

Suspense June 19

D R A F T

5th Memo In².

TO Chief Signal Officer

THROUGH: War Plans and Training Division

~~The undersigned have made~~ a further study of the system proposed ^{has been made,} in the original sketch accompanying basic memorandum with the result that an important modification ^{embodied} has been ~~made~~ therein which, it is believed, has eliminated the features ^{the practicality of which} ~~about which the Patent Board expressed question~~ ^{was in doubt.} ~~as to practicability.~~ This change provides that at no point on the steel tape is there ever impressed more than one set of voice frequencies, the superimposition of sets of frequencies being accomplished by electrical mixing in transformers rather than by successive magnetic impressions on the steel tape. A search has been made, at our own expense, in the Patent Office and there appear to be no conflicting issued patents dealing with ~~systems of similar~~ means ^{for} accomplishing the purpose of this invention, although the Radio Corporation of America and some other organization ^{other} have patented ~~different~~ schemes for accomplishing a similar purpose.

governmental channels is now desirable.

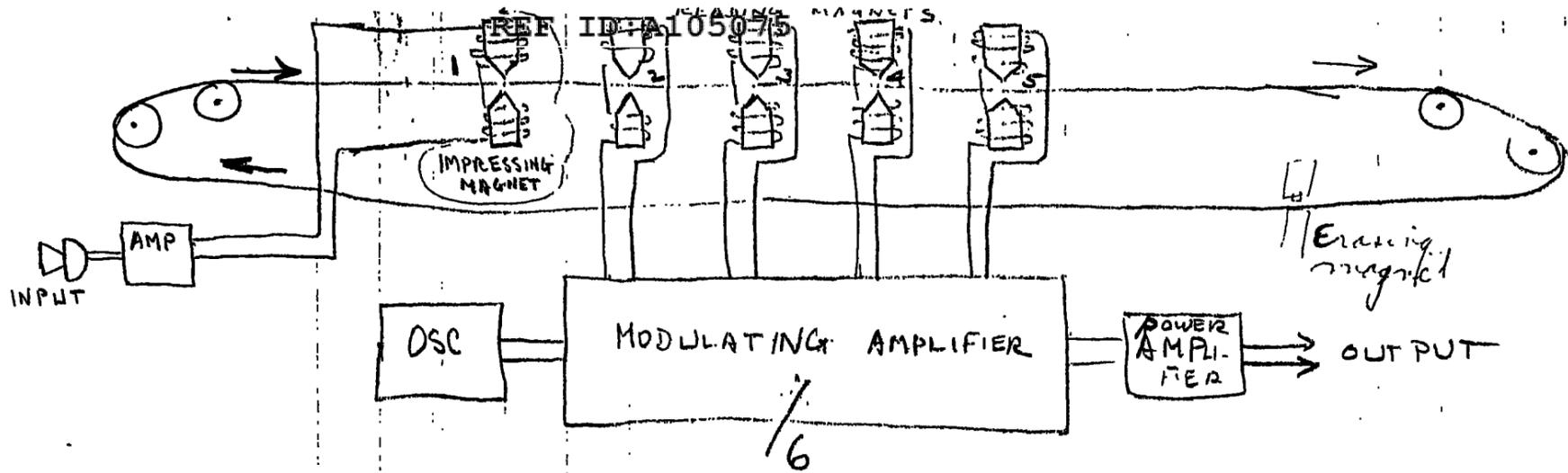
~~The undersigned~~ ^{It is} believed that this modification eliminates the technical objections on which previous action of the Patent Board was based. ^{It is} also believed that the invention now appears to be so practical as to warrant ~~It is, therefore, requested~~ that the Board be asked to reconsider the invention. ^{a view to ascertaining whether or not its patenting through regular} ~~in view of the modification now proposed.~~ A sketch of the system ^{as it stands} ~~as it stands~~

at the present time, together with a brief explanation, is attached hereto.

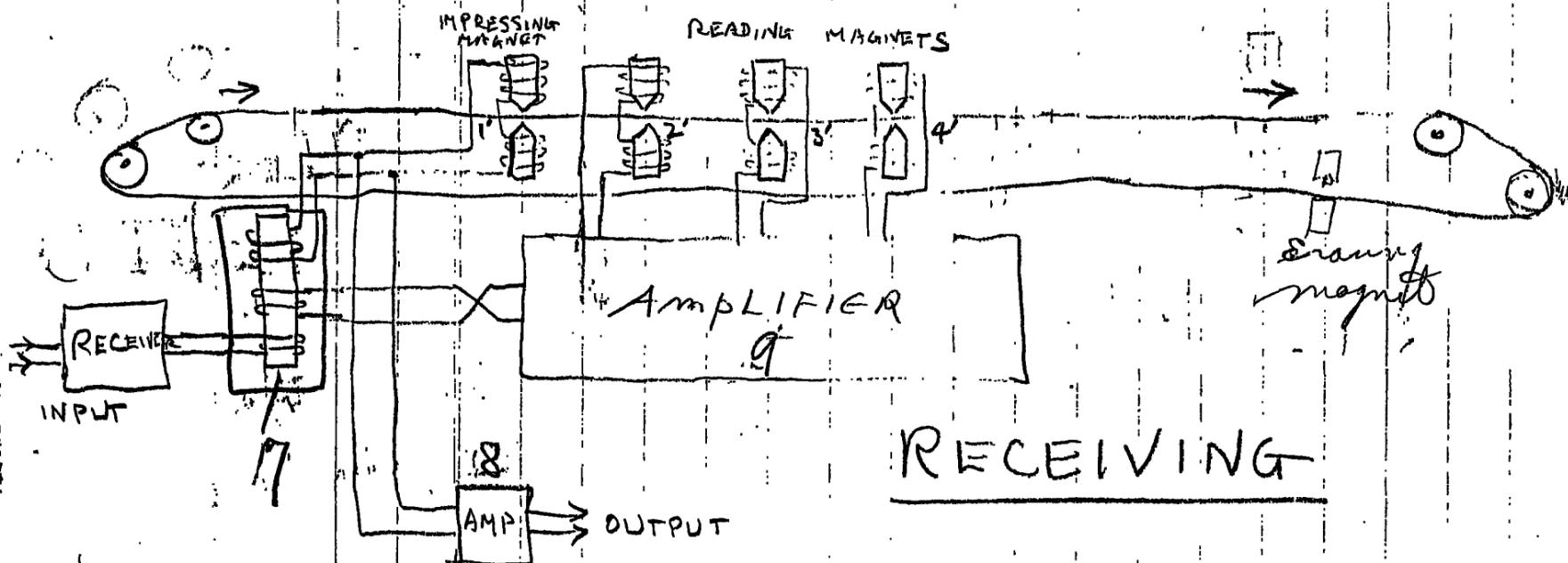
If, as a result of the findings of the Patent Board, the Chief Signal Officer is still of the opinion that ~~he is not warranted in patenting this invention through regular government channels,~~ ^{not warranted,} the undersigned ^{is requested,} request permission to patent the invention at ~~their~~ ^{our} own expense with all rights reserved to themselves. ~~The inventors~~

over

Attention is ^{current} invited to an article in the ~~last~~ issue
of the Bell Telephone Journal, entitled -
~~which~~ ^{which} ~~states~~ ^{states} that the recent great advances in
the art ~~indicate~~ that our invention is technically
feasible.



TRANSMITTING



RECEIVING

June 7, 1937.
Disclosure made by
inventors:
Frank B. Rowlett
Lawrence Clark

Date of Conception: April 6, 1937
Inventors: William F. Friedman
Frank B. Rowlett
Capt. R. C.

Transmitting end: Electrical oscillations corresponding to input signals are recorded on a moving steel tape, the tape passing in the direction shown between the paired impressing magnets 1. The tape then moves between paired reading magnets 2, 3, 4, and 5 which pick up the signals on the tape and pass them into modulating amplifier 6. Thence the signals go through power amplifier to output. Thus, the final output corresponds to a sequence of blocks of algebraically superimposed frequencies representable by A, AB, ABC, ABCD, BCDE, CDEF, ..., the A block of frequencies coming at the head of the train. Except for the first block, A, each block of frequencies is mixed with one to three blocks preceding it.

Receiving end: Received signals are led to receiver and thence to transformer 7, which has three coils. Signals from the transformer 7 are impressed on steel tape by impressing magnets 1', and simultaneously led to amplifier 8, for final output. Signals on the tape then pass under reading magnets 2', 3', and 4', which feed into amplifier 9. Output of the amplifier 9 is reversed in polarity and led to transformer 7. When the block of frequencies represented by A is received, there is nothing on the tape for reading magnets 2', 3', and 4', to pick up. Hence A is final output. When the block of frequencies represented by AB is received, reading magnets 2' are reading the A block, and these frequencies are led back to transformer 7 through amplifier 9. This neutralizes A from the received block AB, leaving only B. In the same way when ABC comes in, the reading magnets 2' and 3' feed back -A and -B, neutralizing the latter from ABC and leaving only C; ... etc. The cryptographic principle consists in micrometrically varying the distances between the impressing and reading magnets at the two ends, the variations being determined by prearranged cipher keys. While in this embodiment steel tapes and magnetic recordings are used, other media may be employed for recording the basic principle being the mixing with the signals, recordings of signals which occurred during previous time intervals.