

The Developing Field of Aviation (1938 Oxygenator Apparatus)

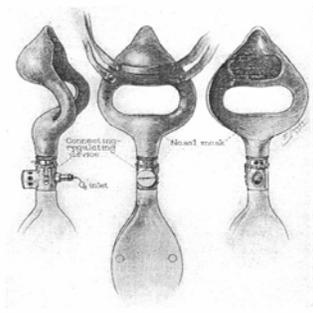


Fig. 1. The front, back and semilateral views of the oxygen inhalation apparatus.



Lindbergh Outfitted To Receive Emergency Oxygen During Simulated High Altitude Parachute Jumps

Just 35 years after the first recorded powered flight,¹ the field of aviation had burgeoned to reach greater heights and cross barriers. One challenging barrier involved aviators experiencing anoxemia – the deprivation of oxygen at altitudes higher than 10,000 feet. *Mayo Clinic Proceedings* reported on the solution in its October 12, 1938 issue.^{2,3}

Drs Lovelace and Bulbulian, one a fellow in surgery and the other a dentist, recognized the source of the problem and created practical ways to improve the outcome. Dr Lovelace said in his article: “The symptoms of anoxia are often compared with those of alcohol intoxication because of their close similarity in many respects. In both instances the individual always is convinced that he is rational, seldom lacks confidence and soon loses capacity for self-criticism. Some individuals become euphoric, others morose, and still others pugnacious and unwilling to listen to advice.”² As with many inventions, the commercial and medical benefits overlap. While this was invented for aviators, Dr Lovelace reported its use in patients with congestive heart failure, post-operative pneumonia, and asthma, as well as for treatment of gaseous distention during surgery and reduction of nausea after surgery.¹

Dr Bulbulian tackled the challenge of function and form by considering the requirements of the apparatus: it needed to fit patients of many sizes and also be comfortable enough to wear, while at the same time retaining a good seal around the nose and mouth to ensure the oxygen was delivered safely and appropriately.² He included 2 options – one that fit around the nose alone (best for aviators who needed to be able to speak), and one that also covered the mouth. These would accommodate a variety of needs by patients as well. His dental background lent expertise to the design and construction. He examined facial structure and form. Dr Charles Mayo, in the discussion following this presentation, said: “...Dr. Lovelace has brought before you the instances of practical application of high concentrations of oxygen. Dr. Bulbulian has presented the means by which oxygen can be given in concentrated form efficiently and reasonably.”² Clearly, 1938 was an exciting time. It is amazing how far-reaching the vision of Mayo Clinic was, and *Mayo Clinic Proceedings* was there to report the discovery. Charles Lindbergh even assisted with testing the effectiveness of oxygen at high altitudes.

References

1. First powered flight. http://en.wikipedia.org/wiki/Wright_Flyer. Accessed October 31, 2013.
2. Lovelace WR II. Oxygen for therapy and aviation: an apparatus for the administration of oxygen or oxygen and helium by inhalation. *Staff Meet Mayo Clin Proc.* 1938;13:646-654.
3. Bulbulian AH. Design and construction of the masks for the oxygen inhalation apparatus. *Staff Meet Mayo Clin Proc.* 1938;13:654-656.