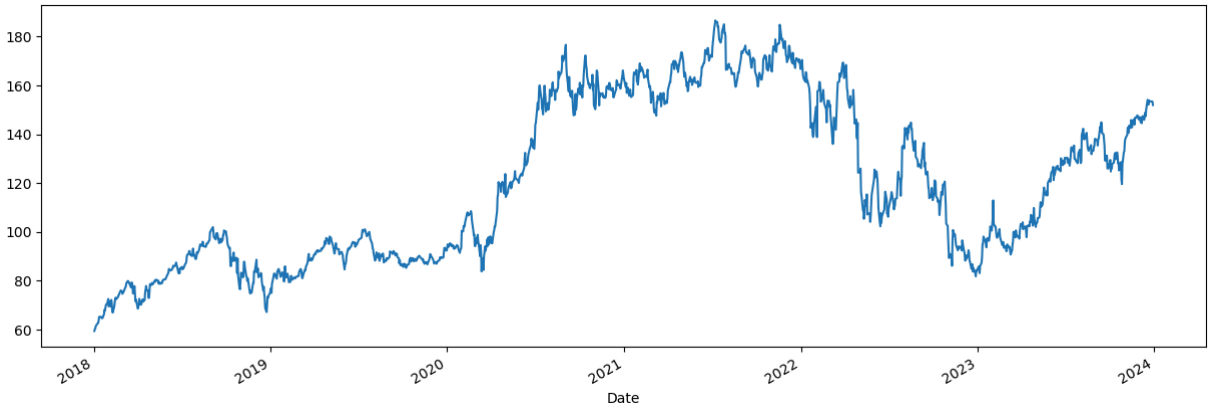
Backtesting Mean Reversion Strategy. Will

In [1]:
```
import yfinance as yf
import pandas as pd
import matplotlib.pyplot as plt
```

In [18]:
```
ticker = "AMZN"
df = yf.download(ticker, start="2018-01-01", end="2024-01-01")
df['Close'].plot(figsize=(15, 5))
```

```
[**********************100%%**********************]  1 of 1 completed
```

Out[18]: <Axes: xlabel='Date'>



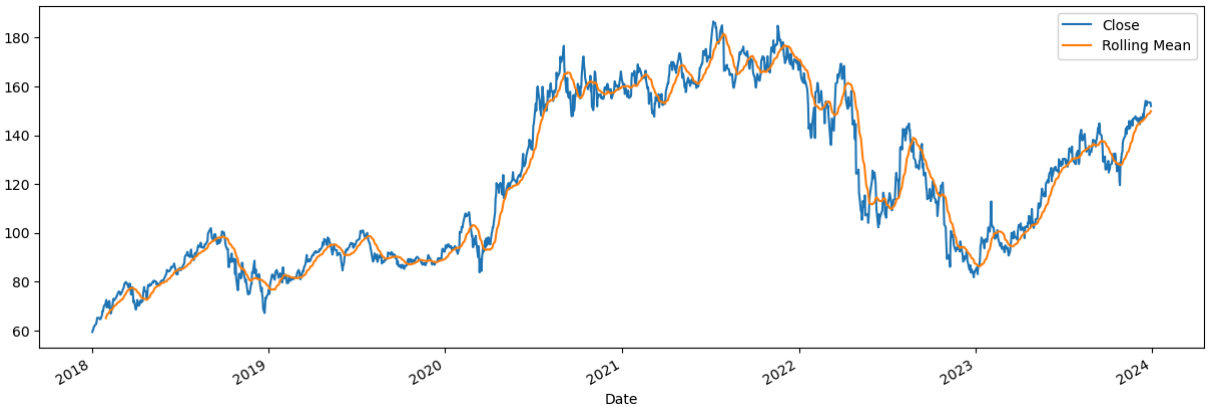
In [19]:
```
df.head(5)
```

Out[19]:

Date	Open	High	Low	Close	Adj Close	Volume
2018-01-02	58.599998	59.500000	58.525501	59.450500	59.450500	53890000
2018-01-03	59.415001	60.274502	59.415001	60.209999	60.209999	62176000
2018-01-04	60.250000	60.793499	60.233002	60.479500	60.479500	60442000
2018-01-05	60.875500	61.457001	60.500000	61.457001	61.457001	70894000
2018-01-08	61.799999	62.653999	61.601501	62.343498	62.343498	85590000

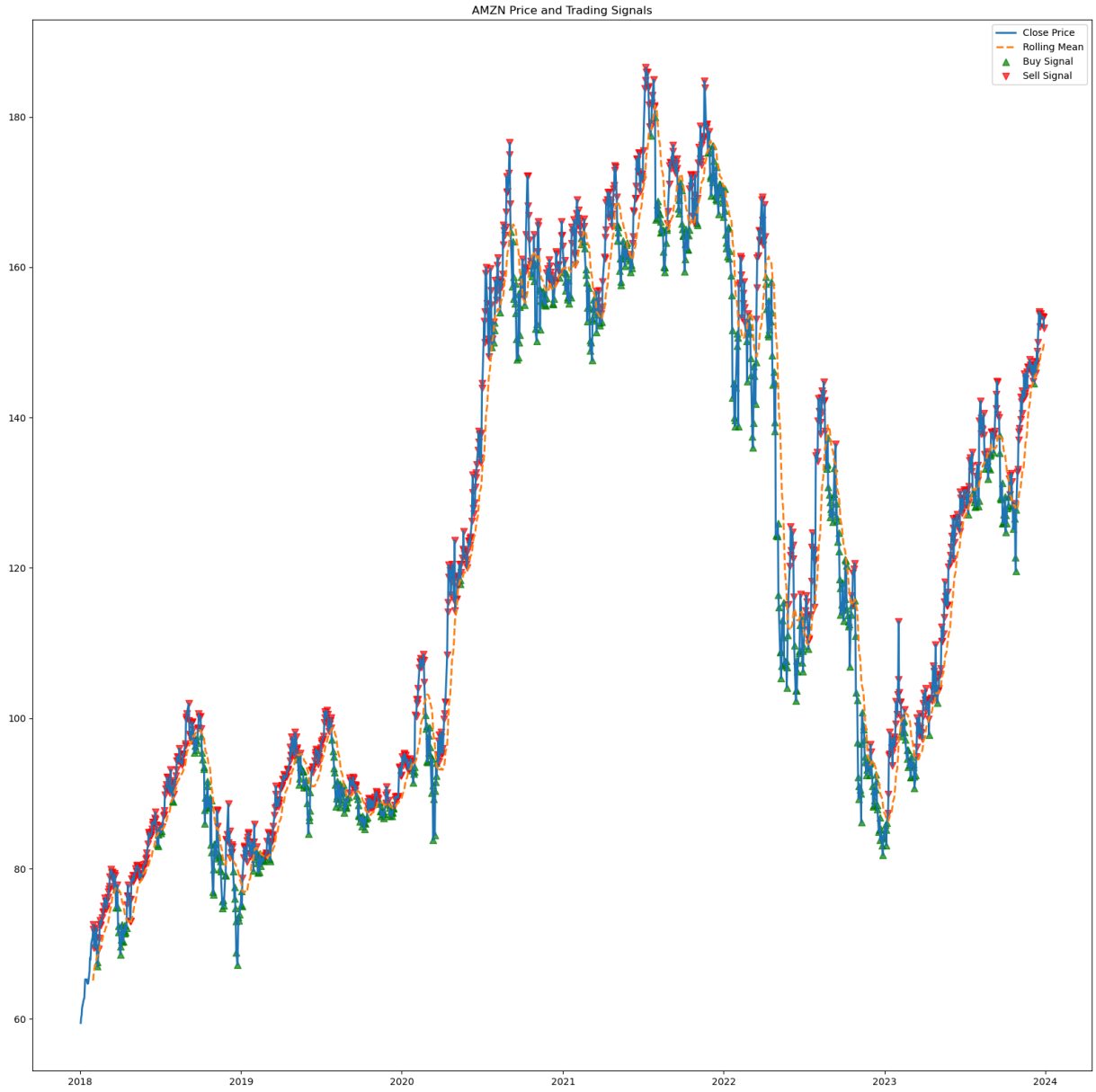
In [20]:
```
window = 20
df['Rolling Mean'] = df['Close'].rolling(window=window).mean()
df['Rolling Std'] = df['Close'].rolling(window=window).std()
df[['Close', 'Rolling Mean']].plot(figsize=(15, 5))
```

Out[20]: <Axes: xlabel='Date'>



In [21]:
```
df['Buy Signal'] = df['Close'] < df['Rolling Mean']
df['Sell Signal'] = df['Close'] > df['Rolling Mean']

plt.figure(figsize=(20, 20))
plt.plot(df['Close'], label='Close Price', linewidth=2)
plt.plot(df['Rolling Mean'], label='Rolling Mean', linestyle='--', linewidth
plt.scatter(df.index[df['Buy Signal']], df['Close'][df['Buy Signal']], label
plt.scatter(df.index[df['Sell Signal']], df['Close'][df['Sell Signal']], lab
plt.title(f'{ticker} Price and Trading Signals')
plt.legend()
plt.show()
```



In [22]:
```
initial_cash = 100000
cash = initial_cash
shares = 0
for date, row in df.iterrows():
    if row['Buy Signal']:
        shares = cash // row['Close']
        cash -= shares * row['Close']
    elif row['Sell Signal'] and shares > 0:
        cash += shares * row['Close']
        shares = 0
# portfolio value
final_value = cash + shares * df['Close'][-1]
print(f'Initial Cash: ${initial_cash}')
print(f'Final Portfolio Value: ${final_value:.2f}')
```

```
Initial Cash: $100000
Final Portfolio Value: $63.00
```

In [23]:
```
returns = df['Close'].pct_change()
strategy_returns = returns[df['Buy Signal'].shift(1) | df['Sell Signal'].shi

# calculate performance metrics
mean_return = strategy_returns.mean()
std_dev = strategy_returns.std()
sharpe_ratio = mean_return / std_dev * (252**0.5)

print(f'Mean Return: {mean_return:.4f}')
print(f'Standard Deviation: {std_dev:.4f}')
print(f'Sharpe Ratio: {sharpe_ratio:.4f}')
```

```
Mean Return: 0.0008
Standard Deviation: 0.0224
Sharpe Ratio: 0.5342
```

In [ ]: