To all whom it may concern:

Be it known that I, Oscar B. Pulis, citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Tie-Member Fastening Devices, of which the following is a specification.

The present invention relates in general to devices which are used in the erection and aligning of forms and molds such as are utilized in the construction of walls and other structures from concrete or other plastic material.

15 Tie members of wire and the like are commonly utilized to connect and fasten different elements, and the object of this invention is to provide a novel device whereby the tie wires can be tightened and the ends thereof twisted together in a quick and effective manner and with considerable economy over the old way of tightening and twisting these wires.

In the erection of concrete forms tie wires of this character are used in different capacities, being commonly employed to connect the opposite sides of a wall form, to prevent the said sides from spreading under the weight and lateral pressure of the concrete, and also to fasten intersecting bars or liners which may extend along the outer face of a form to hold the different portions of the form in proper alignment, both horizontally and vertically, and the present invention provides a most satisfactory means for simultaneously tightening the wires and twisting the ends thereof together; to hold the wires in position and fasten the members with which the wires are in engagement.

Further objects of the invention are to provide a device of this character which is simple and inexpensive in its construction which is practically unbreakable and can be used repeatedly, and which in most instances can be removed from position as soon as the tie wire has been tightened and twisted, thereby enabling the same device to be used for twisting a large number of tie wires and enabling the work to be done with a minimum amount of equipment.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a sectional view through a portion of a wall form or mold showing the manner of applying the device to the ends of the tie wires when tightening and twisting the same.

Figure 2 is an enlarged side elevation of one of the tie wire fastening devices.

Figure 3 is a top plan view thereof.

Figure 4 is a sectional view through one of the devices with the ends of the tie wire threaded through the same; the outer ends of the tie wire being twisted prior to operating the device for the stretching and final twisting of the wire.

Figure 5 is a similar view showing the position of the parts after the device has been operated to stretch the tie wire and impart the final twist thereto.

Figure 6 is a detail view showing the manner of utilizing the device for fastening a pair of aligning bars at their point of intersection.

Figure 7 is a top plan view of a modified form of the device.

Figure 8 is a longitudinal sectional view through the same.

Corresponding and like parts are referred to in the following description and indicated in all of the views of the drawings by like reference characters.

In the erection of concrete walls and other structures the use of sectional metal forms has, in recent years, very largely superseded the use of wooden forms, for the reason that the metal form units are interchangeable so that they can be readily assembled in the different relations necessary to meet the many requirements of building construction, and the metal forms can be used time and time again for an almost unlimited period; for which reason they are more economical in the long run than the wooden forms, which can only be used once. For this reason the invention has been illustrated as used in connection with standard metal forms, although it will be understood that it is not restricted to such use, but can be employed in connection with any kind of concrete forms where wires are used to tie or fasten different parts of the form together. Figure 1 shows a fragmentary portion of a wall form each side of which comprises a series of superposed units A. These units are of rectangular shape and are each formed of a sheet metal plate 1, having an angle iron reinforcement 2 extending around the edges.
thereof. The units A are usually assembled
in superposed horizontal rows and any con-
ventional form of clamp or fastening de-
vice may be provided for securing the abut-
ing edges of the units. This is all of the
well known construction and no claim to
novelty is based thereon.

Suitable spacing elements such as those
indicated at 3 are interposed between the
opposite sides of the wall form to hold the
sides of the form the proper distance apart
to provide for the desired thickness of wall.
The opposite sides of the wall frame are
also connected by tie wires 4 which, as in-
dicated more clearly by Figures 4 and 5, are
threaded through suitable openings 5 in the
form units A, suitable openings being pref-
erably provided in the edges of the units so
that the tie wires will engage the angle iron
reinforcements 6 and be looped around the
outstanding flanges thereof. The ends of the
wire at one side of the form are twisted
together so that the opposite sides of the
wall form are held in a close engagement
with the spacers 3 and prevented from
spreading under the weight and lateral pres-
sure of the concrete.

The device of the present invention pro-
vides an effective means whereby the pro-
jecting ends of these tie wires can be simul-
taneously tightened and twisted with greater
speed and economy than has hitherto been
possible. The tightening and twisting de-
vice comprises a foot 8 which is adapted
to fit against and engage the concrete form,
and which is provided with an opening 7
through which the projecting ends of the
tie wires 4 pass. The base of the foot 6
is slotted or bifurcated at 8 so that it will
receive the reinforcing flanges of an abutting
pair of units A and interlock therewith.
The outer portion of the opening 7 is thread-
ad at 9 for engagement with a twisting head
10. This head is formed with a clearance
space providing a twisting chamber 11, and
also with a transverse wall or diaphragm
12 having spaced openings 13 for the re-
ception of the two ends of the tie wire.

After the device has been initially placed
in position with the extremities of the tie
wire threaded through the openings 13, the
projecting ends of the wire are given an
initial twist, as indicated at 14 on Figure
4. A wrench or like tool is then applied
to the polygonal end 15 of the twisting head
10 and the later forcibly turned in such a
direction as to unscrew the twisting head
from the foot 6. The twisting head
is thereby moved bodily outward in
such a manner as to place the tie
wire under a strong tension and, at the
same time, the portion of the tie wire in
the twisting chamber 11 is given a final
twist at 16 to hold the tie wire in proper
engagement with the parts. The threads
are, of course, of the proper pitch to act
in the desired manner to stretch the wire ef-
fectively.

Under most conditions the projecting ends
of the tie wire, together with the initial
twist 14 thereof, can now be clipped off or
severed and the twisting device removed.

This enables the same twisting device to be
used for fastening a large number of tie
wires and materially reduces the amount
of equipment which is necessary for any
particular job. The twisting head 10 is,
of course, screwed into the foot before it is
applied to the next tie wire to be twisted,
in order that it may be in proper position
to tighten and twist the wire when it is
screwed outwardly.

Another one of the many adaptations of
the invention is shown by Figure 6 in which
the device is illustrated as being utilized
for securing the intersecting portions of a
pair of liners 17 by means of a tie wire.
These liners may be made either of wood
or metal and are at times applied to the
outside of a large panel of the units A for
the purpose of holding the said units in
proper horizontal and vertical alignment
with each other. The intersecting portions
of the aligning bars 17 are shown as fas-
tened by a wire 18 and the ends of the
wire are given the final pull and twist by
the device of the invention. The base of
the foot 6 is preferably serrated or formed
with teeth, as indicated at 19, so that it will
obtain a firm bearing upon a wooden liner
or bar and interlock therewith so that it
will not rotate when the twisting head is
turned.

A modification is illustrated by Figures 7
and 8 in which the foot 6 has the same
construction as that heretofore described,
although the twisting head 10 has the cap
15a swiveled in position. The cap 15a is
polygonal in shape so that it can be readily
engaged by a wrench, and the base thereof
fits in the rabbeted outer end of the opening
through the twisting head. A retaining
ring 20 which is removably held in
position by any suitable fastening means
such as the screw 21 engages a flange 92
on the cap 15a and holds the latter rotatably
in position, thereby enabling the cap to be
rotated independently of the member 10a.
This enables an extra twist to be given to
the wire after an initial turning of the com-
bined members 10a and 15a to stretch and
twist the wires. This extra twist of the
wires give a solid final twist so that all
possible looseness is taken up and the wires
brought into a firm engagement with the
forms. The member 10a has a polygonal
outer end 10b which can be engaged by a
wrench when it is desired to rotate the two
members 10a and 15a to both stretch and
twist the wire. After the initial stretching
and twisting the cap 15° is given an extra turn or two and a solid final twist thereby imparted to the wires. The necessary friction may be provided at the swivel joint to insure the desired action of the members. The extra twist which is possible with this modified form of the invention insures a solid twisting of the wires, after which it is usually possible to sever or cut off the twisted portion 14 of the wires and remove the tool.

While I have illustrated and described in detail only two of the many possible embodiments of the invention and shown certain ways of using the same, it will be obvious that many changes and modifications can be made in the details of construction without departing from the spirit of the invention, and that the device will be found very useful in twisting and fastening the ends of tie wires wherever the same are used in the erection and assembly of molds and forms for concrete work.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

1. A tie fastening device of the character described, including a foot member having an opening therein through which the ends of the tie wire are passed and having the base thereof constructed for a detachable and interlocking engagement with the member against which it is placed, and a twisting head threaded in the opening of the foot member and having a wall which is apertured to receive the ends of the tie wire preparatory to connecting the same with an initial twist, the inner end of the twisting head being received within the opening of the foot member while the outer end thereof has a polygonal portion adapted to be engaged by a separate tool for forcibly rotating the head.

2. A tie wire fastening device of the character described, including a foot member adapted to bear against the form, a stretching and twisting head threaded upon the foot member, and a wire engaging element carried by the stretching and twisting head and rotatable independently thereof to twist the wire without additionally stretching the same.

3. A tie wire fastening device of the character described, including a foot member having an opening therein, a sleeve threaded in the opening, and a wire engaging element carried by the sleeve and rotatable independently of the sleeve, whereby the wire is both stretched and twisted when the twisting head and said element are rotated in unison and is twisted without being additionally stretched when the wire engaging element is rotated independently of the sleeve.

4. A tie wire fastening device of the character described, including a foot member adapted to engage the form, and having an opening therein, a sleeve threaded in the opening, and a wire engaging cap member swiveled upon the sleeve so that it can be rotated independently thereof, the wire being both stretched and twisted when the sleeve and cap member are rotated together and being twisted without being additionally twisted when the cap member is rotated independently of the sleeve.

5. A tie wire fastening device of the character described, including a foot member adapted to engage the form, a wire stretching member threaded upon the foot member, and a wire engaging element swiveled upon the stretching member and having a frictional connection therewith, the wire being both stretched and twisted when the stretching member and wire engaging element are rotated in unison and being twisted without being additionally stretched when the wire engaging element is rotated independently of the stretching member.

In testimony whereof I affix my signature.

OSCAR B. PULIS.