MEDICINE

How The Breathing Machine Keeps Miss McGann Alive

Had She Been Stricken Six Months Ago, Death Would Have Come at Once, For the Respirator Was Not Ready Then

FOR three weeks a man-made respirator has kept life in the body of the Chicago nurse, Frances McGann, whose breathing muscles were attackeed by infantile paralysis. According to latest reports, the girl is now able to breath without the aid of the respirator for short periods.

The machine was designed by Drs. Philip Drinker and L. A. Shaw of the Harvard School of Public Health. When it was first announced to the medical world, physicians saw that one of its greatest fields of usefulness might be in helping victims of infantile paralysis whose breathing muscles became paralyzed. Until six months ago these patients were doomed to die.

The so-called metal lung acts by alternating air pressure with vacuum and thus keeps the patient breathing artificially.

If Miss McGann continues to live the physicians and others who have participated in the case will merit enthusiastic acclaim. They will have supplied a deficiency of nature.

We might build a model of the chest to illustrate how we breathe. To an upright stick we would loosely nail one edge of a series of hoops, one above another. The unsupported edges of the hoops would sag downward. Next we would cover the hoops with an air-tight fabric. The bottom of the contraption we would close, air tight, with a dome shaped piece of rubber, the dome projecting upward into the "chest."

Balloons for Lungs

Last we would close the top of the model except for a small hole. Inside, connected with the single hole by pipes, we would hang two light rubber ballons. Moreover we would have made some provision for exhausting the air between the balloons and the walls of the "chest." When this had been done the balloons would tend to swell and fill the cavity, just as the lungs fill the cavity of the real chest, without air between them and the chest wall.

This would not be a bad chest. The upright stick would represent the spinal column. The loosely nailed, sagging hoops would take the place of the ribs, which are loosely attached to the spinal column and which sag downward in front. The dome-shaped piece of rubber, the bottom, would serve as a diaphragm, the thin sheet of muscle which separates the chest from the abdomen. The hole in the top, the pipes, and the balloons would represent the air passages and the lungs.

Now, if we wanted to make the model take in more air we could do one of two things: We could increase the inside length by pulling down the diaphragm, or we would increase the inside diameter by lifting the sagging unsupported edges of the hoops. In either case there would be a tendency toward the formation of a vacuum and air would rush into the balloons.

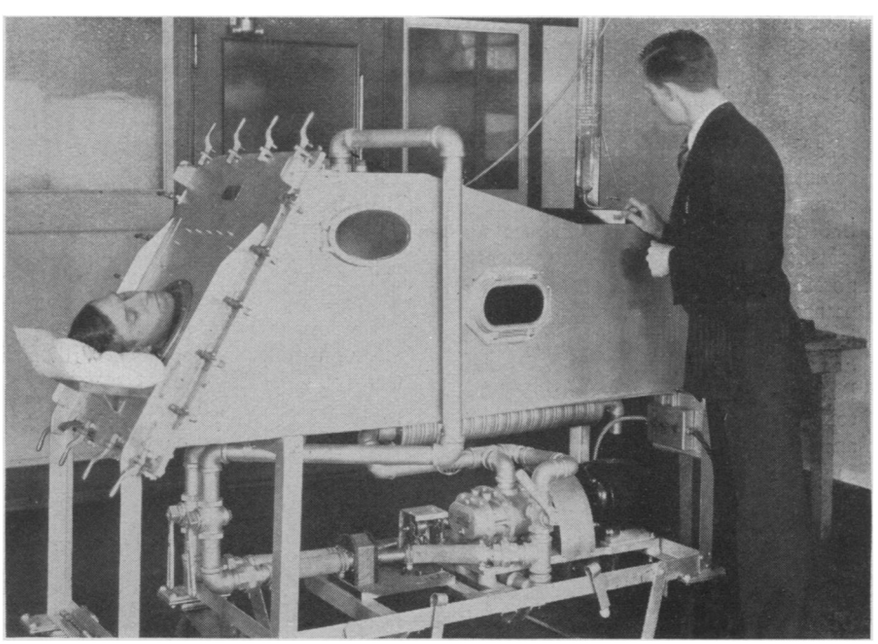
Control of Breathing

Substantially that is the way we breathe. We tighten the diaphragm which pulls its dome down out of the chest, and we lift the ribs by a complicated system of muscles. Air flows into the lungs, or, rather, is pushed into them by the pressure of the surrounding atmosphere. However, nature has been so lavish in provision for breathing, as in provision for other vital functions, that animals and man can breathe and can live normal, active lives when the diaphragm has been disabled.

But there must be a control of this complicated system of muscles that we use in breathing—a method of synchronizing them. We do not have to think about inhaling and exhaling as we would have to think if we wanted to raise an arm or crook a finger seven-times a minute. Of course, the control resides in the nervous system. The most important factor in it seems to be what is called the respiratory center, about which considerable remains to be learned. At all events, it is situated in that part of the brain which takes care of us while we sleep or while our minds are on something else than keeping alive. The respiratory center is stimulated to action by the carbon dioxide which accumulates in the intervals of breathing.

When enough of this intricate system of muscles, nerves and chemistry of gases fails, man must step in with artificial methods. He may use the prone pressure method until he can place his patient in skilled hands, such as those which are ministering to Miss McGann, or, in cases in which the trouble is more with the respiratory center than with muscular paralysis, until someone skilled in administering carbon dioxide can be summoned.

Science News Letter, October 11, 1930



WHEN LUNGS FAIL

This artificial respirator begins to do their work. This is the kind of machine that has kept Miss McGann alive.