

## The Third Dimension in Naval Warfare

By Maurice Prendergast,

SEA WARFARE, ever since its inception, has been conducted on a basis of two dimensions. The antagonists opposed each other on a common surface embodying the two dimensions of length and breadth in relation to their movements. Neither side could obtain any advantages by occupying a position of higher altitude as in land warfare; all combatants were compelled to fight on the same level. The importance of certain parts of the surface in relation to land (as in the case of various straits) cannot be denied, but the arrangements of land and sea are peculiar to each series of hostile operations. In the present case, it is assumed that movements are carried out on a surface of unlimited dimensions.

### The agents of warfare,

the fighting ships, acting against each other on a two-dimensional basis, are themselves creations moving in counterpoise between two media—one medium being the sea and the other the air. They depend for this counterpoise on the two opposing forces of gravity and buoyancy. Destroy that counterpoise and the ship descends and becomes completely enveloped in the lower medium—in other words, she sinks. We therefore have two dimensions and two media as constant factors in naval warfare.



Lieut.-Commander Max Kennedy Horton, Whose Submarine has two German Cruisers to its Credit.

Naval warfare, as regards actual fighting between ships, has recently shown a tendency towards one dimension. The adoption of the centre-line disposition of guns in battleships implies, to a certain extent, broadside fighting. This, in conjunction with modern systems of ranging and fire-control, indicates that the opening stages of an action will demonstrate the maintenance of a constant length or range between the two fleets moving on parallel or concentric courses.

### Within the last few years, two new agents

of warfare have been created with the power of using a Third Dimension, and also of moving in one medium alone. These new agents are the seaplane and the submarine. Not only can they move on the surface of two dimensions like older forms of warcraft, but they have the power of moving in a vertical direction, and by using the Third Dimension of altitude or depth, they can ascend above or descend below the surface, becoming completely enveloped in one medium alone—that of the sea or air.

In all previous maritime warfare, the opponents could only vary their relative positions by either drawing nearer to or going away from one another. The new Third-Dimensional agents can vary their positions by going above or below each other in their own media and also going above or below surface-fighting ships. In the past, warfare has always assumed the visible presence in battle of any enemy to be attacked. The submarine has nullified this assumption and its invisibility confers the right of invulnerability upon it. The seaplane is however visible, but its small size, mobility,

and rapidity of movement render the determination of its actual position and future progress very difficult for the purpose of attacking it, so that it is, to a certain extent, invulnerable. In the past, surface-fighting ships directed their attack against each other rather in a horizontal manner.

### Vertical methods are needed

to deal with the new conditions of naval air-craft. Howitzer and mortar-fire have been used in the past, of course, but principally against land defences. Since the conclusion of the Russo-Japanese War, Russian warships have had the upper portions of the barbettes ports composed of large armoured hinged flaps which, together with special elevating gear, permit of high-angle fire by big guns. But this need not be regarded as a direct resultant of aerial attack since, in 1906, Messrs. Vickers incorporated these methods in the Russian cruiser Rurik. It is rather the outcome of the high-angle bombardment over Liaot-shan of the impotent Russian Fleet immured within Port Arthur during low tides.

So long as each Third-Dimensional ship remains in its own medium, it is more or less

### immune from attack

from surface-fighting ships. Both "supermarine" and submarine depend on a combination of horizontal planes and mechanical power for their movements from the surface and above or below it. If the motive power fails, both types must return to the surface and lose their powers of using the Third Dimension. This entails loss of their invulnerable properties and they become two-dimensional surface craft liable to destruction by the older types.

The points of dissimilarity between aerial and sub-aqueous craft are however more strongly marked. The seaplane is capable of a speed seven or eight times that of a submerged boat. The increase of aerial velocity is said to give the seaplane greater stability; no real advantage is gained by any increase in the sub-surface speed of a submarine. The fastest destroyer cannot keep pace with a seaplane and the submarine below the surface would be out-stripped by our oldest warships.

The submarine's radius of vision, even when on the surface, is of a circumscribed nature on account of its low command of visible horizon. When submerged at a small depth, it is obtained second-hand and in an indifferent manner by a periscope. At greater depths, vision is nil. To the seaplane is given the power of commanding a horizon far greater than that of any other type. In addition to this, it possesses an advantage denied to all other surface-craft; that of

### locating a submarine

running below the surface. Neither the submarine nor the ship attacked by the submarine can see each other continuously. The seaplane can see both, and were the means developed, it might assist either side in delivering or repelling an attack. If the introduction of the Third Dimension influences the

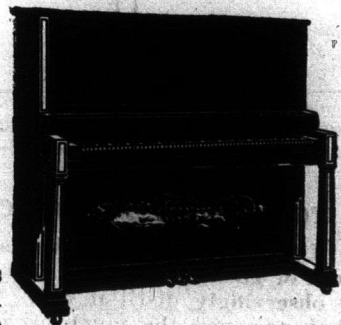
### future course of Naval warfare,

the condition of hostilities may be complicated by the relation of three types, super-surface, surface and sub-surfaces acting separately, in conjunction with or against one another. In its present stage of development, the seaplane is virtually impotent of effective attack. The submarine is perhaps the deadliest menace to surface warships ever conceived.

The possibilities of conjoint warfare between Third Dimensional craft against surface ships were recently discussed by Mr. Jane in the "London Magazine." Were it possible to establish direct communication between the seaplane and submarine by wireless methods, the latter's defect of vision might be removed.

(Continued on Page 25)

## During War Only



Owing to the present war conditions it is the desire of the manufacturers of the Gerhard Heintzman Piano to retain all of their help at the factory. In order to do this it is necessary to sell more Pianos. For the first time in the history of this high grade instrument, they are being placed on sale at

### A SUBSTANTIAL DISCOUNT

Those wishing to own a first class Piano now have the opportunity of purchasing one of "Canada's Premier Pianos" of the highest grade in every particular, and latest styles, at a price never before known.

	Regular	Now
Gerhard Heintzman Piano Style 60, mahogany or walnut...	\$475	\$398
Gerhard Heintzman Piano Style 64, mahogany or walnut...	\$525	\$425
Gerhard Heintzman Piano Style 68, mahogany or walnut...	\$525	\$425
Gerhard Heintzman Piano Style 45, mahogany or walnut...	\$550	\$440
Gerhard Heintzman Piano Style 72, mahogany or walnut...	\$575	\$465
Gerhard Heintzman Piano Style 76, mahogany or walnut...	\$575	\$465
Gerhard Heintzman Piano Style Mission, any shade...	\$475	\$385
Gerhard Heintzman Player Piano, 88-Note and 12 Rolls...	\$950	\$775

One, two or three years Terms arranged

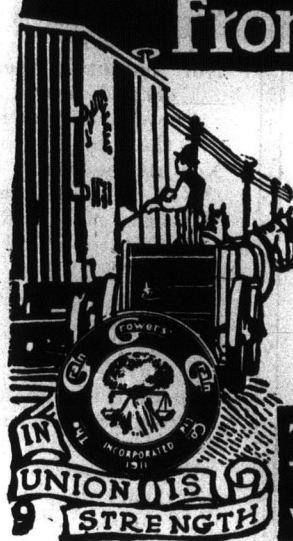
Used Pianos taken in exchange on Gerhard Heintzman Player Pianos

\$400 Nordheimer Piano, ebony case, very nice tone...	\$165
\$400 Newcombe, good as new, only	\$238
\$450 Bell, excellent tone, mahogany	\$285
\$450 Heintzman, walnut case, now	\$285
\$500 Gourlay, mission, latest style	\$298
\$500 Gerhard Heintzman, mission	\$335
\$850 Autopiano Player and 12 rolls Music	\$365

Terms \$10 Cash, \$7 and \$8 monthly

WINNIPEG PIANO CO. 333 Portage Avenue WINNIPEG

## From Colliery to Cellar



The great co-operative movement instigated by Western Canada's farmers, resulting in the establishment of their own Company to handle what they use and produce—

The GGG Co. Ltd.

—makes it possible for you and your neighbors to buy COAL in carload lots at a great saving. The middlemen are eliminated—you are the gainer. Write for quotations today.

The Grain Growers Grain Co. Ltd. WINNIPEG CALGARY FORT WILLIAM NEW WESTMINSTER

## FARMERS!

You will get good satisfaction and the best possible cash results by employing our services to look after and dispose of your carlot shipments of Wheat, Oats, Barley and Flax. Liberal advances against shipping bills at 7 per cent interest.

Thompson, Sons & Co. 700 W Grain Exchange Winnipeg

## Donald Morrison & Co.

ESTABLISHED 190

GRAIN COMMISSION

Grain Exchange

Winnipeg

WE handle Wheat, Oats, Flax and Barley on Commission, obtaining best possible grades and prices. Our work is prompt, accurate and reliable. Let us handle YOUR shipments this season. Daily or weekly market letter on application.

References: Bank of Toronto, Northern Crown Bank and Commercial Agencies.