The object of this invention is to produce a code, which at will may be varied indefinitely, a message in plain English or other language, and to decode such a code-message into plain language.

One feature of the invention comprises a shiftable type-carrying member, such as a pivoted disk or a reciprocable rod, carrying two groups comprising the same set of symbols (such as letters, punctuation marks, or other characters), the symbols of one group being in normal mutual arrangement and in normal position individually, and the other group consisting of an arbitrary arrangement of the same symbols (but preferably in laterally reversed position, individually) in relief as printing-type, each symbol of the one group being doubly paired or coupled with some other symbol of the other group, e.g.: the normal “C” being paired with a laterally reversed “F” in relief, and the normal “F” being coupled with a laterally reversed “C” in relief.

A second feature of the invention comprises providing such shiftable type-carrying member with demountable and interchangeable types or reversed letters or symbols in relief.

A third feature of the invention comprises the combination with a suitably-arranged plurality of such shiftable type-carrying members of suitable means whereby said types can be aligned for printing, the correctness of the work verified, and the aligned types then printed upon a suitable material such as paper.

More particularly, the invention comprises, fourthly, in combination with the last-mentioned feature, of means to cause the aligned types, when verified, to be brought into operative contact with a suitable print-impacting medium such as a typewriter-ribbon and be printed upon a suitable print-receiving medium such as a roll of paper, and thereafter to cause the advance of said print-receiving medium and said print-impacting medium, and finally to reset the type-carrying members in their normal position.

Finally, the invention comprises the various features and details hereinafter set forth by the appended claims.

The broad invention may be exemplified in various embodiments; but it will be best understood by reference to the annexed drawings and the ensuing description, which disclose one preferred embodiment comprising type-carrying members in the form of a plurality of reciprocable rods, shown as installed in operative relation with a convenient form of printing-apparatus.

In these drawings:

Fig. 1 is a plan view of the apparatus;

Figs. 2 and 3 are elevations of opposite sides, respectively;

Fig. 4 is a longitudinal vertical section through the line 4—4 of Fig. 1;

Figs. 5 and 6 are transverse vertical sections through the lines 5—5 and 6—6, respectively, of Fig. 1;

Fig. 7 is a horizontal section, partly broken away, through Fig. 2;

Fig. 8 is a vertical section through a detail of the printing-mechanism.

Fig. 9 is a plan view, partly broken away, of two of the shiftable type-carrying bars and the intermediate fixed bar, showing some of the exposed symbols or letters, alternating with bosses;

Fig. 10 is a bottom view, partly broken away, of three of said fixed bars and two of such shiftable bars, showing some of the reversed types for printing;

Fig. 11 is a detail, showing in perspective one of the demountable printing-types;

Fig. 12 is an elevation of a pawl-and-ratchet device for feeding the paper; and

Fig. 13 is a plan, partly broken away, of a pawl-and-ratchet device for feeding the ribbon.

Figure 14 is a view in side elevation of the hook connecting the cover with the machine.

The preferred printing-apparatus will be described first. It is here shown as comprising a main framework 1, mounted upon a base-board 2, and having at its rear end the operating-bar 3. Near the rear of said framework is demountably journaled a transverse spindle 4, on which is provided a demountable roll of paper 5. The paper is passed over a vertically-movable supporting-platen secured on a spindle 6 and under a straight cutting-edge 7. On the project-
ing ends of a transverse spindle 8, at the front of the upper part of the framework, are two ribbon-spools 9—9', each of which can be made fast by a thumb-nut 10. From one spool, whose thumb-nut is loosened to constitute it a supply-spool, the ribbon passes rearwardly, thence over a diagonal guide 11 on the framework, and crosses just above the paper on the supporting-platen, and thence to a second diagonal guide 11 and forwardly to the other spool, whose thumb-nut clamps it to its spindle as the take-up spool. 12 is a transverse rock-bar journaled in the lower part of the framework between the paper-roll and the supporting-platen, and from it extend rearwardly two parallel lever-arms 13, each having an offset stud 14; and forwardly extend two parallel lever-arms 15, which carry a platen-frame 16 in whose upper part is journaled the aforesaid spindle 6 for the supporting-platen and also two pressure-rollers 17 for maintaining the paper in frictional engagement with the platen; while suitable means, such as the vertical ones of the group of springs 18, normally maintain the platen-frame in its lowermost position. The horizontal ones of said group of springs 18 tend to hold the pressure rollers operative. The operating-bar 3 is carried by the rear ends of two lever-arms 19, whose front ends are pivoted at the front of the framework, and which extend in vertical alignment above said studs 14. So that depression of the operating-bar 3 elevates the platen 6, and interposes the superposed paper and the interposed ribbon against the depending faces of the particular printing types which may at that time be present, immediately overhead, by the superposed upper frame as hereinafter described; and release of the operating-bar permits the springs and gravity to restore the platen to normal position, with the superposed paper and ribbon out of contact with the overhanging type.

Depression and release of the operating-bar thus causes a to-and-fro vertical movement of the platen and its spindle. Suitable mechanism is provided for causing this movement to produce a partial one-direction rotation of the platen, so as to advance the paper one step. There may be such feeding mechanism for each end of the platen-carrying spindle. As shown in Fig. 12, it comprises a ratchet-wheel 20 fast on said spindle and connected spring-controlled pawl 21 pivoted on the outer end of an arm 22 which is journaled on the spindle and whose movement is limited by a projecting stud or screw 23, extending into a vertical slot provided in a stationary support 24. The location and vertical extent of the slot are such as to prevent said stud and arm from continuing their upward movement along with the upward movement imparted to the platen-frame and its ratchet by the depression of the operating-bar, whereby the continued upward movement of the spindle and ratchet tilts the spring-pressed pawl and causes it to ride over one of the cam-teeth and engage the next tooth; and when the operating-bar is released, and the platen and its frame restored to the lower position, the opposition of the engaged pawl causes the aforesaid partial rotation of the ratchet and of the platen.

Parallel to the lower part of the main framework is journaled a longitudinal rock-bar 25, from the rear of which extends rigidly a crank 26, which is linked to the adjacent portion of one of the aforesaid arms 19; while from the forward end of said rock-bar extends rigidly another crank 27, for actuating the ribbon-feed. The latter comprises the aforesaid spindle 8 carrying, on its ends the aforesaid ribbon-spools 9 and 9', one of them fast and the other loose thereon, and immediately on said shaft 8 is fast a worm-gear, in mesh with a worm on a vertical shaft 28. The last-mentioned crank 27 is connected to said vertical shaft by a pawl-and-ratchet connection 29. Each depression and release of the operating-bar, therefore, rotates the then fixed ribbon-spool one step, thereby advancing the ribbon upon that spool and unwinding it from the then loosely-mounted spool. When all the ribbon has been unwound from one spool, the two thumb-nuts 10 are loosened, and the ribbon is rewound by manually spinning the emptied spool in the reverse direction.

The type-carrying members and their arrangement will now be described. Referring to Figs. 1, and 4—8, a rectangular upper frame 30 is shown as carrying rigidly at its forward corners the depending up-turned hooks 31 adapted to engage under the projecting ends of a transverse rod 32 fixed at the front end of the main framework, see also Figure 14; while on the rear of said frame 30 is pivoted a locking-member 33 which carries rigidly at each side a forwardly-opening hook adapted to engage a stud near the rear upper corner of the main framework. So that, by inclining the frame 30 forward more than ninety degrees, said front hooks 31 can engage (or be disengaged from) their complementary rod 32, and by then swinging the frame 30 back upon the main framework, its rear hooks can be made to engage their respective studs, and said upper frame becomes securely locked in position upon the main framework.

As shown, this rectangular upper frame 125 comprises (eleven) longitudinally-arranged parallel and equidistant members 34, each of them channelled along each side-face. The front end of said channels and of the spaces between said members 34 is normally
closed by a demountable end-gate 35, a transverse member secured in place as by two screws.

The several (ten) type-carrying bars 38 are structurally identical, and are about one-half the length of the frame 30. Each is a compound bar and consists of a lower member, fitted to slide longitudinally in the opposing channels of two adjacent longitudinal members 34, and an upper member connected thereto by an interposed spacing-neck located near each end of the compound rod, said upper member overhanging and sliding upon the same two adjacent longitudinal members 34. Upon the upper face of each of the set of compound rods is presented the same set of symbols, such as the properly-arranged letters of the alphabet disposed in normal position, alternating with small bosses (represented in solid black); so that, when all the rods have been shifted to normal position (with their front ends abutting against the end-gate 35), the same individual symbols will be presented in transverse alignment across the frame, and the rearmost row of aligned identical symbols will be in printing-position immediately above the platen. A transverse bar 37, whose ends are secured on top of the frame 30, carries (ten) forwardly-extending spring-plates 38, one for each rod 36; and the free end of each swing-plate is downturned and curved around so as to fit between two bosses on the particular rod 36, and to ride over the bosses thereon when the rod is shifted in either direction. In other words, these springs 38 serve for normally maintaining their respective rods 36 in the particular positions selected for each.

In using the machine, the operator slides each rod 36 in turn to bring its desired letter or other symbol into the printing-position above the platen,—that is, as here shown, immediately in advance of its spring 38; and he can reset the rods individually. But preferably they are reset simultaneously, as by means of a resetting-frame, a reciprocable rectangular frame which comprises a reset-bar 39, located at a level to abut against the rear of the upper members 36, two side-members slidably fitted in longitudinal channels in the side-members of said upper frame 30, and at the front a transverse actuating-bar 40 located at a higher level to clear the rods. The resetting-frame is thus maintained in operative relation to the rods, and its movements are limited to rectilinear reciprocation. By removing the aforesaid end-gate 35, the resetting-frame as well as the rods 36 can be inserted into or removed from said upper frame 30.

From the lower member of each of the slidable rods depends its set of printing-types of the normal letters or other symbols presented by the upper face of the same compound rod; but each printing-symbol (on the lower face) is doubly paired or coupled with some other normal letter or symbol exposed on the upper face. For example, beneath the normal letter “C” (exposed on the upper face) will be the relief-type of some other symbol or letter, as “F”; in which case the reversed relief-type “C” (on the lower face) must be beneath the normal “F” (on the upper face). So that, when the rod has been shifted to present said normal “C” in the printing-position (immediately in front of its retaining-spring 38), and the operating-bar 3 is depressed, the other symbol of that pair (in the supposed case, the “F”) will be imprinted upon the paper; and when the normal symbol “F” has been brought in front of its retaining-spring, its paired symbol (“C”) can be imprinted upon the paper.

Preferably, in aid of quick reading of the letters of the code message for subjecting the latter to the “unscrambling” operation of the decoding machine, each printing-type on each rod is laterally reversed relative to its paired symbol exposed on the upper side of said rod, so that the imprint of this printing-type on the code-message recording tape will not be reversed laterally, that is, will “read right”. Also, preferably, in aid of quick deciphering of the decoding message on its recording tape, each printing-type on each rod of the decoding machine is similarly laterally reversed relative to its paired symbol exposed on the upper side of that rod.

Preferably each of the rods bears at its forward end a distinctive numeral by which it may be identified; and also preferably the same two symbols that may be coupled for one of the rods 36 will not be coupled for any other rod. So that, even should an outsider learn that the “F” printed by the first rod indicate a “C”, yet an “F” printed by any of the other rods may (and preferably will) indicate some other letter (not a “C”); and therefore the outsider would not be able, to decipher a code-message written by this apparatus.

Moreover, the individual printing-types are preferably demountable and interchangeable. That is, while the exposed normal letters or symbols are permanently arranged in regular order, yet their corresponding or doubly-paired printing-types can be and preferably are arbitrarily arranged, and the pairings of the symbols can be arbitrarily changed at will for each and every rod. This is done by forming the lower member of the rods with a separate transverse slot beneath each of the exposed permanently-positioned letters or symbols, and forming each individual printing-type 41 with a flattened neck 42 and a squared
head 48, so that any one of these demountable types can be inserted at will into the slot beneath any one of the permanently-located letters or symbols.

The procedure, in case a message in the English or other plain language is to be coded, is as follows: The operator slides the several rods 36 into such positions respectively that the first ten letters of the plain-language message appear in transverse alignment immediately in front of the maintaining-springs 38; he then reads the letters there exposed, and verifies the correctness of his work; he next depresses and then releases the operating-bar 3, whereby (firstly) the proper but arbitrarily selected code-letters or symbols are printed upon the paper and (secondly) the paper and the inked ribbon are advanced, ready to receive the next line of code-letters; he then repeats the foregoing operations for the next ten letters of the plain-language message, and so on until the message has been completed; and, finally, he lifts the locking-member 28, swings back the upper frame 30, draws the coded message forward past the cutting-edge 7, and tears off the paper.

For decoding a coded message into plain English or other plain language, the procedure is similar. That is, the operator aligns in front of the maintaining-springs the first ten letters or symbols of the coded message, and prints upon the paper the corresponding letters of the decoded message. In other words, the coding and decoding machines may desirably be of identical construction, including even the same number of rods and the same arrangement of exposed symbols on these rods; yet with different arbitrary arrangements of the printing-types of the different rods, except only that corresponding rods of the two machines shall both have arbitrarily located printing-types on their under sides in the same relation to the exposed symbols on the upper sides of said rods, if the aforesaid double pairing principle is to be retained in carrying out the invention. In regard to said double pairing of the printing-types and exposed symbols, this has been explained hereinafore, but in a somewhat narrow sense, that is, in connection with an embodiment of the invention such as is shown in the drawings. Therefore it should be added, taking for example an embodiment including a plurality of relatively adjustable rods as here, that what is broadly meant by the double pairing of the printing-types and exposed symbols is, first, a pairing of the fifth exposed symbol from a given end of a rod with a printing-type for a different indicium, as by locating said printing point on the under side of the rod immediately below the exposed symbol on the upper face of the rod, as well as, second, a pairing of the exposed symbol corresponding to said indicium with another printing-type corresponding to the first mentioned exposed symbol, as by locating the last mentioned printing-type on the under side of the rod and arranging on the upper side of the rod immediately above said point said exposed symbol corresponding to said indicium. In other words, although the printing-types of both machines may be arranged with absolute arbitrariness, and even to obtain greater secrecy, the different rods of each machine may have a columnar sequence of their printing-types widely dissimilar, the similarly constructed rods of the coding and decoding machine need not have corresponding positions relative to the other rods of said machine; instead, a rod of one machine may have a different location from a rod of the other,—and then there will not be a double pairing of the rods of the coding and decoding machines. In such cases, of course, the printed message on the tape of the decoding machine will have to be read by regularly recurring transpositions of the printed indicia, pursuant to a previously arranged or suitably transmitted scheme. Always, however, there will be incorporated a double pairing of the exposed symbols and printing-types of the entire rod equipment of one machine with the exposed symbols and printing-types of the entire rod equipment of the other machine.

Preferably the decoding machine has rods to the same number as the coding machine, and these rods are so arranged that, looking down on the machine, the first rod to the left of the decoding machine is the reciprocal of the corresponding rod on the coding machine, the next rod to the right on the coding machine is the reciprocal of the corresponding rod of the coding machine, and so on. By stating that a decoding machine rod is the reciprocal of a coding machine rod, is meant that the normally consecutive arrangement of the exposed symbols, as A, B, C, D, E, etc., columnarly or lengthwise of a rod of the coding machine is matched by a similar arrangement of the printing-types on the under side of the corresponding rod of the decoding machine, and that the arbitrarily selected columnar sequence of the printing devices on the under side of said rod of the coding machine is matched by a similar arrangement of the exposed symbols on the upper side of said rod of the decoding machine.

Or, if desired, one single machine may have its rods and their respective upper symbols and lower printing types arranged for coding and decoding; according to the principles already explained; for example, in a ten-rod machine, the first five rods may
be used for coding and the second five rods
for decoding, when said sets of rods are re-
ciprocals as just explained.

As stated, the individual rods are prefer-
ablely identified by being stamped "1", "2",
"3", etc.; and two (or more) correlated ma-
Chines are provided for two (or more) cor-
respondents in different places. The corre-
lated machines all have their rods in the
same order and with the same relative ar-
rangement of their respective printing-sym-
Bols for the corresponding rods; and if a
change of code be desired, one correspond-
ent notifies the other of the new code, by
cabling or telephoning or writing a sequence
of numerals to indicate the new order in
which the rods are to be arranged. There-
by, with a ten-rod machine whose printing-
types are not demountable, over three and a
half million theoretically different codes are
available. And if the printing-types are
demountable, then millions upon millions
of theoretically different codes become avail-
able.

The invention has been described in full
detail, but only for the sake of clearness.
The invention is not limited to the de-
tailed features herein disclosed. Parts of
the disclosed structure may be omitted, and
modifications of structure and of arrange-
ment may be employed, without in any case
departing from the spirit of the broad in-
tention. For example: the type-carrying
members need not be reciprocable rods, but
they may be of any other suitable form, and
they may be more than ten or less than ten
in number; any appropriate embodiment of
printing-mechanism may be used in co-op-
eration therewith; and, indeed, under the
broad invention a set of such members car-
ying two groups of symbols, may be uti-
ilized in various ways, even without actually
printing the coded or decoded message.

Furthermore, it is to be understood that
what is claimed is:

1. A coding and decoding apparatus com-
prising the combination of a platen revol-
uble upon a vertically-movable axis, a supply of
paper supported upon and frictionally fed
by said platen, an inking-ribbon presenting
an operating-portion parallel to the axis of
the platen and directly above the same and
the superposed paper, a plurality of parallel
rods located in horizontal alignment above
said ribbon-portion and independently recip-
corable at a right-angle to the vertical
plane through said ribbon-portion and said
axis, each rod presenting on its upper face
a vertically-aligned group of symbols ar-
ranged and individually disposed normally
as symbols for characters such as the regu-
larly-arranged letters of the alphabet, and
each rod presenting from its lower face the
same group of demountable downwardly-
-facing printing-types of the same symbols
but not in normal arrangement, the exposed
symbol for each character being directly
above the printing-type for some other char-
acter and the exposed symbol for that other
character being directly above the printing-
type for the first-named character, means
for retaining said rods in their respectively-
selected positions for printing a line of the
desired message, means for causing the
platen to impress the paper and the inter-
posed ribbon against the row of selected
type and then restoring the paper and rib-
bon to normal position and for thereafter
advancing the paper and the ribbon, and
means for resetting the rods.

2. A coding and decoding apparatus com-
prising the combination of a platen revol-
uble upon a vertically-movable axis, a supply of
paper supported upon and frictionally fed
by said platen, an inking-ribbon presenting
an operating-portion parallel to the axis of
the platen and directly above the platen and
the superposed paper, a plurality of parallel
rods located in horizontal alignment above
said operative ribbon-portion and independ-
ently reciprocable at a right-angle to the
vertical plane through said portion and the
axis of said platen, each rod exposing on its
upper face a vertically-aligned group of
symbols arranged and, individually posi-
tioned normally as symbols for characters
such as the letters of the alphabet, and each
rod presenting from its lower face the same
group of demountable downwardly-facing
printing-types of the same symbols but ar-
ranged arbitrarily for each individual rod,
the exposed symbol of each character being
directly above the printing-type for some
other character and the exposed symbol for
that other character being directly above
the printing-type for the first-named char-
acter, and means for causing the platen to
impress the paper and the interposed ribbon
against the row of selected types and then
restoring the paper and ribbon to normal
position and for thereafter advancing the
paper and the ribbon.

3. In a coding and decoding machine, the
combination comprising a plurality of
parallel members, each member exposing the
same arrangement of the same group of
symbols such as the regularly-arranged let-
ters of the alphabet, said members being in-
dependently-movable to align different sym-
bols of their respective groups, each of said
members likewise presenting a second but
differently-arranged group of those same
printing-types, each symbol of the one group being doubly associated on
the same member with some other symbol
of the second group, and means for printing
in a row the desired printing-types afore-
said.

4. In a coding and decoding machine, a
plurality of parallel members, each member

exposing the same arrangement of the same group of symbols such as the regularly-arranged letters of the alphabet, said members being independently-movable to align different symbols of their respective groups, and each of said members likewise presenting a second group consisting of those same symbols arranged arbitrarily and each paired on said member with some other symbol of the first-named group on the same member.

5. In a coding and decoding machine, a plurality of parallel rods independently reciprocable lengthwise, each rod exposing on its upper face the same group of the same symbols arranged and disposed normally as characters such as the regularly-arranged alphabet, and each member presenting also another group of the same symbols such as printing-types, the exposed symbol for each character being directly above the printing-type for some other character of the group, and the exposed symbol of that other character being directly above the printing-type for the first-named character, means for retaining said rods in their respectively-selected positions for printing a line of the desired message, and means for printing in a row the desired printing-types aforesaid.

6. In a coding and decoding machine, the combination comprising a plurality of parallel rods independently reciprocable lengthwise, each rod exposing on its upper face the same group of the same symbols arranged and individually-positioned normally as characters such as the regularly-arranged letters of the alphabet, and each rod presenting from its lower face a second group of the same symbols in the form of downwardly-facing printing-types arranged arbitrarily for each individual rod, the exposed symbol for each character being directly above the printing-type for some other character on the same rod, and the exposed symbol of that other character being directly above the printing-type for the first-named character on the same rod, and means for printing in a row the desired printing-types aforesaid.

7. In a coding and decoding machine, a reciprocable compound-bar comprising mutually-spaced upper and lower members, the upper member exposing in permanent normal arrangement a group of symbols representing characters such as the regularly-arranged letters of the alphabet, and said lower member having a transverse slot directly beneath each of said exposed symbols and carrying in said slots demountable and interchangeable printing-types of the respective characters of the same group, but each of said types printing some other character than the exposed one immediately above it, while the exposed symbol of such last-named character is immediately above the printing-type of the first-named character.

8. In a coding and decoding machine, a reciprocable bar whose upper face exposes in permanent normal arrangement a group of symbols representing characters such as the regularly-arranged letters of the alphabet, and whose lower face presents arbitrarily-arranged printing-types of the respective characters of the same group, but each of said types being for some other character than the exposed one immediately above it, while the exposed symbol of such last-named character is immediately above the printing-type of the first-named character.

9. A plurality of coding and decoding members each having two groups of the same characters such as letters, one group being exposed and permanently arranged in normal order and with its individual characters in normal position, and the other group consisting of arbitrarily-arranged printing-types for the same characters, but each character being doubly paired by the arrangement of the two groups, said arrangement of the two groups, as to the double pairing of at least certain of said characters and printing-types, being dissimilar in the different members.

10. A plurality of coding and decoding members each carrying two groups of the same characters such as the letters of the alphabet, one group being arbitrarily arranged in normal order, and the other group consisting of the same characters arbitrarily arranged to be coupled with some other characters of the first group; said coupling of the two groups, as to a double pairing of at least certain of the characters and printing-types, being dissimilar in the different members.

11. In a machine for printing coded and decoded messages, a plurality of regularly-disposed members shiftable through substantially parallel planes, each presenting the same regularly-arranged symbols of the same characters and also carrying arbitrarily-arranged printing-types of said characters, said members comprising two equal groups, and each of the symbols of each member of one group being doubly paired with the printing-type of some different character of the corresponding member of the other group.

12. In a machine for printing coded and decoded messages, a plurality of regularly-disposed members shiftable relative to different predetermined printing points, each presenting the same regularly arranged symbols of the same characters and also carrying arbitrarily-arranged printing-types of said characters, said members comprising two equal groups, and each of the symbols of each member of one group being doubly paired with the printing-type of some different character of the corresponding member of the other group.
paired with the printing-type of some different character of the corresponding member of the other group.

13. In a machine for printing coded and decoded messages, a plurality of parallel and longitudinally-shiftable rods each presenting the same regularly-arranged symbols of the same characters and also carrying arbitrarily-arranged printing-types of said characters, said rods comprising two equal groups, and each of the symbols of each rod of one group being doubly-paired with the printing-type of some different character of the corresponding rod of the other group.

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