity, the field in which his mechanic genius expressed itself most originally, began in his fortieth year. A Dr. Spence appeared in Boston in 1746 and exhibited some crude electrical apparatus on the mysterious working of which he dilated in popular lectures. Franklin heard him and was interested, despite the fact that Spence was not over-skillful in manipulating his apparatus nor over-illuminating in his explanations. When Franklin returned to Philadelphia he repeated some of Spence's experiments with a glass tube that had been sent over by Peter Collinson, a merchant who had an extensive trade with the colonies and who took a lively interest in the Library Company with which Franklin was actively connected. After a year's experimenting Franklin was convinced that he had made advances of real import and sent to Collinson an account of the first electrical discoveries made in America. Early in that famous scientific correspondence he referred to the "wonderful effect of pointed bodies both in drawing off and throwing off the electrical fire" and told Collinson how a cork suspended by a silk string was repelled after contact with an electrified cannon ball, and how a steel bodkin held near the ball conducted the electricity away from the iron so that the cork fell back and was no longer repelled by it.

The rubbing of a long tube with buckskin proved too tedious in the end, and so Philip Sing, one of Franklin's associates, transformed the tube into a ball, provided it with an axle and a driving wheel after the manner of a grindstone, and thus reinvented the electrical machine.

All this was done by a man naturally apt in the handling of instruments, guided only by the books which Collinson had supplied, by Collinson's brief letters, and by Spence's awkward demonstration. Of contemporaneous European work nothing was known. In a way it was fortunate that Franklin knew nothing of the electrical investigations which were then conducted in Europe, for he was thus led to explain in his own way the cause of the "drawing off" action of pointed rods. He proposed a theory that accounted for the observed facts with singular simplicity. The phenomena observed could be explained, he argued, by assuming that there is a certain quantity of electricity naturally belonging to every substance in its unexcited state. If by suitable means that quantity be increased, the substance may be said to be plus or positively electrified; if diminished, minus, or negatively electrified. Adding to this hypothesis the view that electricity is self-repellent and attractive of matter generally, he was able to construct satisfactorily what has since been called the one-fluid theory of electricity in contradistinction to the two-fluid theory of his European predecessors and contemporaries.

Curiously enough modern physicists are reverting to Franklin in their negative-corpuscle theory. The idealistic school of English scientists, headed by Thomson, Lodge, and Crookes, account for negative electricity by the discharge of a negative corpuscle from a positively-charged body. Just why this action should take place we are no better informed than was Franklin. In two hundred years we have advanced not very much beyond him, so far as the philosophy of static electricity is concerned. Of the electric spark and of lightning we know but little more than he did.

We need not here repeat the story how several persons before Franklin's day had detected the resemblance between lightning and electricity, but that no one had yet entertained the magnificent idea of examining the suggestion experimentally; how Franklin proposed to present a long, pointed conductor to a thunder cloud in order to withdraw the electricity from it, if any it had; how in France instruments constructed in accordance with his principle proved the expected identity; how almost simultaneously he himself in Philadelphia succeeded by means of a kite; and how he applied his discovery in the lightning rod. We may be permitted to observe, however, that his kite experiment is one of the most brilliant examples of luck yet recorded. To attempt the extraction of lightning flashes from a lowering sky was almost suicidal. Even at this late day timid persons occasionally fly to feather beds, sit on glass-legged chairs, or find refuge